Designing Curricula Based on Learning Outcomes

5 March 2009
University of Warsaw

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Department of Education,
University College Cork, Ireland
1. What are Learning Outcomes?
2. How do I write Learning Outcomes?
3. How do I design curricula based on Learning Outcomes?
4. How do I link Learning Outcomes, Teaching and Learning Activities and Assessment?
What are learning outcomes?

Learning outcomes are statements of what is expected that a student will be able to DO as a result of a learning activity. (Jenkins and Unwin).

Learning outcomes are explicit statements of what we want our students to know, understand or to be able to do as a result of completing our courses. (Univ. New South Wales, Australia)

“Learning outcomes are statements that specify what learners will know or be able to do as a result of a learning activity. Outcomes are usually expressed as knowledge, skills or attitudes”. (American Association of Law Libraries).

Learning outcomes are an explicit description of what a learner should know, understand and be able to do as a result of learning. (Learning and Teaching Institute, Sheffield Hallam University)
Working Definition

Learning outcomes are statements of what a student should know, understand and/or be able to demonstrate after completion of a process of learning.

- The learning activity could be, for example, a lecture, a module or an entire programme.
- Learning outcomes must not simply be a “wish list” of what a student is capable of doing on completion of the learning activity.
- Learning outcomes must be simply and clearly described.
- Learning outcomes must be capable of being validly assessed.
Aims and Objectives

- The **Aim** of a module or programme is a broad general statement of teaching intention, i.e. it indicates what the teacher intends to cover.
- Example of aim: To give students an introduction to organic chemistry

- The **objective** of a module or programme is a specific statement of teaching intention, i.e. it indicates one of the specific areas that the teacher intends to cover.
- Examples of objectives:
  1. Give students an appreciation of the unique nature of carbon and its ability to bond to other carbon atoms.
  2. To give students an understanding of the concept of hybridisation.
  3. To ensure that students know some characteristic properties of alkanes and alcohols.
  4. To make students familiar with a range of families of organic compounds: alkanes, alcohols, carboxylic acids and esters.
From the definition of Learning Outcome we see:

- Emphasis on the learner.
- Emphasis on the learner’s ability to do something.

Focus on teaching – aims and objectives and use of terms like *know, understand, be familiar with.*

- Aims: Give broad purpose or general intention of the module.
- Objectives: Information about what the teaching of the module hopes to achieve.
- Learning outcomes are not designed to replace the traditional way of describing teaching and learning but to supplement it.

Outcomes: Focus on what we want the student to be able to do - use of terms like define, list, name, recall, analyse, calculate, design, etc.
Focus on Learning Outcomes – Bologna

- Bologna Agreement signed in Bologna, Italy in 1999 by 29 countries. A total of 46 countries have now signed up to this agreement.

- The overall aim of the Bologna Agreement is to improve the efficiency and effectiveness of higher education in Europe in terms of academic standards of degrees and quality assurance standards.

- One of the main features of this process is the need to improve the traditional ways of describing qualifications and qualification structures.

Bologna, Italy (1999)
What countries have signed the Bologna Agreement?

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<thead>
<tr>
<th>European Union</th>
<th>Non-European Union</th>
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<tr>
<td>Austria</td>
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<td>Belgium</td>
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<td>United Kingdom</td>
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What is the Bologna Process all about?

- Setting up of European Higher Education Area (EHEA) to ensure the increased international competitiveness of the European system of higher education.
- The Bologna Process is not based on a European Union initiative. The agreement is between both EU and non-EU countries.
- Setting up of system to make it easier to understand the description of qualifications and qualification structures.
- Every student graduating will receive a *Diploma Supplement* describing the qualification that the student has received. The purpose of the Diploma Supplement is to improve transparency and facilitate recognition. A standard format will be used to help compare qualifications and make them easier to understand. The Diploma Supplement will also describe the content of the qualification and the structure of the higher education system in which it was issued.
Framework of Qualifications for European Higher Education Area (EHEA)

- Conference of European Ministers Responsible for Higher Education in Bergen, Norway (2005) adopted the overarching framework for qualifications in EHEA.

- This framework shows
  - **Three cycles** (including within national contexts, the possibility of intermediate qualifications)
  - **Generic descriptors** for each cycle based on learning outcomes and competences.
  - **ECTS credit ranges** in the first and second cycles (i.e. Bachelors and Masters levels).

- Ministers committed themselves to drawing up National Frameworks for Qualifications compatible with Framework of Qualifications for European Higher Education area by 2010.
First Cycle : Bachelor’s Cycle

[180 – 240 ECTS credits]

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>ECTS Credits</th>
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<tr>
<td>First cycle qualification qualification</td>
<td>Typically include 180-240 ECTS credits</td>
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<tr>
<td>Qualifications that signify completion of the first cycle are awarded to students who:</td>
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<td>• have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study;</td>
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<td>• can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study;</td>
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<td>• have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues;</td>
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<td>• can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences;</td>
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<td>• have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy.</td>
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Second Cycle: Master’s cycle
[60 – 120 ECTS credits]

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<tr>
<th>Second cycle qualification</th>
<th>Qualifications that signify completion of the second cycle are awarded to students who:</th>
<th>Typically include 90-120 ECTS credits, with a minimum of 60 credits at the level of the 2nd cycle</th>
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<td>• have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with the first cycle, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context;</td>
<td>1 year or 2 years</td>
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<td>• can apply their knowledge and understanding, and problem solving abilities in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study;</td>
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<td>• have the ability to integrate knowledge and handle complexity, and formulate judgments with incomplete or limited information, but that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments;</td>
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<td>• can communicate their conclusions, and the knowledge and rationale underpinning these, to specialist and non-specialist audiences clearly and unambiguously;</td>
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<td></td>
<td>• have the learning skills to allow them to continue to study in a manner that may be largely self-directed or autonomous.</td>
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### Third Cycle: Doctoral cycle

[Number of ECTS credits not specified]

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<tr>
<th>Third cycle qualification</th>
<th>Qualifications that signify completion of the third cycle are awarded to students who:</th>
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<tr>
<td></td>
<td>• have demonstrated a systematic understanding of a field of study and mastery of the skills and methods of research associated with that field;</td>
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<td>• have demonstrated the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity;</td>
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<td>• have made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, some of which merits national or international refereed publication;</td>
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<td>• are capable of critical analysis, evaluation and synthesis of new and complex ideas;</td>
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<td>• can communicate with their peers, the larger scholarly community and with society in general about their areas of expertise;</td>
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<td></td>
<td>• can be expected to be able to promote, within academic and professional contexts, technological, social or cultural advancement in a knowledge based society.</td>
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See two page summary of framework of qualifications on:
Learning Outcome in Bologna Process

- ‘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 Communique 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 competences, and credit ranges in the first and second cycles.’

  Bergen Communique 2005
‘We underline the importance of curricula reform leading to qualifications better suited both to the needs of the labour market and to further study. Efforts should concentrate in future on removing barriers to access and progression between cycles and on proper implementation of ECTS based on learning outcomes and student workload.’

‘Qualifications frameworks are important instruments in achieving comparability and transparency within the EHEA and facilitating the movement of learners within, as well as between, higher education systems. They should also help HEIs to develop modules and study programmes based on learning outcomes and credits, and improve the recognition of qualifications as well as all forms of prior learning.’

‘We urge institutions to further develop partnerships and cooperation with employers in the ongoing process of curriculum innovation based on learning outcomes.’

‘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
Bologna Process:

- As a step towards achieving greater clarity in the description of qualifications, by 2010 all modules and programmes in third level institutions throughout the European Union must be written in terms of learning outcomes.

- “Learning outcomes represent one of the essential building blocks for transparency within higher education systems and qualifications”
  - Bologna Working Group, p.18 (December 2004)

- Major contribution of exemplar material from staff taking “Postgraduate Certificate / Diploma in Teaching and Learning at Higher Education”.

- Staff training in UCC – lunchtime session and setting up of “Postgraduate Certificate / Diploma in Teaching and Learning at Higher Education”.

- To date, translated into Spanish, German, Albanian, Serbian, Lithuanian and Hungarian.
Implementing Bologna in your institution

Using learning outcomes and competences

Planning and implementing key Bologna features

Writing and Using Learning Outcomes: a Practical Guide

Declan Kennedy, Áine Hyland, Norma Ryan

Abstract

Given that one of the main features of the Bologna process is the need to improve the traditional ways of describing qualifications and qualification structures, all modules and programmes in third level institutions throughout the European Higher Education Area should be (re)written in terms of learning outcomes. Learning outcomes are used to express what learners are expected to achieve and how they are expected to demonstrate that achievement. This article presents a summary of developments in curriculum design in higher education in recent decades and, drawing on recent practical experience, suggests a user-friendly methodology for writing modules, courses and programmes in terms of learning outcomes.
National Framework of Qualifications

Putting the Bologna Process into practice.

For many countries, one of the most challenging parts of the Bologna reform process is to make their National Framework of Qualifications compatible with the Framework for Qualifications of the European Higher Education Area.

– Showing that National Qualifications Framework is compatible with European Qualifications Framework.
– Introducing Learning Outcomes and writing modules and programmes in terms of Learning Outcomes.
– Showing evidence that the Learning Outcomes have been achieved.
– Workload in terms of ECTS credits and credit accumulation rather than teaching time.
– Showing how the National Framework of Qualifications facilitates Lifelong Learning.
– Lifelong Learning the only way to avoid obsolescence and is the key for ensuring progress.
National Framework of Qualifications in Ireland

Available at: http://www.nqai.ie/docs/publications/13.pdf
Development of Framework

The National Framework of Qualifications was proposed through the Qualifications (Education and Training) Act 1999 and launched in 2003.

Definition of framework: The single, nationally and internationally accepted entity through which all learning achievements may be measured and related to each other in a coherent way and which defines the relationship between all education and training awards.

An ambitious undertaking: the Framework seeks to encompass the entire spectrum of learning achievements.
How do I write Learning Outcomes?
Benjamin Bloom
(1913 – 1999)

- He looked on learning as a process – we build upon our former learning to develop more complex levels of understanding.
- Carried out research in the development of classification of levels of thinking behaviours in the process of learning. PhD University of Chicago in 1942.
- Worked on drawing up levels of these thinking behaviours from the simple recall of facts at the lowest level up to evaluation at the highest level.
Bloom’s Taxonomy of Educational Objectives

- Bloom’s taxonomy (1956) is a very useful aid to writing learning outcomes.
- The taxonomy consists of a hierarchy of increasingly complex processes which we want our students to acquire.
- Provides the structure for writing learning outcomes.
- Bloom’s Taxonomy is frequently used by teachers in writing learning outcomes as it provides a ready made structure and list of verbs.
Bloom (1956) proposed that knowing is composed of six successive levels arranged in a hierarchy.

1. Knowledge
2. Comprehension
3. Application
4. Analysis
5. Synthesis
6. Evaluation
This area is commonly called the **cognitive** ("knowing" or "thinking") **domain** (involving thought processes).

Bloom suggested certain verbs that characterise the ability to demonstrate these processes.

These verbs are the key to writing learning outcomes.

The list of verbs has been extended since his original publication.

The "toolkit" for writing learning outcomes!
1. Knowledge - ability to recall or remember facts without necessarily understanding them

- Use action verbs like:
  - Arrange, collect, define, describe, duplicate, enumerate, examine, find, identify, label, list, memorise, name, order, outline, present, quote, recall, recognise, recollect, record, recount, relate, repeat, reproduce, show, state, tabulate, tell.
## Examples: Knowledge

- **Recall** genetics terminology: homozygous, heterozygous, phenotype, genotype, homologous chromosome pair, etc.
- **Identify** and consider ethical implications of scientific investigations.
- **Describe** how and why laws change and the consequences of such changes on society.
- **List** the criteria to be taken into account when caring for a patient with tuberculosis.
- **Define** what behaviours constitute unprofessional practice in the solicitor – client relationship.
- Outline the history of the Celtic peoples from the earliest evidence to the insular migrations.
- **Describe** the processes used in engineering when preparing a design brief for a client.
- Recall the axioms and laws of Boolean algebra.
2. Comprehension - ability to understand and interpret learned information

- Use action verbs like:
  - Associate, change, clarify, classify, construct, contrast, convert, decode, defend, describe, differentiate, discriminate, discuss, distinguish, estimate, explain, express, extend, generalise, identify, illustrate, indicate, infer, interpret, locate, predict, recognise, report, restate, review, select, solve, translate.
Examples: Comprehension

- **Differentiate** between civil and criminal law
- **Identify** participants and goals in the development of electronic commerce.
- **Discuss** critically German literary texts and films in English.
- **Predict** the genotype of cells that undergo meiosis and mitosis.
- **Translate** short passages of contemporary Italian.
- Convert number systems from hexadecimal to binary and vice versa.
- **Explain** the social, economic and political effects of World War I on the post-war world.
- **Classify** reactions as exothermic and endothermic.
- **Recognise** the forces discouraging the growth of the educational system in Ireland in the 19th century.
- **Explain** the impact of Greek and Roman culture on Western civilisation.
- **Recognise** familiar words and basic phrases concerning themselves....when people speak slowly and clearly.
3. Application: ability to use learned material in new situations, e.g. put ideas and concepts to work in solving problems

Use action verbs like:
Apply, assess, calculate, change, choose, complete, compute, construct, demonstrate, develop, discover, dramatise, employ, examine, experiment, find, illustrate, interpret, manipulate, modify, operate, organise, practice, predict, prepare, produce, relate, schedule, select, show, sketch, solve, transfer, use.
Examples application

- **Construct** a timeline of significant events in the history of Australia in the 19th century.
- **Apply** knowledge of infection control in the maintenance of patient care facilities.
- **Select** and employ sophisticated techniques for analysing the efficiencies of energy usage in complex industrial processes.
- **Show** proficiency in the use of vocabulary and grammar, as well as the sounds of the language in different styles.....
- **Relate** energy changes to bond breaking and formation.
- **Modify** guidelines in a case study of a small manufacturing firm to enable tighter quality control of production.
- **Show** how changes in the criminal law affected levels of incarceration in Scotland in the 19th century.
- **Apply** principles of evidence-based medicine to determine clinical diagnoses.
4. Analysis: ability to break down information into its components, e.g. look for inter-relationships and ideas (understanding of organisational structure)

- Use action verbs like:
  - Analyse, appraise, arrange, break down, calculate, categorise, classify, compare, connect, contrast, criticise, debate, deduce, determine, differentiate, discriminate, distinguish, divide, examine, experiment, identify, illustrate, infer, inspect, investigate, order, outline, point out, question, relate, separate, sub-divide, test.
Examples: Analysis

- **Analyse** why society criminalises certain behaviours.
- **Compare** and contrast the different electronic business models.
- **Categorise** the different areas of specialised interest within dentistry.
- ** Debate** the economic and environmental effects of energy conversion processes.
- **Identify** and **quantify** sources of errors in measurements.
- **Calculate** gradient from maps in m, km, % and ratio.
- Critically **analyse** a broad range of texts of different genres and from different time periods.
- **Compare** the classroom practice of a newly qualified teacher with that of a teacher of 20 years teaching experience.
- **Calculate** logical functions for coders, decoders and multiplexers.
5. Synthesis - ability to put parts together

- Use action verbs like:
  Argue, arrange, assemble, categorise, collect, combine, compile, compose, construct, create, design, develop, devise, establish, explain, formulate, generalise, generate, integrate, invent, make, manage, modify, organise, originate, plan, prepare, propose, rearrange, reconstruct, relate, reorganise, revise, rewrite, set up, summarise.
Examples: Synthesis

- Recognise and formulate problems that are amenable to energy management solutions.
- Propose solutions to complex energy management problems both verbally and in writing.
- Assemble sequences of high-level evaluations in the form of a program.
- Integrate concepts of genetic processes in plants and animals.
- Summarise the causes and effects of the 1917 Russian revolutions.
- Relate the sign of enthalpy changes to exothermic and endothermic reactions.
- Organise a patient education programme.
6. Evaluation: Ability to judge value of material for a given purpose

Use action verbs like:

Appraise, ascertain, argue, assess, attach, choose, compare, conclude, contrast, convince, criticise, decide, defend, discriminate, explain, evaluate, interpret, judge, justify, measure, predict, rate, recommend, relate, resolve, revise, score, summarise, support, validate, value.
Examples: Evaluation

- Assess the importance of key participants in bringing about change in Irish history
- Evaluate marketing strategies for different electronic business models.
- Appraise the role of sport and physical education in health promotion for young people.
- Predict the effect of change in temperature on the position of equilibrium…
- Summarise the main contributions of Michael Faraday to the field of electromagnetic induction.
Bloom Revisited: Anderson and Krathwohl (2001)

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<td>Knowledge</td>
<td>To remember</td>
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<td>Comprehension</td>
<td>To understand</td>
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<td>Application</td>
<td>To apply</td>
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<td>Analysis</td>
<td>To analyse</td>
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<tr>
<td>Synthesis</td>
<td>To evaluate</td>
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<td>Evaluation</td>
<td>To create</td>
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Analysis, Synthesis, Evaluation – Higher Order Thinking Skills
Two other domains in Bloom’s Taxonomy

AFFECTIVE DOMAIN (“Feeling”) concerned with value issues: involves attitudes.

1. Receiving
2. Responding
3. Valuing
4. Organisation
5. Characterisation

- Willingness to receive information
- Active participation in own learning
- Commitment to a value
- Comparing, relating, synthesising values
- Integration of beliefs, ideas and attitudes
Active verbs for affective domain

Appreciate, accept, assist, attempt, challenge, combine, complete, defend, demonstrate (a belief in), discuss, dispute, embrace, follow, hold, integrate, order, organise, join, share, judge, praise, question, relate, share, support, synthesise, value.
Examples of Learning Outcomes in Affective Domain

- Accept the need for professional ethical standards.
- Appreciate the need for confidentiality in the professional client relationship.
- Display a willingness to communicate well with patients.
- Relate to participants in an ethical and humane manner.
- Resolve conflicting issues between personal beliefs and ethical considerations.
- Embrace a responsibility for the welfare of children taken into care.
- Participate in class discussions with colleagues and with teachers.
PSYCHOMOTOR ("Doing") DOMAIN:
Work never completed by Bloom.
Involves co-ordination of brain and muscular activity. Active verbs for this domain: bend, grasp, handle, operate, perform, reach, relax, shorten, stretch, differentiate (by touch), perform (skilfully).
Laboratory skills
- Operate the range of instrumentation specified in the module safely and efficiently in the chemistry laboratory.
- Perform titrations accurately and safely in the laboratory.
- Construct simple scientific sketches of geological features in the field.

Clinical Skills
- The student is able to perform a comprehensive history and physical examination of patients in the outpatient setting and the general medical wards, excluding critical care settings.
- The student is competent in performing venipuncture and basic CPR.

Presentation skills
- Deliver an effective presentation.
- Demonstrate a range of graphic and CAD communication techniques.
- Perform basic voice and movement tasks (theatre studies).
Module Title: Dental Surgery – 5th Year Dental Students
Module Code: DS5001

On successful completion of this module, students should be able to:

- Summarise relevant information regarding the patient’s current condition to generate a differential diagnosis
- Formulate an appropriate treatment plan and justify the proposal giving due consideration to patient expectations and limitations
- Arrange appropriate tests and demonstrate the ability to interpret tests and reports
- Administer local anaesthetics safely and perform basic dento-alveolar surgical procedures in a professional manner showing good clinical governance
- Recognise, evaluate and manage medical and dental emergencies appropriately
- Differentiate between patients that can/can not be safely treated by a GDP
- Manage competing demands on time, including self-directed learning & critical appraisal
- Master the therapeutic and pharmacological management of patients with facial pain and oro-facial disease

(Learning outcomes written by Dr. Eleanor O’Sullivan)
Learning Outcomes

- The ECTS credit system is the common currency for education.
- Learning Outcomes are the common language for education.
- Facilitate comparability across the various systems in different countries.
- Facilitate diversity – formal learning, informal learning, life long learning, etc.
- The term “competency” is commonly used to point the learner in the general direction but caution must be exercised when using this term.
What is the relationship between Learning Outcomes and Competences?

- Difficult to find a precise definition for the term “competence”.
- “Some take a narrow view and associate competence just with skills acquired by training” (Stephen Adam, 2004)
- In Tuning project, the term competence is used to represent a combination of attributes in terms of knowledge and its application, skills, responsibilities and attitudes and an attempt is made to describe the extent to which a person is capable of performing them.
- ECTS Users’ Guide describes competences as “a dynamic combination of attributes, abilities and attitudes. Fostering these competences is the object of educational programmes. Competences are formed in various course units and assessed at different stages. They may be divided in subject-area related competences (specific to a field of study) and generic competences (common to any degree course)” (ECTS, 2005)
- Advice – if you have to write competences use the language of learning outcomes to describe competences.
Competence:
The student should be able to use the mass and energy balances for a given food process.

Objectives:
- Understand scope of mass balances in food processing systems.
- Understand appropriate use of mole fractions and mass fractions in mass balances.

Learning outcomes:
- Describe the general principles of mass balances in steady state systems.
- Draw and use process flow diagrams with labels on flow streams for mass balance problems.
- Solve mass balance problems associated with food processing operations.
- Design and solve mass balances for complex process flow systems, including batch mixing problems, multiple stage flow problems, problems with multiple inflows and outflows, recycle streams and multiple components, and processes where chemical reactions take place.

Hartel and Foegeding (2004)
Competence – a “fuzzy” concept
(Van der Klink and Boon)

- Van der Klink (2002) and Boon describe competence as a “fuzzy concept”
- On the positive side they state it is a “useful term, bridging the gap between education and job requirements”.

Competencies: the triumph of a fuzzy concept

Marcel R. van der Klink and Jo Boon

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Abstract: This article investigates the current popularity of the concept of competencies. After a brief exploration of perspectives on the concept of competencies, a study will be presented that was conducted in order to gain more insight into the backgrounds of the current status of this concept and to investigate competency-based practices. The study investigated the applications in enterprises and higher education. The last section summarises the main findings and raises some issues that need further elaboration.
Since there is not a common understanding of the term competence, learning outcomes have become more commonly used than competences when describing what students are expected to know, understand and/or be able to demonstrate at the end of a module or programme.

The “fuzziness” of competences disappears in the clarity of learning outcomes!

In short, use Learning Outcomes to clarify what is meant by a statement of Competence.

The End!
The challenge of beginning the task of writing

Learning Outcomes

- It is vital that learning outcomes are clearly written so that they are understood by students, colleagues and external examiners.
- When writing learning outcomes it may be helpful to you if you focus on what you expect students to be able to demonstrate upon completion of the module or programme.
- It is standard practice to list the learning outcomes using a phrase like “On successful completion of this module, students should be able to:” [list of learning outcomes]
- Avoid complicated sentences. If necessary use one than one sentence to ensure clarity.
- General recommendation: 5 – 8 learning outcomes per module.
- Avoid certain words........
Words of advice …..

“The key word is DO and the key need in drafting learning outcomes is to use active verbs”. (Jenkins and Unwin, Fry et al.)

Avoid verbs like “know”, “understand”, “be familiar with”, “be exposed to” (Osters and Tiu)

“Try to avoid ambiguous verbs such as “understand”, “know”, “be aware” and “appreciate”. (Sheffield Hallam Guide).

“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” (Univ NSW).

Certain verbs are unclear and subject to different interpretations in terms of what action they are specifying……. These types of verbs should be avoided: know, become aware of, appreciate, learn, understand, become familiar with. (American Association of Law Libraries).
Checklist for writing learning outcomes for modules

- Have I begun each outcome with an active verb?
- Have I avoided terms like know, understand, learn, be familiar with, be exposed to, be acquainted with, be aware of and appreciate?
- Have I included learning outcomes across the range of levels of Bloom’s Taxonomy?
- Are my outcomes observable and measurable?
- Do all the outcomes fit within the aims and content of the module?
Writing Programme Learning Outcomes

- The rules for writing learning outcomes for programmes are the same as those for writing learning outcomes for modules.
- The general guidance in the literature is that there should be 5–10 learning outcomes for a programme and that only the minimum number of outcomes considered to be essential be included.
- Programme learning outcomes describe the essential knowledge, skills and attitudes that it is intended that graduates of the programme will be able to demonstrate.
Two types of Programme Learning Outcomes

1. The first type of learning outcome refers to those learning outcomes that can be assessed during the programme, i.e. within the various modules.

2. “Aspirational” or “desirable” learning outcomes indicate what a good quality student would be expected to achieve by the end of the programme. This type of learning outcome may not be assessed at all but gives an indication to employers and other agencies the type of standard of practical performance that graduates of the programme will display at the end of the programme.
Example of Programme Learning Outcomes [BSc(Ed)]

On successful completion of this programme, students should be able to:

- Recognise and apply the basic principles of classroom management and discipline.
- Identify the key characteristics of excellent teaching in science.
- Develop comprehensive portfolios of lesson plans that are relevant to the science curricula in schools.
- Evaluate the various theories of Teaching and Learning and apply these theories to assist in the creation of effective and inspiring science lessons.
- Critically evaluate the effectiveness of their teaching of science in the second-level school system.
- Display a willingness to co-operate with members of the teaching staff in their assigned school.
- Foster an interest in science and a sense of enthusiasm for science subjects in their pupils.
- Synthesise the key components of laboratory organisation and management and perform laboratory work in a safe and efficient manner.
- Communicate effectively with the school community and with society at large in the area of science education.
Further Example of Programme Learning Outcomes

On successful completion of this programme, students should be able to:

- Derive and apply solutions from knowledge of sciences, engineering sciences, technology and mathematics.
- Identify, formulate, analyse and solve engineering problems.
- Design a system, component or process to meet specified needs and to design and conduct experiments to analyse and interpret data.
- Work effectively as an individual, in teams and in multi-disciplinary settings together with the capacity to undertake lifelong learning.
- Communicate effectively with the engineering community and with society at large.

[Undergraduate engineering degree]
Further Example of Programme Learning Outcomes

On successful completion of this programme, students should be able to:

- Perform problem solving in academic and industrial environments.
- Use, manipulate and create large computational systems.
- Work effectively as a team member.
- Organise and pursue a scientific or industrial research project.
- Write theses and reports to a professional standard, equivalent in presentational qualities to that of publishable papers.
- Prepare and present seminars to a professional standard.
- Perform independent and efficient time management.
- Use a full range of IT skills and display a mature computer literacy.

[Postgrad Comp Sc degree]
What are the benefits and potential problems of Learning Outcomes?
“Learning Outcomes represent one of the essential building blocks for transparent higher education systems and qualifications… It is important that there should be no confusions about their role, nature and significance or the educational foundations of the Bologna process will be weakened”

(Adams S, 2004)
“Learning outcomes represent what is formally assessed and accredited to the student and they offer a starting point for a viable model for the design of curricula in higher education which shifts the emphasis from input and process to the celebration of student learning”

(Allan J, 1996)
The benefits of Learning Outcomes

- Help to explain more clearly to students what is expected of them and thus help to guide them in their studies – motivation and sense of purpose.
- Help teachers to focus more clearly on what exactly they want students to achieve in terms of knowledge and skills.
- Help teachers to define the assessment criteria more effectively.
- Help to provide guidance to employers about the knowledge and understanding possessed by graduates of programmes.
- Help to start discussion on Teaching and Learning in third level institutions.
Potential problems with Learning Outcomes

- Could limit learning if learning outcomes written within a very narrow framework – lack of intellectual challenge to learners.
- Learning outcomes should not be reductionist but rather expansive and intended to promote the higher order thinking skills.
- Danger of assessment-driven curriculum if learning outcomes too confined.
- Could give rise to confusion among students and staff if guidelines not adhered to when drawing up learning outcomes, etc.
How do I link Learning Outcomes to Teaching and Learning Activities and Assessment?
“The adoption of a learning outcomes approach represents more than simply expressing learning in terms of outcomes. It entails much more due to their significant implications for all aspects of curriculum design, delivery, expression, assessment and standards”.

Adam S, 2004
Assessment of Learning Outcomes

- Having designed modules and programmes in terms of learning outcomes, we must now find out if our students have achieved these intended learning outcomes.

- How will I know if my students have achieved the desired learning outcomes? How will I measure the extent to which they have achieved these learning outcomes?

- Therefore, we must consider how to match the method of assessment to the different kinds of learning outcomes e.g. a Learning Outcome such as “Demonstrate good presentation skills” could be assessed by the requirement that each student makes a presentation to their peers.

- When writing learning outcomes the verb is often a good clue to the assessment technique.

- How can we design our examination system so that it tests if learning outcomes have been achieved?
Formative Assessment

- Assessment FOR learning – gives feedback to students and teachers to help modify teaching and learning activities, i.e. helps inform teachers and students on progress being made.

- Assessment is integrated into the teaching and learning process.

- Clear and rich feedback helps improve performance of students (Black and Williams, 1998).

- Usually carried out at beginning or during a programme, e.g. coursework which gives feedback to students.

- Can be used as part of continuous assessment, but some argue that it should not be part of grading process (Donnelly and Fitzmaurice, 2005).
Summative Assessment

- Assessment that summarises student learning at end of module or programme – Assessment OF Learning.
- Sums up achievement – no other use.
- Generates a grade or mark.
- Usually involves assessment using the traditional examination.
- Only a sample of the Learning Outcomes are assessed – cannot assess all the Learning Outcomes.
Continuous Assessment

- A combination of summative and formative assessment.
- Usually involves repeated summative assessments.
- Marks recorded.
- Little or no feedback given.
Assessment

“Assessment is the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know, understand and can do with their knowledge as a result of their educational experiences” (Huba and Freed, 2000)

“A way of finding out what our students know and can do”
Assessing learning outcomes: points to consider

• Learning outcomes: “statements of what a student will know, understand, and/or be able to do at the end of a learning experience”.

• Having described your courses in terms of learning outcomes, you now want to find out whether students have achieved them.

• Specify the types of student performance that will provide evidence of learning.
“Techniques” of assessment

- **Written**: tests, examinations, assignments
- **Practical**: skills testing; lab/workshop practice
- **Oral**: interviews, various formats
- **Aural**: listening tests
- **Project work**: individual/group; research/design
- **Field work**: data collection and reporting
- **Competence testing**: threshold standards
- **Portfolio**: combination of techniques
## Example of Matching the Assessment to the Learning Outcome

<table>
<thead>
<tr>
<th>Learning outcomes</th>
<th>Assessment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate good presentation skills.</td>
<td>a) Multiple choice questions</td>
</tr>
<tr>
<td>2. Formulate food product</td>
<td>b) Prepare a 1000-word research proposal</td>
</tr>
<tr>
<td>3. Identify an area for research</td>
<td>c) Lab-based project</td>
</tr>
<tr>
<td>4. Identify signs and symptoms of MS in a patient</td>
<td>d) Make a presentation to peers</td>
</tr>
</tbody>
</table>
Assessing your assessment – is it doing the job you want it to do? Is it comprehensive?

<table>
<thead>
<tr>
<th>Learning Outcome 1</th>
<th>Assessment Task 1 e.g. Written Exam</th>
<th>Assessment Task 2 e.g. Project</th>
<th>Assessment Task 3 e.g. Presentation</th>
<th>Assessment Task 4 e.g. Lab work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Describe…</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning Outcome 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigate..</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learning Outcome 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate..</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To what extent has each Learning Outcome been achieved?

- Not a question of “yes” or “no” to achievement of Learning Outcomes.

- Rubric: A grading tool used to describe the criteria which are used in grading the performance of students.

- Rubric provides a clear guide as to how students’ work will be assessed.

- A rubric consists of a set of criteria and marks or grade associated with these criteria.
Linking learning outcomes and assessment criteria.

<table>
<thead>
<tr>
<th>Learning outcome</th>
<th>Assessment criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 1</td>
</tr>
<tr>
<td>On successful completion of this module, students should be able to:</td>
<td>Outstanding use of literature showing excellent ability to synthesise evidence in analytical way to formulate clear conclusions.</td>
</tr>
<tr>
<td>Summarise evidence from the science education literature to support development of a line of argument.</td>
<td></td>
</tr>
</tbody>
</table>
Important to ensure that there is alignment between teaching methods, learning outcomes and assessment criteria.

Clear expectations on the part of students of what is required of them are a vitally important part of students’ effective learning (Ramsden, 2003).

This correlation between teaching, learning outcomes and assessment helps to make the overall learning experience more transparent and meaningful for students.

For the good teacher, earning outcomes do not involve a “paradigm shift”.

There is a dynamic equilibrium between teaching strategies and Learning Outcomes.
It is important that the assessment tasks mirror the Learning Outcomes since, as far as the students are concerned, the assessment is the curriculum: “From our students’ point of view, assessment always defined the actual curriculum” (Ramsden, 1992). Biggs (2003) represents this graphically as follows:

“To the teacher, assessment is at the end of the teaching-learning sequence of events, but to the student it is at the beginning. If the curriculum is reflected in the assessment, as indicated by the downward arrow, the teaching activities of the teacher and the learner activities of the learner are both directed towards the same goal. In preparing for the assessment, students will be learning the curriculum” (Biggs 2003)
Steps involved in linking Learning Outcomes, Teaching and Learning Activities and Assessment

1. Clearly define the learning outcomes.
2. Select teaching and learning methods that are likely to ensure that the learning outcomes are achieved.
3. Choose a technique or techniques to assess the achievement of the learning outcomes.
4. Assess the learning outcomes and check to see how well they match with what was intended.

If the learning outcomes are clearly written, the assessment is quite easy to plan!
### Linking Learning Outcomes, Teaching and Learning Activities and Assessment

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Teaching and Learning Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>Lectures, Tutorials, Discussions</td>
<td>• End of module exam.</td>
</tr>
<tr>
<td>(Demonstrate: Knowledge,</td>
<td>Laboratory work, Clinical work</td>
<td>• Multiple choice tests.</td>
</tr>
<tr>
<td>Comprehension, Application,</td>
<td>Group work, Seminar</td>
<td>• Essays.</td>
</tr>
<tr>
<td>Analysis, Synthesis,</td>
<td>Peer group presentation etc.</td>
<td>• Reports on lab work and research project.</td>
</tr>
<tr>
<td>Evaluation)</td>
<td></td>
<td>• Interviews/viva.</td>
</tr>
<tr>
<td>Affective</td>
<td></td>
<td>• Practical assessment.</td>
</tr>
<tr>
<td>(Integration of beliefs,</td>
<td></td>
<td>• Poster display.</td>
</tr>
<tr>
<td>ideas and attitudes)</td>
<td></td>
<td>• Fieldwork.</td>
</tr>
<tr>
<td>Psychomotor</td>
<td></td>
<td>• Clinical examination.</td>
</tr>
<tr>
<td>(Acquisition of physical</td>
<td></td>
<td>• Presentation.</td>
</tr>
<tr>
<td>skills)</td>
<td></td>
<td>• Portfolio.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Performance.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Project work.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Production of artefact etc.</td>
</tr>
<tr>
<td>Learning outcomes Module ED2100</td>
<td>Teaching and Learning Activities</td>
<td>Assessment 10 credit module Mark = 200</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td><strong>Cognitive</strong></td>
<td>Lectures (12)</td>
<td>End of module exam.</td>
</tr>
<tr>
<td>• Recognise and apply the basic principles of classroom management and discipline.</td>
<td>Tutorials (6)</td>
<td>Portfolio of lesson plans</td>
</tr>
<tr>
<td>• Identify the key characteristics of high quality science teaching.</td>
<td>Observation of classes (6) of experienced science teacher (mentor)</td>
<td>(100 marks)</td>
</tr>
<tr>
<td>• Develop a comprehensive portfolio of lesson plans</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Affective</strong></td>
<td>Participation in mentoring feedback sessions in school (4)</td>
<td>Report from school mentor</td>
</tr>
<tr>
<td>• Display a willingness to co-operate with members of teaching staff in their assigned school.</td>
<td>Participation in 3 sessions of UCC Peer Assisted Learning (PAL) Programme.</td>
<td>End of project report.</td>
</tr>
<tr>
<td>• Participate successfully in Peer Assisted Learning project</td>
<td>Peer group presentation</td>
<td>(50 marks)</td>
</tr>
<tr>
<td><strong>Psychomotor</strong></td>
<td>Teaching practice 6 weeks at 2 hours per week.</td>
<td>Supervision of Teaching Practice</td>
</tr>
<tr>
<td>• Demonstrate good classroom presentation skills</td>
<td>Laboratory work</td>
<td>Assessment of teaching skills</td>
</tr>
<tr>
<td>• Perform laboratory practical work in a safe and efficient manner.</td>
<td></td>
<td>(50 marks)</td>
</tr>
</tbody>
</table>
Programme Accreditation

- Module descriptors with clearly written Learning Outcomes – see handout (1) CIT.
- Framework for Accreditation e.g. Engineer’s Ireland.
- Mapping of Programme Areas vs Programme Outcomes – see handout (2) CIT.
- Mapping of Module Learning Outcomes vs Programme Learning Outcomes

<table>
<thead>
<tr>
<th>Module 1</th>
<th>Prog. Outcome 1</th>
<th>Prog. Outcome 2</th>
<th>Prog. Outcome 3</th>
<th>Prog. Outcome 4</th>
<th>etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 2</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module 3</td>
<td></td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module 4</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Module 5</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module 6</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>
Does every learning outcome have to be assessed?

- In theory “yes” but in practice “no”.
- In some cases they have to be assessed, e.g. licence to practice (e.g. medicine) or to perform essential tasks (e.g. aircraft pilot).
- When assessment is limited purely to an examination paper, it may not be possible to assess all the Learning Outcomes in such a short space of time – sampling of Learning Outcomes.
- Even if all the Learning Outcomes are assessed on an examination paper, due to choice of questions, a student may not be assessed on all of them.
Modularisation

- A module is a self-contained fraction of a student’s workload for the year and carries a unique examination/assessment mark.
- The size of a module is indicated by its credit weighting.
- Under ECTS system, each year of degree programme = 60 credits.
- Modules are allocated 5, 10, 15 or 20 credits depending on the fraction of the programme workload covered in the module.
- Each module is given a unique code, e.g. ED2013

ED2013

Education  Year 2  Number assigned to this module
Advantages of modularisation

- Gives greater clarity of structure and helps to establish clear relationship between credits and student workload in ECTS system.
- Reflects more accurately the various elements of students’ workload.
- Facilitates work abroad, work placement, off-campus study as modules for degree examinations.
- Gives greater clarity and consistency in assessment.
- Provides flexibility in the design of degree programmes by incorporating modules from different areas.
- Facilitates credit accumulation, i.e. increases number of pathways to final degree award. Hence, encourages greater diversity of students, e.g. mature and part time students.
- Allows third level institutions to participate in schemes like SOCRATES so that students obtain ECTS credits towards their degree.
- Facilitates greater ease of student transfer between institutions offering ECTS-based programmes.
## Modules, Marks, Exams in UCC

<table>
<thead>
<tr>
<th>Module</th>
<th>Student Workload</th>
<th>Marks</th>
<th>Exam Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 credits*</td>
<td>125 – 150 hours</td>
<td>100</td>
<td>1.5 hours</td>
</tr>
<tr>
<td>10 credits</td>
<td>250 – 300 hours</td>
<td>200</td>
<td>3 hours</td>
</tr>
<tr>
<td>15 credits</td>
<td>375 – 450 hours</td>
<td>300</td>
<td>3 hours</td>
</tr>
<tr>
<td>20 credits</td>
<td>500 – 600 hours</td>
<td>400</td>
<td>2 x 3 hours</td>
</tr>
</tbody>
</table>

Note: Total per year = 60 credits = 1200 marks
In University College Cork, a 5-credit module normally consists of 24 hours of lectures plus associated tutorials/essays/reading/practical/coursework

OR

The equivalent in student workload such as literature projects, field courses, or indeed set reading assessed by written examination, work for problem sets, studying of legal material and cases outside of lecture hours, etc.
1. Identify aims and objectives of module

2. Write learning outcomes using standard guidelines

3. Develop a teaching and learning strategy to enable students to achieve learning outcomes

4. Design assessment to check if learning outcomes have been achieved

5. If necessary modify module content and assessment in light of feedback
“Writing Learning Outcomes is a Process not an Event”
The present situation in UCC

- All undergraduate modules written in Learning Outcomes in 2006 – 2007 academic year. Work in progress on postgraduate modules.
- Sub-committee set up (Quality Promotion Unit, Teaching and Learning Centre, Registrar’s Office and Educationalist) to study Learning Outcomes submitted.
- Programme co-ordinators working on programme Learning Outcomes at present.
- Working towards deadline of 2010.
Looking to the Future
“Learning outcomes had fundamentally changed the Scottish sector’s approach to learning since the 1990s and had resulted in enhanced coherence of the learning experience, greater transparency, increased dialogue with stakeholders, more opportunity for students to manage their own learning and better support for transitions into and out of learning programmes at points that suited the needs of the student”

- Judith Vincent, Univ of West of Scotland
  (Seminar 21 – 22 February 2008)
Students’ Perspective on Learning Outcomes

- Learning outcomes are an important aspect of student-centred learning which focused on student needs.

- Learning outcomes provided students with
  - a clear idea of what was expected
  - helped them to identify their own personal and professional development
  - increased their sense of ownership of their educational experience.
  - encouraged them to engage more actively in their learning.
  - gave a more accurate and meaningful picture of student achievement than workload.

(Jill Little National Union of Students Scotland)
Recommendations from students

- Learning outcomes should not be used in a tokenistic way e.g., only referred to in course handbooks.

- Learning Outcomes should be communicated to students so that they can articulate the knowledge and skills they have acquired.

- Learning Outcomes should be neither so prescriptive as to impede freedom of learning nor so broad as to become meaningless.

(Jill Little National Union of Students Scotland)
Advantages of Learning Outcomes from students’ perspective

The use of learning outcomes with ECTS would result in:

- A broader, fairer and more accurate recognition of students’ knowledge and skills.
- A more transparent learning environment
- Easier to engage with and to choose programmes.
- Easier mobility within academic fields, education systems and countries.
- Enhanced employability in Europe
- More student centred learning.

(Jill Little National Union of Students Scotland)
Issues with Introduction of Learning Outcomes

- Learning Outcomes are only part of a massive reform package, e.g. Qualification Frameworks, Lifelong Learning, ECTS, Mutual Recognition, Quality Assurance.
- How best to introduce Learning Outcomes ("top down" or "bottom up"? Best left to local and National autonomy.
- How best to deal with sceptical attitude of some staff members – “dumbing down”, “restricting academic freedom”? Hence, important to introduce Learning Outcomes in a proper fashion using sources of good practice and advice.
- Lack of clarity and lack of shared understanding on key terminology, e.g. learning outcomes and competences.
Some Advice

- Introducing learning outcomes at institutional level requires a carefully tailored strategy, whose primary goal should be quality enhancement rather than compliance with external directives;

- Learning outcomes must be capable of assessment and at the module level should be linked to assessment criteria, also expressed in terms of learning outcomes;

- The best learning outcomes are the product of sincere reflection about realistic and attainable combinations of knowledge and understanding, practical and cognitive skills, levels of autonomy, learning skills etc.

- Learning Outcomes are challenging but it is impossible to have a meaningful European Higher Education area without their widespread and consistent use

(Stephen Adams, 2008)
Some Recommendations from Porto Conference (19 – 20 June 2008)

- Develop and disseminate user-friendly documentation to explain to all stakeholders the benefits of learning outcomes and credits.
- Implement a holistic approach, developing learning outcomes as an integral part of teaching, learning and assessment methods within an aligned curriculum.
- Offer incentives to encourage staff to engage in new approaches to teaching, learning and assessment.
Concluding Points

- Momentum generated by
  - European University Association project.
  - International Bologna conferences.
  - Setting up of Teaching and Learning Centre (Ionad Bairre).
  - Postgraduate Cert/Diploma and MA in Teaching and Learning in Higher Education
  - Lunchtime seminars for staff.

- Keep it simple.
- Provide support to staff.
- Staff training is the key.
- Setting up of expertise within each Department – Postgraduate Cert/Diploma course.
- The UCC Quality Promotion Unit - the driving force.
- A team effort.
That’s all Folks. Hope you learned something about designing curricula based on Learning Outcomes!
References


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Tuning Educational Structures in Europe: [http://tuning.unideusto.org/tuningeu/](http://tuning.unideusto.org/tuningeu/)
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Framework website: www.nfq.ie

National Qualifications Authority of Ireland: www.nqai.ie


www.bologna.ie


