

UNIVERSITY OF DUBLIN, TRINITY COLLEGE

THE BOLOGNA PROCESS: IMPLEMENTING THE  
NATIONAL FRAMEWORK OF QUALIFICATIONS

**WRITING LEARNING OUTCOMES  
AT PROGRAMME AND MODULE LEVELS**

'It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change' (Charles Darwin)

This is a document about learning outcomes, what they are, how they have emerged and about the necessity for putting them in place, throughout Trinity College, at programme, course, module and unit levels. It also makes some suggestions about how they may be written.

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## 1. Background

Increasingly national policies on third-level education within Europe are being driven by the agenda of the Bologna Process and its objective to create a European Higher Education Area (EHEA) by 2010. This process, begun in 1998, and articulated in what is more or less its present form in 1999, has been signed up to by 46 countries so far and is bringing about the most radical reforms that the third-level sector has seen. In Ireland, which signed up to the process in 1999, a number of policy changes resulting from the protocols and action lines established by the Bologna Process have been instituted in the last few years:

- Discussions around the need for a more coherent and effective system of qualifications began in Ireland in the early 1990s. The Qualifications (Education and Training) Act 1999 established the legislative context for the development of the National Framework of Qualifications. The Act also established the National Qualifications Authority of Ireland (NQAI) which was tasked with developing and implementing a national framework of qualifications based on standards of knowledge, skills and competence. Universities, like other academic institutions, have agreed to map their awards on to a ten-point scale established by the NQAI, points 7-10 on the National Framework of Qualifications (NQF) being particularly relevant for universities.<sup>1</sup> The Bologna Process requires that each country develop national qualifications frameworks compatible with the eight-point Bologna meta-framework, which is effectively a translation device for national frameworks. Countries self-certify the compatibility of their national frameworks with the Bologna framework. The compatibility of the NQF with the Bologna framework was formally verified in 2006.<sup>2</sup>
- In 2005-6 generic learning outcomes and level-descriptors were written for Trinity College's degree awards,<sup>3</sup> modified in relation to 'professional doctorates' earlier this academic year.<sup>4</sup> In 2007 learning outcomes and level descriptors were written in relation to the College's 'sub-degree awards', mainly diplomas.<sup>5</sup>
- Out of the Bologna protocol dealing with the 'establishment of a system of credits' has come the widespread use of ECTS. The Higher Education Authority (HEA) intends to use the calculation of student workload as a proxy for calculating the annual grant and Trinity College has established, in all but a very few areas, this credit system for all its courses at levels 7, 8 and 9. Whether ECTS can or should be used at doctoral level is still under discussion.
- Out of the Bologna protocol dealing with the length of degree cycles is emerging in Ireland, as in much of Europe, a reconfiguration of professional courses in Engineering.

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<sup>1</sup> See *National Framework of Qualifications: Initial Major Award Types and Awarding Bodies* (2004), pp. 36-41.

<sup>2</sup> See <http://www.nqai.ie/docs/publications/31.doc>

<sup>3</sup> See John Scattergood's paper *Implementing the Bologna Process: Learning Outcomes and Level Descriptors* (2005) for the Teaching and Learning Committees and subsequently Council. These descriptors were adopted and now appear in the relevant sections of the *University of Dublin Calendar*.

<sup>4</sup> See John Scattergood's paper *Professional Doctorates* (2007) for the Postgraduate Teaching and Learning Committee the substance of which was accepted by Council earlier this year. These descriptions will appear in future calendars.

<sup>5</sup> See the paper by John Scattergood and Alexandra Anderson on *Minor Awards* adopted by Council in 2006 and submitted to the IUA.

The HEA is now asking that third-level institutions, in furtherance of the implementation of the National Framework of Qualifications, should establish a set of written learning outcomes not just at a generic level, but for all programmes, courses, modules and units:

‘The focus on learning outcomes is being undertaken in the context of the National Framework of Qualifications and institutions will need to demonstrate that they

- have written overarching programme descriptors for named awards and aligned them with the award-type descriptors of the Framework – in framework terms, the programmes should lead to major, minor, special purpose or supplemental awards;
- have written module/course/unit descriptors in a manner consistent with the overarching descriptors;
- have allocated ECTS to programmes in a manner that conforms to the agreed principles and operational guidelines for a national approach to credit in higher education established by the national Qualifications Authority of Ireland.’<sup>6</sup>

As indicated above, the College has addressed or is addressing the first and third of these points, and needs to focus on the second. This is logical in terms of the ways third-level policy has been developing, and is, in our view, intrinsically useful in that it adds clarity and transparency to the teaching and learning processes. But the HEA has also made the establishment of learning outcomes at programme, course, module and unit level a condition of funding for the future, so there is an obvious time constraint on the achievement of this in the College.

## 2. *The emergence of Learning Outcomes*

Learning outcomes in themselves are limited, modest and prosaic devices for describing achievement but they have attained importance because they are an essential part, one of the basic building blocks, of a larger movement from the traditional ‘input-based’ description of educational entities (which concentrates on access requirements, course length, aims and objectives, methods of instruction, curricula, methods of examination, etc.) to an ‘output-based’ system which concentrates on what the student has learned at the end of a period of instruction.<sup>7</sup>

The Bologna Process was slow to recognise their importance. They are not mentioned as such in the original six protocols, or in the three added as a result of the Prague Communiqué of 2001. But the subject has been an important one at each of the three subsequent ministerial meetings:<sup>8</sup>

‘Ministers encourage the member states to elaborate a framework of comparable and compatible qualifications for their higher education systems, which should seek to describe qualifications in terms of workload, level, learning outcomes, competences and profile. They also undertake to elaborate an overarching framework of qualifications for the European Higher Education Area’. (Berlin Communiqué, 2003)

‘We adopt the overarching framework for qualifications in the EHEA, comprising three cycles (including, within national contexts, the possibility of intermediate qualifications), generic descriptors for each cycle based on learning outcomes and

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<sup>6</sup> *Proposals for the Incorporation of Performance into Institutional Funding* (HEA, 2008), p. 6.

<sup>7</sup> See Stephen Adam, *A Consideration of the Nature, Role, Application and Implications for European Education of Employing ‘Learning Outcomes’ at the Local, National and International Levels* (2004), p. 5.

<sup>8</sup> On the emergence and current status of learning outcomes in relation to the Bologna Process see Stephen Adam, *Learning Outcomes Current Developments in Europe: Update on the issues and Applications of Learning Outcomes Associated with the Bologna Process* (2008), pp. 1-3.

competences, and credit ranges in the first and second cycles'. (Bergen Communiqué, 2005)

With a view to the development of more student-centred, outcome-based learning, the next (Stocktaking) exercise should also address in an integrated way national qualifications frameworks, learning outcomes and credits, lifelong learning and the recognition of prior learning'. (London Communiqué, 2007)

In 2001 learning outcomes were simply a tool to help define qualifications. By 2007 they have become part of a broader and more complex set of ideas which defines, on the one hand, entities as small as modules or units but, on the other, feeds into arguments which embrace curricular reform and innovation and seek to shape the recognition of prior learning in an overarching agenda predicated on the concept of lifelong learning.

It is essential, therefore, that Trinity College should not only comply with the HEA request for the establishment of written learning outcomes at programme, course, module and unit level, but that it should seriously engage with the learning-outcomes based approach to third-level education because learning outcomes are part of a broader agenda which is radical in its intentions.

### **3. *What Learning Outcomes are and what they are not***

There are many definitions of learning outcomes but that in the ECTS Users' Guide for 2004 is as good as any and has achieved wide currency:

'Learning outcomes are statements of what a learner is expected to know, understand and / or be able to demonstrate after completion of a process of learning'.<sup>9</sup>

They may be large enough to account for a course or small enough to account for a module or unit. They seek to describe the progress of the student's learning in terms of the knowledge which has been acquired, the comprehension of that knowledge, and the capacity, in relation to that body of knowledge, to apply it, to analyse it, to synthesize it, and to evaluate it. Learning outcomes define what is learned in two broad areas:

- Subject-specific outcomes relate narrowly to a defined body of often very precise or technical knowledge. This type of learning outcome may be dominant at module or unit level.
- Generic outcomes describe transferable skills relating to any discipline – problem-solving skills, written or oral communication skills, team-working skills, IT skills and so on. This type of learning outcome will figure more prominently at programme or course level.

But whether specific or generic, what the student has learned has to be at the centre of the definition.<sup>10</sup>

Learning outcomes are not to be confused with the 'aims' and 'objectives' of a course or module – two of the ways in which teaching and learning have been traditionally described. These are usually written from the perspective of the teacher. There are no commonly-accepted definitions of these terms. But 'aims' are usually broad statements of the intention of the teacher in relation to a body of knowledge and indicate the general content and direction of the teaching.

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<sup>9</sup> ECTS Users' Guide (2004), p. 44.

<sup>10</sup> See D. Gosling and Jenny Moon, *How to Use Learning Outcomes and Assessment Criteria* (2001).

'Objectives' are commonly understood to be subsets of 'aims' and deal with more specific bodies of knowledge which the teacher intends to cover and narrower sets of competences which are to be taught.

#### **4. Writing Learning Outcomes: some general remarks**

It is essential to appreciate that learning outcomes are simply part of the way of describing the educational process. According to Stephen Adam, who is summarizing the conventional wisdom:

'Learning outcomes have been described as the basic educational building blocks and as such they have direct and powerful links with a number of other educational tools. They make possible much more than the simple identification of learning achievements. They have a direct relationship to levels and level indicators'.<sup>11</sup>

They also relate to curriculum content and the organization of it, to teaching strategies and methods, to assessment processes, to credit systems. They are not universally admired.

The perceived drawbacks to the use of learning outcomes are both conceptual and pragmatic. At a conceptual level it is said that outcome-based systems inhibit and constrain the learning process and are antithetical to the traditional function of universities with their liberal and enabling approaches to learning. It is said that learning outcomes are more appropriate to vocational education which is based on the acquisition of skills and competences – and it is certainly easier to write learning outcomes for vocational or professional courses. At a practical level it is said that learning outcomes written at a threshold level (as most are) can limit learning, lower standards of teaching and learning and stifle creativity. It is said that learning outcomes frequently over-describe or under-describe courses – that they are sometimes too specific or too general to be of much use. It is said that the move to learning outcomes, especially when it is linked to modular frameworks and the introduction of credits, can lead to an overloading of modules and units. And the experience of universities which have moved in this direction is that the amount of assessment can increase dramatically.

On the other side, it is said that an outcomes-based approach aids curriculum design by clarifying the key purposes of courses, how the components of the syllabus cohere and how learning progression is organized. They highlight the relationship between teaching, learning and assessment. Learners benefit from full and clear statements of exactly what they will be able to achieve and do after a specified period of study. Learning outcomes provide learners with clear information which enables them to make more informed choices at programme, module and unit levels. In terms of quality assurance, learning outcomes increase transparency between qualifications and within them. They can play a key role for establishing points of reference for the establishment and assessment of standards. Internationally, learning outcomes can promote the mobility of both students and those seeking employment by facilitating credit transfer and the recognition of qualifications. They can provide a common format for different forms of learning – distance learning, work-based learning, non-formal learning – and facilitate lifelong learning. They benefit higher-educational institutions, employers and society at large by articulating the specific achievements associated with various qualifications.<sup>12</sup>

The advantages of using learning outcomes seem to me to outweigh the disadvantages, all of which can be overcome if learning outcomes are formulated with care, but it is as well to know what some of the pitfalls are.

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<sup>11</sup> *A Consideration of the Nature, Role, Application and Implications for European Education of Employing 'Learning Outcomes' at the Local, National and International Levels* (2004), p. 5.

<sup>12</sup> See Stephen Adam, *A Consideration of the Nature...* pp. 7-8 for a fuller discussion.

To revert to Stephen Adam's words with which this section began, it is essential, in the first place, when writing learning outcomes to remember that they are part – though an essential part – of the whole educational process, and that they need to be written with the other parts in mind. Programme outcomes, therefore, need to relate to the level descriptors for bachelor's degrees, master's degrees, diplomas and the like. And module or unit outcomes need to relate to programme outcomes. The whole set of outcomes should make up a map of the educational process of both general and specific definition.

Secondly, when writing learning outcomes it is necessary to bear in mind that they should not replicate the curriculum, but offer a conceptualized version of it – though in some circumstances, particularly in professionally accredited courses, it may be necessary to be specific at a detailed level. Nor should they be too elaborate: the conventional wisdom is that outcomes should be specified in terms of between four and twelve items. There are no absolutes in this but a general rule of thumb may be that both teachers and students should be able to remember what they are.

Thirdly, learning outcomes, to fulfil their purposes, have to be clearly defined. A vocabulary, almost a rhetoric, has grown up around them, but it does have a logic. Jenny Moon defines the problem:

'[a] common fault in the writing of learning outcomes is that they refer to learning and not the representation of learning. A poorly written learning outcome might say, for example, "At the end of the module, the learner will be expected to know the health and safety practices of laboratory work (Level 1 Chemistry)". We can only tell if the student knows these practices if she is caused to demonstrate her knowledge. She might be asked to write a report, to answer questions, to explain the practices orally and so on'.<sup>13</sup>

J. McLean and P. Looker have a similar point: 'care should be taken in using words such as 'understand' and 'know' if you cannot be sure that students will understand what it means to know or understand in a given context'.<sup>14</sup> S. Osters and F. Tiu recommend: 'Concrete verbs such as 'define', 'apply' or 'analyse' are more helpful for assessment than verbs such as 'be exposed to', 'understand', 'know', 'be familiar with'.<sup>15</sup> In some documents long lists of words have been produced and recommended for use in various contexts in relation to learning outcomes. They are useful to some degree. But they provide no rhetorical panacea. One simply has to ask oneself what a student is expected to achieve in a particular programme, module or unit and use the appropriate verb: if the exercise is definition one should use 'define'; if it is analysis one should use 'analyse'; if it is evaluation one should use 'evaluate' and so on.

## 5. *Writing Learning Outcomes: the programme level*

One needs at the outset to bear in mind the principle enunciated by Jenny Moon on this issue:

'It is important to note that there are clear differences in the nature of programme outcomes and learning outcomes written for modules. Programme outcomes are written for a typical or average student and they may be aspirational. They are not, therefore, directly testable. For example, programme outcomes may evidence areas of learning that are the outcomes of the student's experience of

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<sup>13</sup> See *The Module and Programme Development Handbook* (2002), p. 66

<sup>14</sup> See <http://www.ltu.unsw.edu.au/content/course-prog-support/outcomes.cfm?ss=0>. This is from the University of New South Wales Learning and Teaching Unit.

<sup>15</sup> See <http://www.tamu.edu/gep/documents/Writing-Measurable-Learning-Outcomes.pdf>

engagement in the programme, on the basis that the whole may be greater than the sum of the parts'.<sup>16</sup>

Learning outcomes written at a programme/course level ought not to be a simple digest of module learning outcomes, but should be a generalized version of them with which they are compatible. Programme level outcomes should also map onto the level descriptors for the appropriate award.

Programme level outcomes may be written with some reference to the criteria given for level awards: programmes and courses lead to awards at an appropriate level. What follows is a digest of contemporary thinking at this level which may be useful.

The JQI (Joint Quality Initiative) uses the following categories:

- (i) Knowledge and understanding
- (ii) Applying knowledge and understanding
- (iii) Making judgements
- (iv) Communication
- (v) Learning skills

The more recent EU Commission document on lifelong learning uses a tripartite structure of

- (i) knowledge
- (ii) skills
- (iii) wider competences described as personal and professional outcomes

They say: 'These three types of outcomes can be described at each level of the framework in a way that facilitates amplification and exemplification by national and sectoral bodies'.<sup>17</sup>

The NQAI, which is the national body in Ireland, more elaborately, uses the following categories, and offers the following definitions:<sup>18</sup>

- (i) Knowledge
  - (a) Breadth
  - (b) Kind

'Declarative knowledge is the cognitive representation of ideas, events or happenings. It can be derived empirically from practical and professional experience as well as from formal instruction or study. Such knowledge has meaning outside any specific context of application or practice ... Learning outcomes associated with knowledge have objects; that is, they refer to knowledge of, or about, something. The more diverse, complex and varied the knowledge objects, the greater the breadth of knowledge ... The more knowledge objects are layered on top of each other, and draw successively upon each other to construct meaning, the higher the level of learning. Typically the process is associated with progressively greater abstraction from concrete phenomena into theory'.

- (ii) Know-How and Skill

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<sup>16</sup> See *The Module and Programme Development Handbook*, p. 142.

<sup>17</sup> See *Towards a European Qualifications Framework for Lifelong Learning*, p. 17.

<sup>18</sup> See *National Framework of Qualifications*, Appendix 1.

- (a) Range
- (b) Selectivity

‘Know-how ...is the procedural knowledge required to carry out a task... The exercise of a skill is the performance of a task that in some way responds to or manipulates the physical, informational or social environment of the person. Knowledge underpins skill but is not identical with skill... Know-how may be measured directly or implied from performance. Skill can only be measured by performance...Skills, both in their execution and in the demonstration of the underpinning procedural knowledge, encompass the use of many different kinds of tool. Tools include cognitive and social devices or processes as well as physical artefacts or objects. ... the range of know-how and skill refers to what a learner can do, selectivity (which might be called procedural responsiveness) refers to the judgment that the learner exercises in carrying out procedures, through selecting from the range of know-how and skills available ...’

- (iii) Competence
  - (a) context
  - (b) role
  - (c) learning to learn
  - (d) insight

‘Highly defined and structured situations or contexts constrain the behaviour of the individual and require lower levels of learning. The range of responses required and hence the extent to which a broader range or higher level of knowledge, know-how and skill have to be drawn upon also depends on how predictable the context is. Acting effectively and autonomously in complex, ill-defined and unpredictable situations or contexts requires higher levels of learning... Higher levels of competence are associated with playing multiple roles as well as roles requiring leadership, initiative and autonomy. Higher competence is also concerned with participation in more complex and internally diverse groups... Learning to learn is the ability to observe and participate in new experiences and to extract and retain meaning from these experiences ... Learning to learn refers to the extent to which a learner can use new learning opportunities to reframe and contextualise prior learning...insight refers to the ability to engage in increasingly complex understanding and consciousness, both externally and internally, though the process of reflection on experience. Insight involves the integration of other strands of knowledge, skill and competence with the learner’s attitudes, motivations, values, beliefs, cognitive style and personality’.

Most programme outcomes are written with these sorts of ideas in mind, though not to any specific template. A few examples may be useful.

## **6. *Examples of Learning Outcomes at programme level***

*BAI in Electronic Engineering (TCD four-year honors Bachelor course):*

On successful completion of this programme a student should be able to demonstrate:

- the ability to derive and apply solutions in Electronic Engineering from a knowledge of sciences, engineering sciences, technology and mathematics
- the ability to identify, formulate, analyse and solve engineering problems
- the ability to design a system, component or process to meet specified needs, to design and conduct experiments and to analyse and interpret data

- an understanding of the need for high ethical standards in the practice of engineering, including the responsibilities of the engineering profession towards people and the environment
- the ability to work effectively as an individual, in teams and in multidisciplinary settings together with the capacity to undertake lifelong learning
- the ability to communicate with the engineering community and with society at large<sup>19</sup>

Here six broad, strong outcomes are specified covering the range of the essential knowledge, the nature of it, the skills necessary in its effective deployment, the attitude and personal commitment which must be achieved towards the profession and the scope of the social responsibility and awareness required of its practitioners. And all this is underpinned by more specific learning outcomes of the individual modular components of this programme. A particular feature of these programme outcomes is that they are shared and accepted across the engineering faculties in other universities and are sanctioned by the validating professional body, Engineers Ireland.<sup>20</sup> These are a professionally sanctioned set of learning outcomes, written necessarily at a relatively high level of generality in order to accommodate individual emphases within agreed broad parameters.

Rather different is this:

*Bachelor in Dental Technology (TCD three-year Ordinary Bachelor Degree course)*

On completion of the course the student should be able to demonstrate the ability

- to be part of the dental team with which the clinician may inter-relate in the planning, designing and fabricating of intra-oral appliances;
- to be familiar with the anatomy, physiology and pathology of the oral cavity and its biological response to appliances, materials and trauma;
- to be familiar with some of the basic concepts of physics, chemistry and mechanics and to have an understanding and knowledge of the materials used in dental technology and their physical, chemical and mechanical properties in order that they may be used safely and for the benefit of the public;
- to be aware of the nature of infection and its prevention, and the prevention of cross-infection;
- to be aware of the nature and treatment of medical emergencies, and the general hazards and risks of dental surgery;
- to be aware of the legislation relating to dental practice in Ireland;
- to be aware of the problems relating to drug abuse, Hepatitis B and similar conditions;
- to be proficient in the use of PCs, the internet and computer-based technology.

This is a course for special purposes. It is available to those who satisfy the academic entrance requirements but also to those who can demonstrate, as part of prior learning, relevant experience in dental technology. Graduates would typically work as part of a larger entity, part of a team in which they would probably not be the principal decision-makers. It has a closely defined utilitarian focus and this is reflected in the specificity of the learning outcomes as to the range of knowledge required, and in the depth – it is a course designed to enhance awareness, not to provide stand-alone expertise. The precise skill it does presuppose is the planning of intra-oral devices, designing them and making them.

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<sup>19</sup> See *Accreditation Submission to Engineers Ireland: BAI Electrical Engineering* (2006), Vol. I, pp. 14, 19, 23, 28, 34, 38.

<sup>20</sup> For another version of these see Declan Kennedy, *Writing and Using Learning Outcomes: A practical Guide* (University College Cork, 2007), p. 52.

Different again is this:

*Diploma in European Painting (TCD)*

On successful completion of the course a student should be able to demonstrate

- a general knowledge of the history of painting in western Europe from the Middle Ages to the present day, a broad familiarity with the chronology of the main periods of art and the canonical artists referred to in the course;
- the ability to identify canonical works by authorship / attribution and relate them to some stylistic features; a broad understanding of, and the ability to identify and name, the principal materials and techniques of art and an understanding of the appropriate terminology used;
- the ability to articulate an informed and independent critical response in front of a work of art;
- the ability, using the necessary library and IT skills, to research a topic and to communicate the results of that research in essays, formal presentations and discussions;
- some familiarity with the writings of some of the major historians of art and the ideas of some of the major theorists of art;
- a general familiarity, through direct exposure, with the holdings of local institutions.

This course replicates to a large extent part of the JF honours TSM course provided by History of Art and Architecture, and is usually taken over one year. It is very much an introductory course to the study of European painting. Students who complete it successfully will have acquired a broad familiarity in terms of a set of basic knowledge – of periods, styles, individual artists, materials and the terminology of the subject. They will know something about theories of art and about the scholarship of art history. They will be able, in terms of acquired skills, to talk about the subject and write about it in a formal way. Socially, they will have an enhanced sense of the art around them. And the outcomes are described so that students will know that they will acquire a way into the subject. They may choose to go on to degree work or simply enjoy the course for the pleasure of personal development.

These three courses are all described in terms of knowledge, skills and competences and they all promulgate a limited range of carefully chosen outcomes, but because they are designed to do different things and to provide radically different outcomes they have to be described in different ways. There is no template way of writing learning outcomes – no right ways (or wrong ways), only appropriate (or inappropriate) ways. The best descriptors are those which are most honest, precise and informative.

## **7. *Writing Learning Outcomes: the module level***

Learning outcomes at a module level are usually written so as to address the three strands – knowledge, skills and competences – but they are different in several essential ways from learning outcomes written for programmes or courses. The relationship will differ depending on the articulation of the programme: for example, placements in the context of work will usually come towards the end of a course of learning in medical subjects and the learning outcomes will have to take account of a range of practical issues which may not have been part of the outcomes for the earlier, more theoretical, parts of the course. But, more generally, some of the characteristic differences between module outcomes and the outcomes for larger entities are the following:

- module learning outcomes should be written in the consciousness that they need to map onto the learning outcomes of the larger entities; they are parts of a whole.
- they will tend to be more limited in focus and to be defined more specifically because the area of knowledge covered will be smaller and the concomitant skills necessary to negotiate this area of knowledge will be fewer.
- the number of learning outcomes specified will tend to be fewer or more depending on the ECTS weighting of the module. Outcomes at this level are not aspirational. They need to be realistic in terms of what a student can be expected to do in the time available.
- the learning outcomes at module level need to be directly testable, by whatever means – multiple choice questionnaire, oral presentation, practical, work-book, log-book, written essay or project, dissertation, formal examination and so on.
- learning outcomes for modules are best written at the threshold level, that is, at the pass level so that students know what is required for their progression. For discrimination above that level it may be necessary to devise grade descriptors.
- learning outcomes for modules have to be written with the awareness of progression. Different levels of learning will be achievable in different modules: the demands for a JF module and those for a SF module will be likely to be different.

## 8. *Taxonomies of learning*

The writing of module descriptors was immensely facilitated by Benjamin Bloom and his co-workers on the processes of learning and on the progression and levels of learning more than half a century ago. Bloom's Taxonomy is frequently invoked in writing learning outcomes because it gives a structure to the learning process and lists appropriate verbs with which it may be described.<sup>21</sup> It is not the only structure possible, nor the only list of verbs, but it can be useful.

Bloom identified three domains of learning: the 'cognitive domain',<sup>22</sup> the 'affective domain',<sup>23</sup> and what he called the 'psychomotor domain'. Learning in the cognitive domain is the most generally relevant.

In this domain he identified six stages of learning in ascending order of sophistication.

- (i) *Knowledge*: this is defined as the ability to identify, recall or remember discrete facts or groups of facts without necessarily any deep understanding of their relationships – such as a list of historical dates, chemical formulae, the names of the bones of the hand and so on.

Among verbs which are appropriate for describing learning at this level are: define, enumerate, identify, label, list, memorise, quote, recall, recollect, record, reproduce, show, state, tabulate.

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<sup>21</sup> See Declan Kennedy, *Writing and Using Learning Outcomes...* pp. 24-38 for a summary of Bloom's ideas and some good examples. See also John O'Brien, *Writing Learning Outcomes: A Guide for Academics* (University of Limerick, 2007), pp. 18-23.

<sup>22</sup> See B. S. Bloom, M.D. Engelhart, E.J. Furst, W. Hill, and D. Krathwohl, *Taxonomy of Educational Objectives. Volume I: The Cognitive Domain* (New York, 1956).

<sup>23</sup> See B.S. Bloom, B.B. Masia and D.R. Krathwohl, *Taxonomy of Educational Objectives. Volume II: The Affective Domain* (New York, 1964).

- (ii) *Comprehension*: this is defined as the ability to understand and interpret information, the ability to see relationships between sets of data. At this level a student may be asked, for example, to reflect on the relationship of changes in *per capita* wealth and the incidence of foreign travel.

Among verbs which are appropriate for describing learning at this level are: clarify, classify, contrast, convert, differentiate, discriminate, distinguish, estimate, illustrate, interpret, paraphrase, report, restate, review, translate.

- (iii) *Application*: this is defined as the ability to apply knowledge, ideas and concepts in variable situations, the ability to use knowledge, ideas and concepts to suggest solutions to problems – how, for example, knowledge of infection control might improve patient care facilities in hospitals.

Among verbs which are appropriate for describing learning at this level are: apply, assess, choose, complete, construct, develop, employ, find, modify, operate, organize, practise, produce, select, show, solve, transfer, use.

- (iv) *Analysis*: this is defined as the ability to break down information into its components and to see the inter-relationships between ideas and concept in various areas. A student, for example, might be asked to analyse the social consequences of the Black Death in late fourteenth-century England.

Among verbs which are appropriate for describing learning at this level are: analyse, appraise, calculate, categorise, classify, compare, contrast, deduce, determine, examine, infer, investigate, relate, separate, test.

- (v) *Synthesis*: this is defined as the ability to put together discrete ideas, concepts and information so as to address broad problems. The student, for example, who had earlier been asked to investigate infection control in relation to patient care might at this level be asked to formulate a total patient care programme.

Among verbs which are appropriate for describing learning at this level are: arrange, assemble, collect, combine, compose, construct, create, design, develop, establish, formulate, generalize, integrate, organize, plan, prepare, reorganize, set up.

- (vi) *Evaluation*: this is defined as the ability to judge the value of ideas, concepts and information in relation to given subjects, or the ability to assess the suitability of discrete practices in given areas. Questions at this level tend to be broad and not always amenable to definitive solutions. A student, for example, might be asked to assess the social effects of a move towards the use of bio-fuels, or estimate whether free fees have broadened the social basis of third-level education in Ireland.

Among verbs which are appropriate for describing learning at this level are: argue, assess, convince, criticize, decide, defend, explain, evaluate, judge, justify, measure, resolve, support, validate, value.

This taxonomy clearly fits some subjects better than others and there have been those who have criticized it for suppressing creativity. There is some validity in this. Such a taxonomy would be of only limited use in defining learning outcomes for a course in Creative Writing, for example. So it should be used as a guide only, not as a panacea, not as an inflexible template.

Bloom's *affective domain* has to do with the formation of attitudes and values, which is traditionally understood to be part, though a part which is difficult to test, of an educational

programme. It may range from a willingness to participate in the process of learning, to growth of a commitment to it, to growth of a sense of its value, to growth in the sense of responsibility it brings – to be sensitive to gender differences, for example, social differences, cultural differences. It involves the acceptance of professional and ethical standards, a realization that knowledge needs to be communicated and much else. The medical student who is said to have a good or poor ‘bedside manner’ is being assessed in this domain.

Among verbs which are appropriate for describing learning in this area are: act, appreciate, accept, assist, challenge, combine, complete, co-operate, demonstrate, display, initiate, integrate, join, order, participate, practise, share, relate, resolve, support, value

The *psychomotor domain*, which Bloom and his colleagues did not research very thoroughly but which has been treated by others,<sup>24</sup> refers to learning which develops the co-ordination of the brain with muscular activity. Learning is translated into skilled and appropriate physical action. It is especially relevant in laboratory-based subjects, health science, art, music, drama and physical education. Students may be assessed on their capacity to design, make and use a piece of equipment, or dental students on their ability in scaling and polishing, or actors on their voice production and movement.

Among verbs which are appropriate for describing this sort learning are: adapt, adjust, administer, arrange, assemble, build, construct, design, deliver, demonstrate, dismantle, display, dissect, execute, fix, grasp, handle, manipulate, operate, perform, refine, use.

Learning outcomes for modules and units will vary considerably one from another and from subject to subject, and it is not possible, within a small compass, to address all the possible types. So I will restrict myself to two examples from different ends of the educational spectrum.

## **9. Examples of learning outcomes at the module level**

### *BAI Electronic Engineering: MA1E1 Engineering Mathematics I*

On successful completion of this course

1. the student will be able to recognise mathematical structures in practical problems, translate problems into mathematical language, and analyse problems using methods from one-dimensional calculus
2. the student will be able to solve problems involving concepts of calculus
3. the student will be able to apply differentiation to find minima and maxima of a wide range of functions of one real variable
4. the student will be able to apply integration techniques to a wide range of functions
5. the student will be able to calculate areas between graphs and volumes of solids of revolution using integrals<sup>25</sup>

This is a whole year course taken by all JF Engineering students. It provides the basic foundations for later courses in Engineering Mathematics at SF and JS levels. The learning outcomes are very precise about the areas of knowledge covered and in the application of that knowledge: the verbs are chosen with care and discrimination. The course has no ambitions

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<sup>24</sup> See R.H. Dave, *Developing and Writing Behavioural Objectives* (Tuscon, Arizona, 1970) for some of the ideas in this section.

<sup>25</sup> See *Accreditation Submission to Engineers Ireland: BAI Electrical Engineering*, Vol. I, p. 67.

beyond what is stated: the teacher knows and the students know that there is more to come later in this area. It is appropriately assessed by tutorial assignments, providing an opportunity for feedback, and examinations. The learning outcomes defined here also map precisely onto the first programme outcome for the BAI (see above): ‘The ability to derive and apply solutions in Electrical Engineering from a knowledge of sciences, engineering sciences, technology and mathematics’. It is said that there are no perfect ways to write learning outcomes, but this, in my view, comes pretty close.

The other is a postgraduate module.

*Trinity College Dublin, Faculty of Arts and Humanities, School of English: M.Phil. in Literatures of the Americas*

*EN7024 The Western*

By the end of the module successful students will:

- Be familiar with the literary origins and development of The Western
- Have a good close textual knowledge of works that represent the American west from different perspectives
- Have a clear sense of the relation between The Western and the historical and social development of the West
- Be conversant with theoretical issues of regional and national identity formation pertinent to discussion of the American West
- Be familiar with debates concerning race, gender, and ethnicity in the western
- Be prepared to engage in advanced study of a particular topic related to the Western.

This is a relatively heavy optional course of 15 ECTS taught at a sophisticated level to students already highly qualified. It is, as befits a postgraduate course, capacious and enabling in its specifications. It addresses one of the most basic and enduring genres of the literature of the Americas and so maps precisely onto the course as a whole, but its outcomes are designedly a mixture of the specific and the more general. It does not use the verbs recommended by Bloom and his followers and uses phrases such as ‘be familiar with’ which are outlawed by some theorists on the subject. But it does define a clear sense of the essentials of the subject and distinguishes them from the more general intellectual context in which they are to be studied. The course is tested by means of an essay of 6,000 to 8,000 words ‘exploring some aspect of the course in detail’. The learning outcomes, in a non-coercive way, suggest what the focus of the essay should be – the literary texts – but leave the approach open. This is again a fine, though unconventional, set of learning outcomes.

## ***10. Conclusions and some implications***

The object of this paper is to stress to the College the necessity for providing written learning outcomes at programme/course, and module level for all Bachelors and Masters Degrees, and for Diplomas at both an undergraduate and postgraduate level. It seeks to set out, as briefly as possible, the educational theories underlying the use of learning outcomes, some of the issues which have emerged in relation to their use, and some of the ways they can be written in conformity with good practice. The paper has provided examples – which are not necessarily to be imitated as templates – which illustrate the ways in which the problems of writing learning outcomes have been addressed in different areas. Writing learning outcomes has got to become one of the competences of the university teacher and we have to find a way, individually and collectively, of making this part of the basic pedagogic framework that we have.

So the issue is ostensibly simple and contingent – we have to produce learning outcomes. But there are implications, which do not have to be addressed specifically at this time but which are part of the agenda for change which is being ushered in by the Bologna process. Stephen Adam again:

‘...learning outcomes cannot be divorced from teaching, learning and assessment. This is the most significant set of relationships for curriculum designers. Once the learning outcomes have been decided it is obviously good practice to decide suitable methods of assessing them and the production of relevant assessment criteria. The final stage of the process is to design the appropriate delivery mechanism – the teaching and learning methods to be used. This sequence for module / course development is not necessarily as rigid as described. The important point is that outcomes-learning-delivery-assessment enjoy a causal link and clear reflection on their relationship improves the coherence of course design’.<sup>26</sup>

This is eminently sensible – though it has to include a consideration of ECTS credit weighting as well. Learning outcomes, to deliver their full potential, have to form the basis of, and cohere with, a whole complex teaching and assessment strategy. Some considerations to bear in mind are the following:

- Learning outcomes have to be written with the ECTS weighting of the programme or module in mind. They have to be attainable in the time available for the delivery of the learning process. One cannot expect a 5 ECTS module to have as sophisticated learning outcomes as a 10 ECTS module.
- The delivery of the teaching has to be appropriate to the learning outcomes defined. If ‘team-work’ is an essential outcome it is probably not a good idea to use a lecture-only teaching delivery.
- The assessment of a module should take notice of the mode of delivery and the learning outcomes. Obviously a multiple-choice questionnaire can legitimately be used in the assessment of relatively simple knowledge-based courses, but not generally elsewhere. Equally, obviously complex questions towards the evaluation end of the cognitive process may best be assessed through long essays or dissertations. One has to discriminate and be imaginative in terms of assessment.
- And, since learning outcomes tend to be written at threshold levels, it might be as well to start thinking about grade descriptors, so that differentiation within the passing category can be articulated with reference transparent criteria.

Learning outcomes are restricted descriptive mechanisms with large implications as agents of change, towards a learner-centred reconfiguration of European third-level education. They have to be written, but they ought to be written with some of these implications in mind. If they are they can invigorate and focus the learning process as well as making it more transparent.

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June 2008

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<sup>26</sup> See *A Consideration of the Nature...* p. 6.