# Suggestions on how to write Learning Outcomes



AQU Webinar

The new ex-ante evaluation process

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# The beginning – To be considered

- It started In Europe in the1990s: Forecasts of human resources in the next century
- Strategic vision: To stay competitive
- EU: Skill needs project (**U**niversity-**E**nterprise-**T**raining-**P**artnerships)
- Experienced problem: **How to understand each other**
  - Academics: Certified documents (various designations, descriptions, terms); knowledge-based
  - Enterprises: What does a graduate know and what can he/she do?; skills-based
- Solution: Answer to the question „**What should be the outcomes of education and training**?“, i.e. design learning activities by **starting from the end** (**learning outcomes**; student“-centred learning)
- Means: Field work – descriptions – projects….Bologna / Copenhagen-Brugges Process (Dublin Descriptors, **Qualifications Frameworks** for education & training)

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— ARISTOTELES —
The EHEA?
BRUNELLO CUCINELLI


John Kotter
Our iceberg is melting

# On the road: highly sophisticated – You can apply the highway-code in various situations




5

# Application of learning outcomes – help needed?

You are responsible when you drive.
You should know & understand the „code“ and can drive

**Any relationship to today´s topic?** 7



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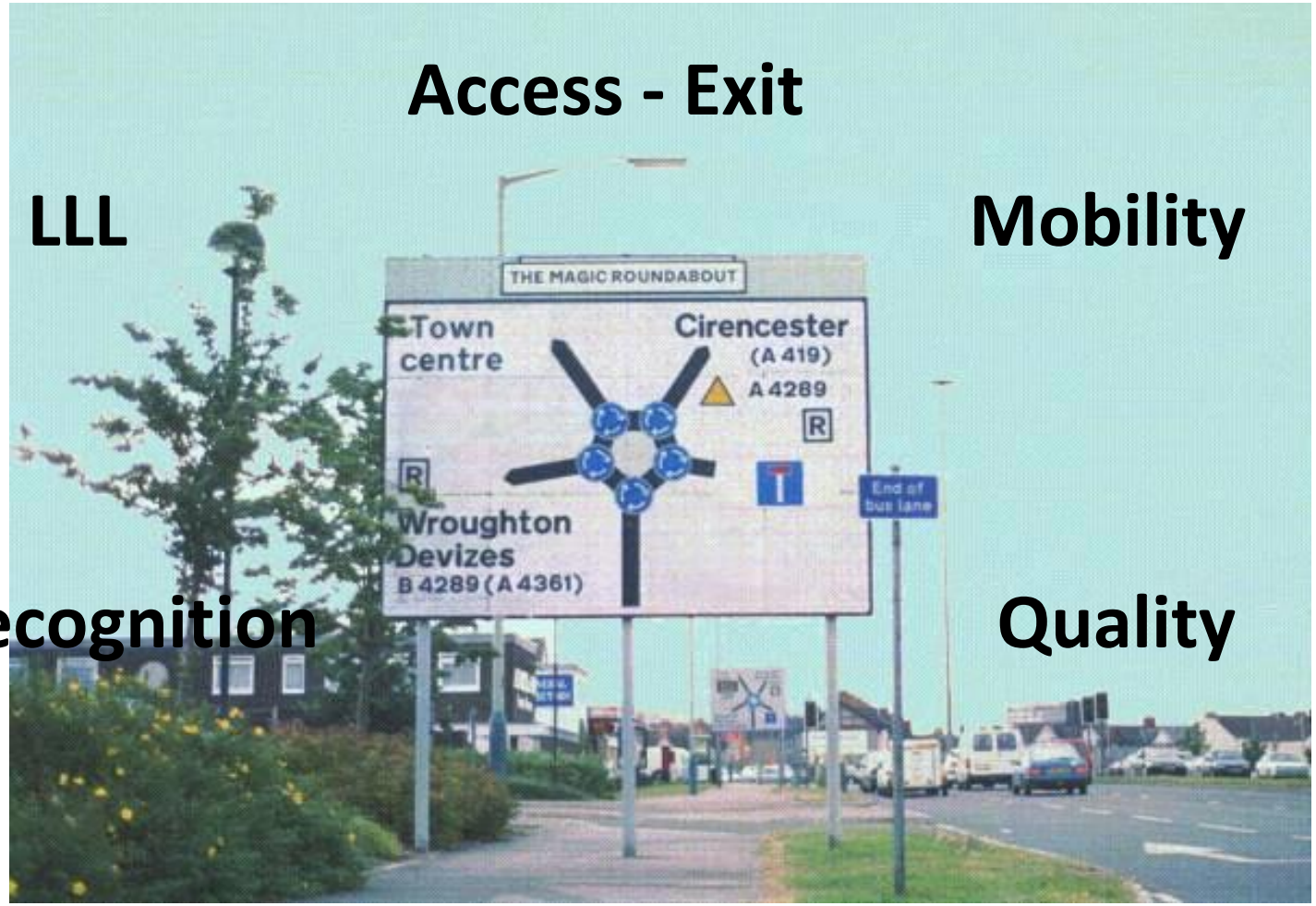
# Learning Outcomes: To drive a vehicle

| level | A **person** | who | subject | | | | |
|---|---|---|---|---|---|---|---|
| Learning Outcomes level | **knows** to start the engine | knows | verb + object | type of knowledge | factual | conceptual | procedural | meta-cognitive |
| | **can drive** along roads realising what the road signs mean | can do | active verb | domain of learning skills | cognitive | affective | psycho-motor | |
| | **gets to** another place | what for | objective | directed at | simple | specific | concepts | new |
| | has to be **aware** of the environment (traffic, weather…) and is **responsible** when driving alone or with guidance | how | modality | ways & means / supported – on his/her own - responsible | structured/ determined<br><br>become aware/ acquainted | narrow/wide<br><br>state/explain/ use | supervised/ autonomous<br><br>identify means/ structures | individual/ group/ diverse/gaps<br><br>describe/ create new structures |

simple……..complex

Learning outcomes progression

# Highway Code „World-Wide“ = Qualifications Framework




Learning Outcomes assessed: „National“ Driving Licence = Qualification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*Example 2:* *According to the Catalonian QF:*

***Learning Outcomes: Eat a Burger***

***Knowledge***

- ***Layers***

***Skills***

- ***Getting into your mouth***

***Competence: Autonomy***

- ***Do you need help?***

***Competence: Responsibility***

- ***For your stomach / health***

# Example 3
# Qualifications Framework for a day-to-day common issue in any society: Supply and Demand of Labour

**Supply: Offering a job (potential employer)**

**Who can do it in this way (expected qualifications)?**

- Who
- has the knowledge *and*
- skills *and*
- know-how to do the job
- in a given environment *and*
- serve the objective

**Demand: Looking for a job (potential employee)**

**Yes, I can (application - confirmed formal/non-formal/informal expectations)!**

- **Me**
- I am endowed with the requested factual, conceptual, procedural and/or metacognitive **knowledge** and
- the required cognitive, affective and psychomotor **skills**
- **how** to meet expectations
- in your **learning environment**
- to serve your **purpose**

# This means for example

There are many jobs anywhere in Spain and outside. How can I compare them?

- That is the point: Comparability is difficult to achieve if for every job **specific descriptions** only were available. This would lead to over- or undervaluation of capacities and capabilites, in particular across borders.

- Then the obvious solution would be to compare **qualifications**.

Could be

## But:

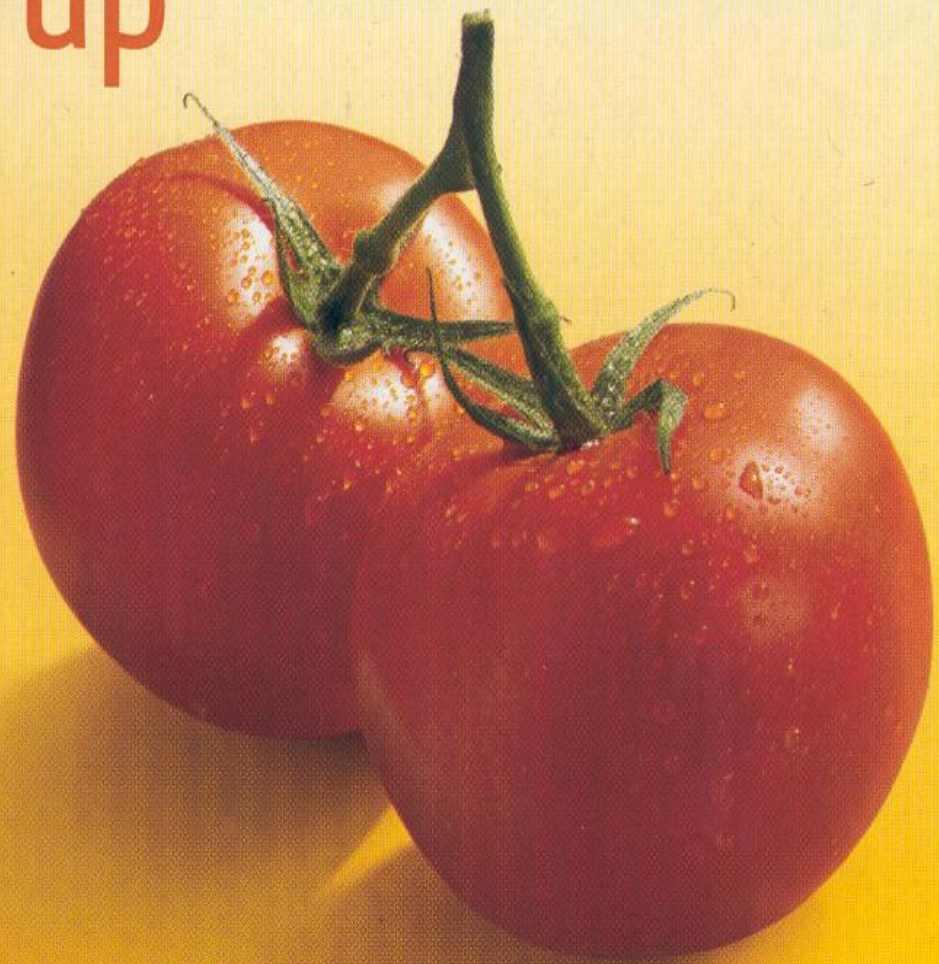
- **Qualifications** are differently defined throughout the world. Experience has shown this. Also, excluding all possible language problems, employers – to come back to the example – are not necessarily interested how a qualification is formally denominated;

- Employers i.a. want to know what a person knows and what he/she can do, i.e. what the learning outcomes are the applicant has acquired through education and training.

# To be considered (cont.)

- Therefore the qualifications have to be described as **learning outcomes**. The **descriptors** group similar knowledge, skills and complementing educational and training components on **levels** (best fit principle), i.e. they are ranked according to the level of complexity of learning.

# catch up



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# What is a qualification really?
## Check yourself:

- Where are the qualifications listed in the European Qualifications Frameworks (both)?
- Where are the qualifications listed in the Spanish/Catalonian Qualifications Framework?

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# Joint Quality Initiative – Dublin Descriptors

(Framework for Qualifications of the European Higher Education Area)

***Knowledge and understanding***

- *1 (Bachelor)* [is] supported by advanced text books [with] some aspects informed by knowledge at the forefront of their field of study ...
  *2 (Master)* provides a basis or opportunity for originality in developing or applying ideas often in a research context ...
  *3 (Doctorate)* [includes] a systematic understanding of their field of study and mastery of the methods of research associated with that field

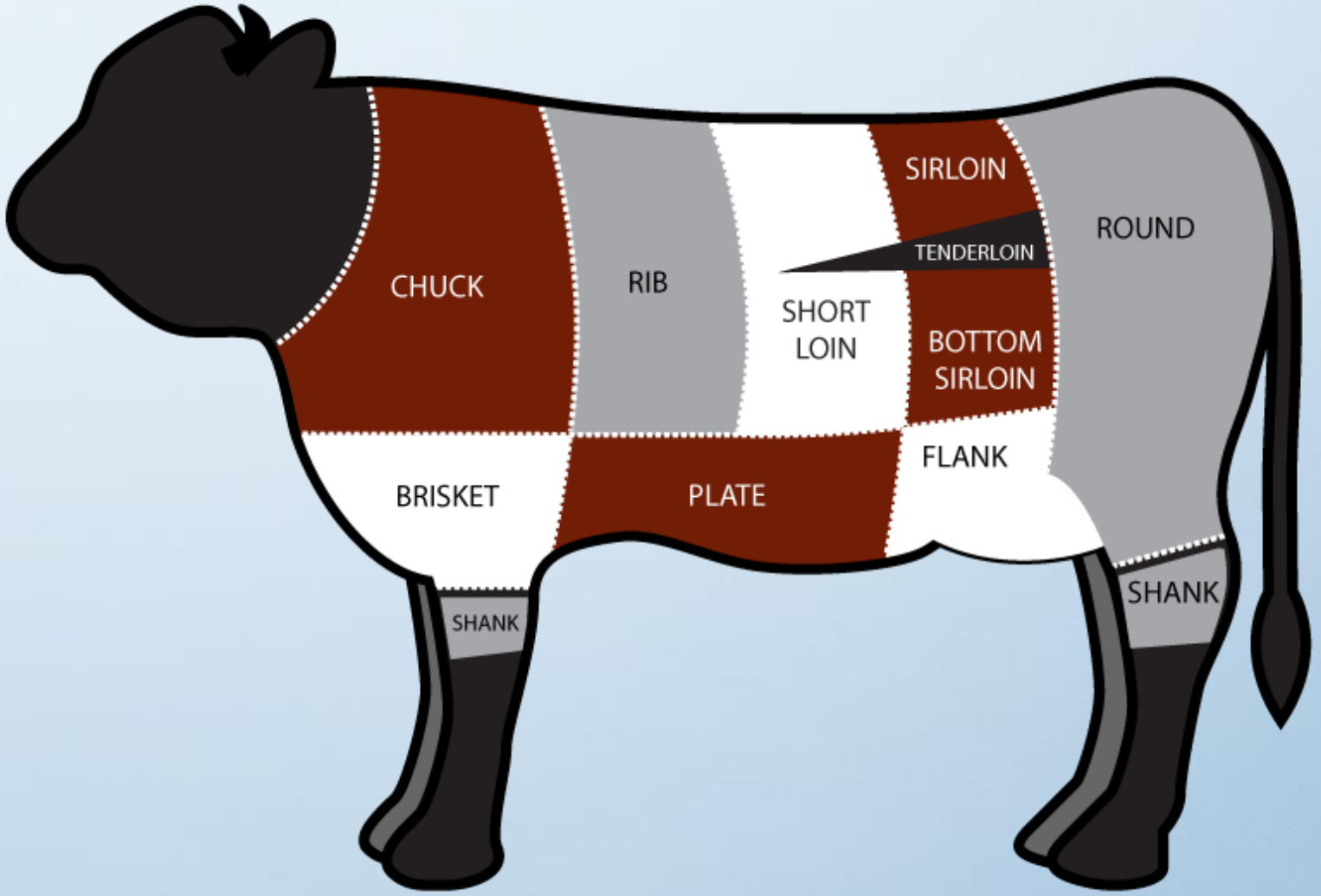
# European Qualification Framework for LLL: Readability – horizontal / vertical

| | **Knowledge & Underst.** | **Skills** | **Competence** |
|---|---|---|---|
| L 6 | advanced knowledge of a field of work or study involving a critical understanding of theories and principles | advanced skills, demonstrating mastery and innovation, in a complex and specialised field of work or study | manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work and study Contexts - lead groups in work and study |
| L 7 | highly specialised knowledge, some of which is at the forefront of knowledge in a field of work Or study, as the basis for original thinking critical awareness of knowledge issues in a field and at the interface Between different fields | specialist research and problem-solving skills, including analysis and synthesis, to develop new knowledge and procedures and to integrate knowledge from different fields | demonstrate leadership and innovation in work and study contexts that are complex, unpredictable and require new strategic approaches take responsibility for continuing personal professional development, for contributing to professional knowledge and practice and for reviewing the strategic performance of teams |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | **PhD Diploma**<br>Not typically credit-rated<br>3 years | | 4 | 8 | **Third Cycle** |
| | **Master's Degree in Arts**<br>120 ECTS<br>2 years | **Master's Degree**<br>120 ECTS<br>2 years | **Integrated Bachelor's Degree**<br>360-ECTS<br>6 years | 3 | 7 | **Second Cycle** |
| | 60-ECTS<br>1 years | 60-ECTS<br>1 years | | | | |
| | **Bachelor's Degree in Arts**<br>240 ECTS<br>4 years | **Advanced Bachelor's Degree**<br>240 ECTS<br>4 years | 300-ECTS<br>5 years | 2 | 6 | **First Cycle** |
| **Advanced Technician in Vocational Training, Advanced Technician in Plastic Arts and Design, Advanced Technician in Sports Education (Advanced Technician)** | | **Bachelor's Degree**<br>180 ECTS<br>3 years | | 1 | 5 | **Short Cycle** |

# What is a framework?

The **body frames & structures** e.g. systems, i.e. bones, musles, blood, digestion, brain…in **general terms**: a cow (cattle), independent whether in reality it is a **specific** breed or type



# What is a qualification really?

- Description of achievements of learners,
  - indicating what learners know, understand and can do (**learning outcomes**)
  - at a stage or end of a **formal** or **non-formal learning pathway**

  **or**
  - a state of-the-art at a point of **informal learning**,
  - acquired either **autonomously** or with support of others, revealing the **responsibility** for the outcomes of learning.
- **may** but **does not have** to be
  - documented on paper (credential, testimonial, report, certificate, diploma, degree e.g.).
- **but has to be**
  - **assessed, evaluated, verified or validated** in reference to the learning level descriptors of a qualifications framework **(standard),** such as - for example - knowledge, skills and competence (defined as autonomy and responsibility) of the European Qualifications Framework.

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# What are learning outcomes?

- **Learning outcomes** are concerned with the **achievements of the learner** rather than the intentions of the teacher (expressed in the aims of a module or course). They can take many forms and can be broad or narrow in nature (Adam, 2004).

- Learning outcomes and **'aims and objectives'** are often used synonymously, although they are not the same.
- Adam (2004) notes that **"aims" are concerned with teaching and the teacher's intentions** whilst **learning outcomes are concerned with learning'**.

- Moon (2002) suggests that one way to distinguish aims from learning outcomes is that **aims** indicate the **general content, direction and intentions behind the module from the designer/teacher viewpoint.**

# ECTS User´s Guide 2015

**Learning Outcomes**

are statements of what the individual knows, understands and is able to do on completion of a learning process.

The achievement of learning outcomes has to be assessed through procedures based on clear and transparent criteria.

Learning outcomes are attributed to individual educational components and to programmes as a whole

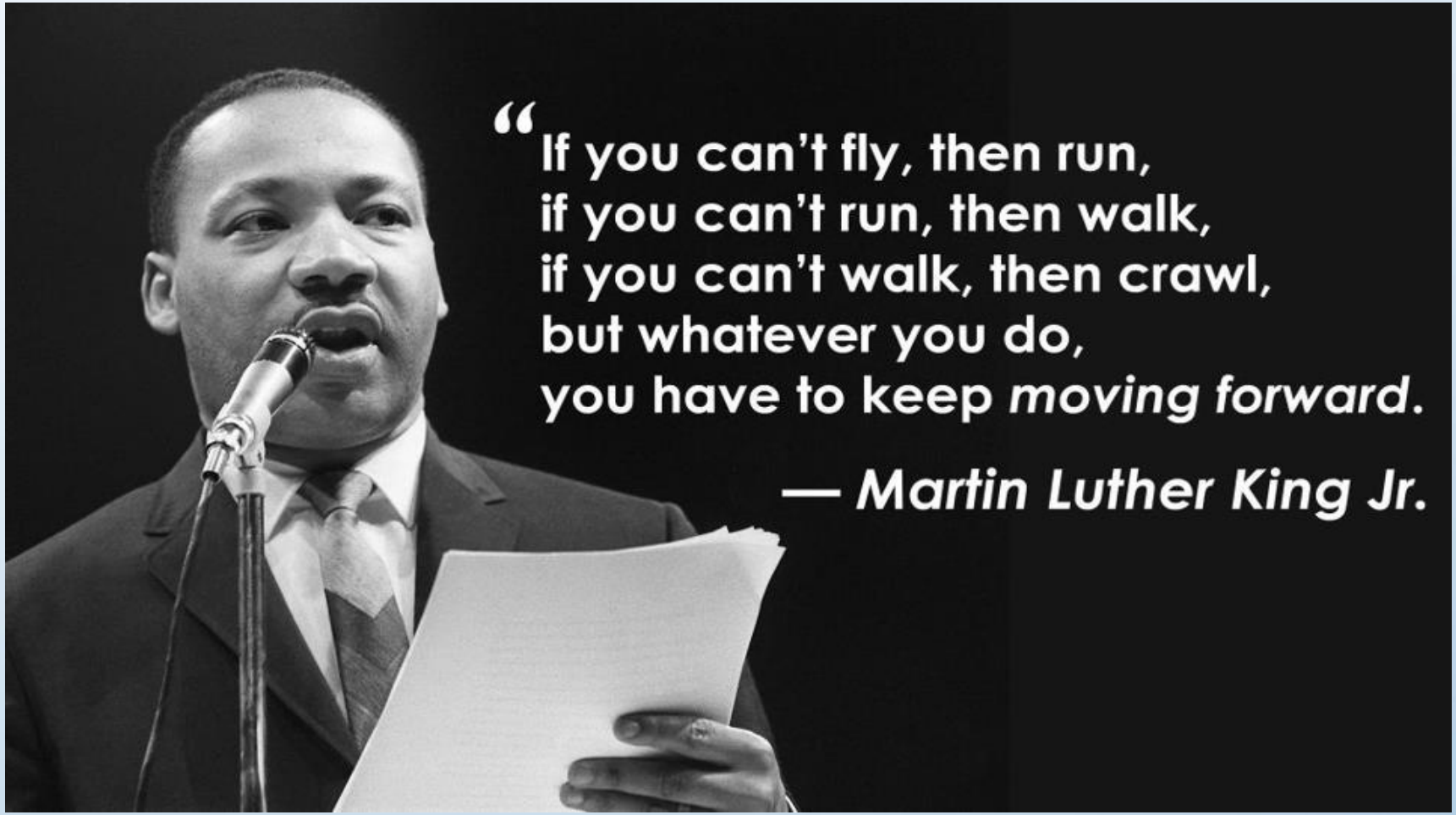
They are also used in European and national qualifications frameworks to describe the level of a specific qualification.

# The learning outcome

- focuses on **THE LEARNER** (subject)
- who has acquired a **type of knowledge** (object)
- by actively involving cognitive, affective and psychomotor **skills** of **domains of learning** (active verbs)
- directing them/being directed **(autonomy)** in an identified **learning environment/learning pathway** (modality)
- to the intended / unintended objective (modality: formal / non-formal / informal learning)
- realising the **responsibility** for the learning activities
- thus stipulating distinctive levels of learning achievements

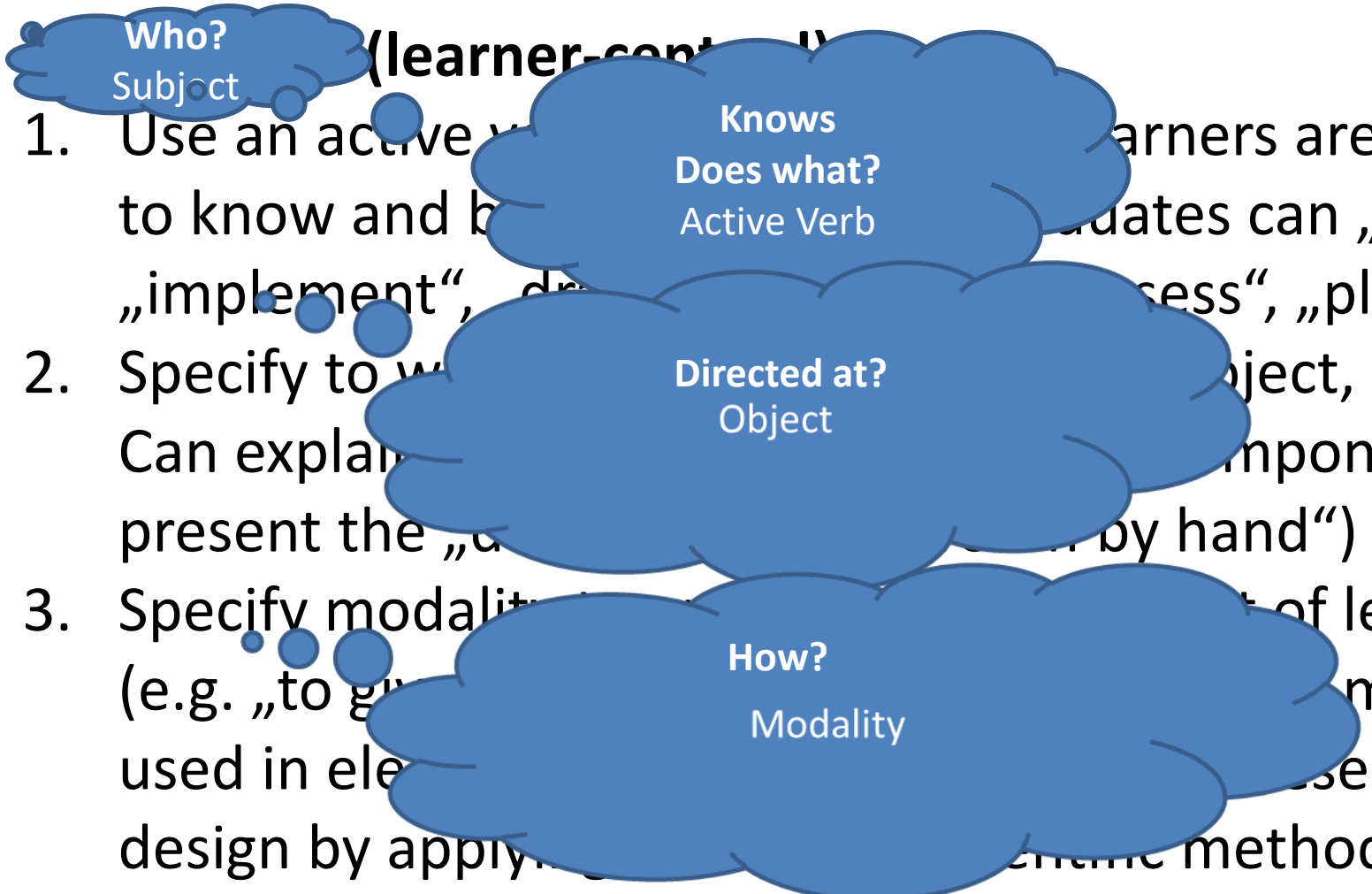
| The Learner Subject | Knowledge<br>Object<br>Le savoir | Skills<br>Activity<br>Le savoir faire | | | | Competence / Autonomy; Responsibility<br>Objective / Goal<br>Le savoir être | |
|---|---|---|---|---|---|---|---|
| **Learning outcomes descriptors** | **The learner knows what** | **Active Verb:<br>can do how** | | | **Context:** | **Modality:<br>can do why?** | |
| Learner´s progression in knowledge & skills | **Type of knowledge** | **Domain of learning** | | | **Direction of learning** | **Learning environment** | **Purpose of learning** |
| | | cognitive | Affective | psychomotor | | | |
| **Level 1** | factual | remember | receive | reflex | simple general facts and figures | structured learning environment; guided by a supervisor | to become aware |
| **Level 2** | | understand | receive | fundamental skills | elementary / basic facts and figures | determined learning environment; depends mostly on a supervisor | become acquainted |
| **Level 3** | conceptual | understand | respond | perceive | specific field | narrow / tall structure;<br>becomes partially autonomous;<br>contributes in groups | state an issue in his/her own words; explain concepts |
| **Level 4** | | apply | respond | perceive | abstraction | wide / flat structure;<br>prepares own objectives shared with groups and discussed with supervisor | Use a concept or abstraction in a new situation |
| **Level 5** | procedural | analyse | value | move skillfully | principles, generalisations, skills, algorithms | subject (discipline, issue, problem)-specific;<br>practice by doing with some direction or coaching by supervisor | identify methods and means to gather data |
| **Level 6** | | analyse | prioritise values | move skillfully | concepts | subject (discipline, issues, problem, profession)-specific;<br>in principle autonomous | identify broad structure, techniques, methods, criteria to determine procedures |
| **Level 7** | metacognitive | evaluate | prioritise values | non-discursive communication | meta-cognitive activities | Individual/ group work in educational/ professional contexts;<br>can define gaps, raise research questions, find answers with limited guidance | describe, relate cognitive tasks, check opinions and practices |
| **Level 8** | | create | Internalise values | non-discursive communication | new meanings, structures, approaches | diverse elements, reveal gaps;<br>creative based on highly developed | rearrange existing perspectives; create a new structure or pattern; reveal gaps in |

# What is a taxonomy?




A **hierarchical order**, e.g. scale of activities

**Well formulated learning outcomes comprise at least three essential elements (see Moon 2004):**




**(learner-cent[illegible])**

1. Use an active v[illegible]arners are expected to know and b[illegible]duates can „describe“, „implement“, „dr[illegible]sess“, „plan“…)
2. Specify to w[illegible]ject, skill, e.g. Can explai[illegible]mponents“; can present the „d[illegible]by hand“)
3. Specify modalit[illegible]t of learning (e.g. „to g[illegible]most often used in ele[illegible]search design by apply[illegible]methods“, etc…

| Learner´s Progression → Domain | KSC | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Learning outcomes** | **Level 1** | **Level 2** | **Level 3** | **Level 4** | **Level 5** | **Level 6** | **Level 7** | **Level 8** |
| **Knows** | **Factual Knowledge** | | **Conceptual Knowledge** | | **Procedural Knowledge** | | **Metacognitive Knowledge** | |
| **Can do cognitively affectively<br><br>physically** | Remember<br>receive<br><br>reflex movement | Understand<br>receive<br><br>fundamental movement | Understand<br>respond<br><br>perceptual abilities | Apply<br>respond<br><br>perceptual abilities | Analyse<br>value<br><br>skilled movements | Analyse<br>Organising values into priorities<br>skilled movements | Evaluate<br>Organising values into priorities<br>nondiscursive communication | Create<br>Internalise values<br>nondiscursive communication |
| **What** | simple general facts and figures | elementary/ basic facts and figures | specific field | abstraction | principles, generalisations, skills and algorithms | material, concepts | meta-cognitive activities, | New meanings, structures, approaches, |
| **Learning environment** | structured learning environment | determined learning environment | narrow structure | larger structure | subject (disciplin, issue, problem)-specific | subject (disciplin, issues, problem, profession)-specific | Individual/ group work in educational/ professional contexts | diverse elements, reveal gaps |
| **Purpose<br>What for?** | become aware | become acquainted | state an issue in one´s own words; explain concepts | use a concept or abstraction in a new situation | identify methods and means to gather data | identify broad structure, techniques, methods, criteria to determine procedures | describe, relate cognitive tasks, check opinions and practices | rearrange existing perspectives; create a new structure or pattern;<br>Reveal gaps in existing facts, figures and assumptions |

| Level | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| **Alternative active verbs** | define, describe, identify, know, label, list, match, name, outline recall, recognise, remember, reproduce, retrieve, select, state | as at level 1 | comprehend, convert, defend, distinguish, estimate, explain, extend, generalise, give an example, infer, interpret, paraphrase, predict, rewrite, state, summarise, translate | change, compute, construct, demonstrate, discover, manipulate, modify, operate, predict, prepare, produce, relate, show, solve, use | break down, compare, contrast, diagram, deconstruct, differentiate, discriminate, distinguish, identify, illustrate, infer, outline, relate, select, separate | break down, compare, contrast, diagram, deconstruct, differentiate, discriminate, distinguish, identify, illustrate, infer, outline, relate, select, separate | appraise, compare, conclude, contrast, criticise, critique, defend, describe, discriminate, evaluate explain, interpret justify, relate, summarise, support | categorise, compile, combine, compose, create, devise, design, explain, generate, modify, organise, plans, rearrange, reconstruct, relate, reorgnise, revise, rewrite, summarise, tell, write |
| **Key terms of learning environment** | general/simple, structured | elementary/basic, determined | Inter-relationsships of basic elements | complexity theories, models | principles, generalisations, skills, algorithms, specific purposes | component parts, subject-specific techniques and methods, appropriate procedures | Individual-/ group work in educational / professional contexts | diverse, gaps |

# Learning Outcomes

- When writing learning outcomes, there are a few rules that you should follow:

1. Learning outcomes always use an action verb.
2. Learning outcomes must be written clearly, and should be easy to understand.
3. Learning outcomes should clearly indicate what learners should learn from within the discipline they are studying.
4. Learning outcomes must show what the expected level of learning or understanding should be, and it should be reasonable to the level of the learners.
5. Learning outcomes help with assessment, and thus should clearly indicate what success looks like for the learner.
6. There should not be too few or too many learning outcomes. Six-ten appears to be a useful number.

# Learning Objectives vs Learning Outcomes

- **Is there a difference between learning objectives and learning outcomes?**

Learning Outcomes and Learning Objectives are significantly similar concepts, although there are fundamental differences between them, namely:

**Learning Objectives.**

- Describe the goals and intentions of the professor who teaches the course.
- Focus on the content and skills important within the program.
- Describe what the staff and faculty will do.
- State the purpose and goals of the course.

**Student Learning Outcomes.**

- Describe or list essential, measurable mastered content, reflecting skills, competencies, and knowledge that students can demonstrate successfully upon completing a course.
- Are exactly what Assessments show that the student is able to do upon completing the course.
- Are an end-product that can be displayed or observed and evaluated against criteria.
- Are clear and measurable criteria for guiding the teaching, learning, and assessment process in the course.

**Student-Centred Learning (SCL) is a process of qualitative transformation for students and other learners in a learning environment, aimed at enhancing their autonomy and critical ability through an outcome-based approach (ECTS User´s Guide).**

## Key elements are:

- Reliance on **active** rather than passive learning
- Emphasis on **critical and analytical** learning and understanding
- Increased **responsibility and accountability** on the part of the student
- Increased **autonomy** of the student
- A **reflective approach** to the learning and teaching process on the part of both the student and the teacher

# Challenge at Programme level

**In outcome-based education the educational outcomes are clearly and unambiguously specified.**

These determine the curriculum content and its organisation, the teaching methods and strategies, the courses offered, the assessment process, the educational environment and the curriculum timetable.

They also provide a framework for curriculum evaluation.

(Harden et al., 1999a)



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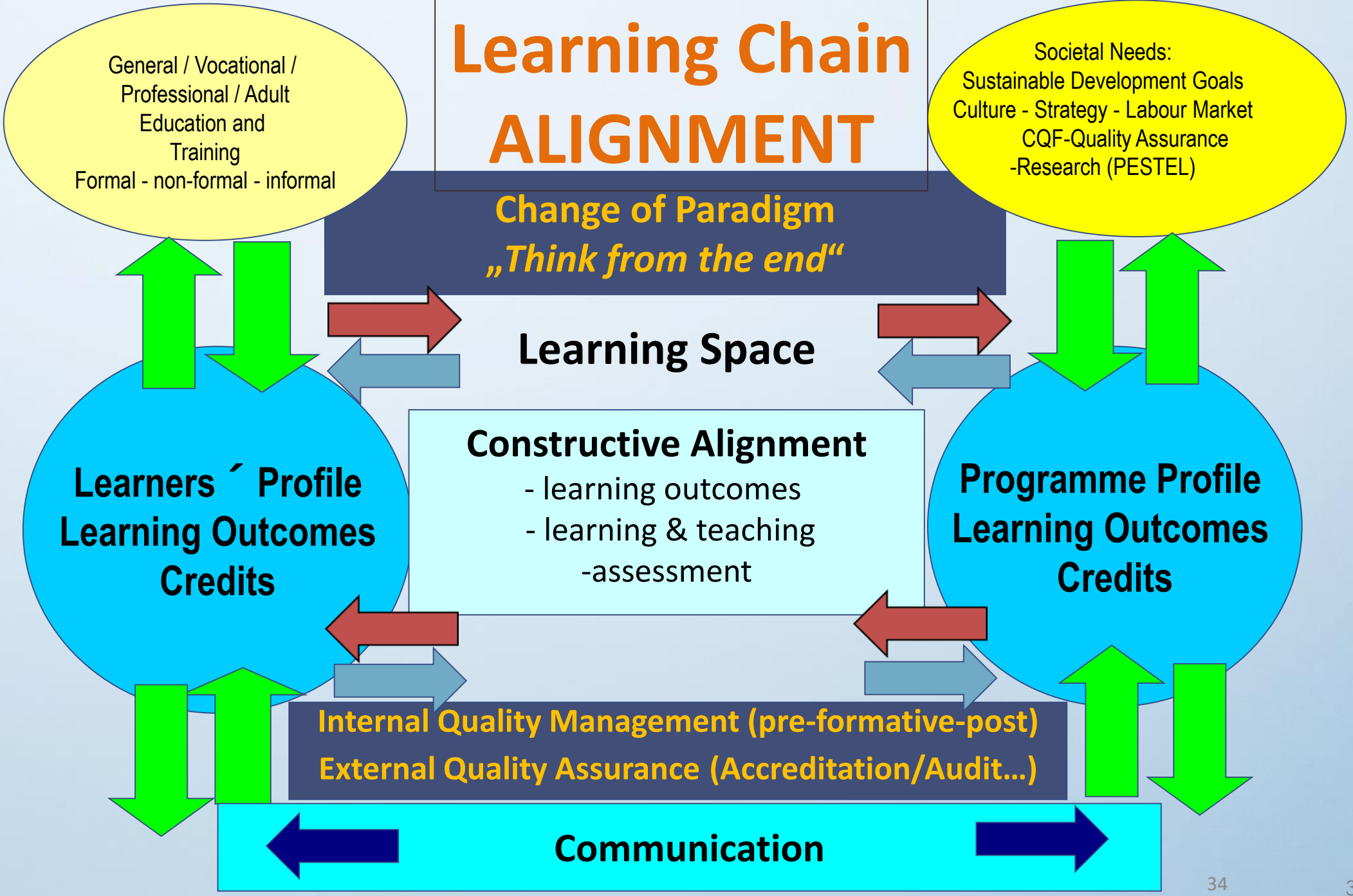
Learning Chain
ALIGNMENT
General / Vocational /
Professional / Adult
Education and
Training
Formal - non-formal - informal
Societal Needs:
Sustainable Development Goals
Culture - Strategy - Labour Market
CQF-Quality Assurance
-Research (PESTEL)
Change of Paradigm
„Think from the end“
Learning Space
Learners ´ Profile
Learning Outcomes
Credits
Constructive Alignment
- learning outcomes
- learning & teaching
-assessment
Programme Profile
Learning Outcomes
Credits
Internal Quality Management (pre-formative-post)
External Quality Assurance (Accreditation/Audit…)
Communication



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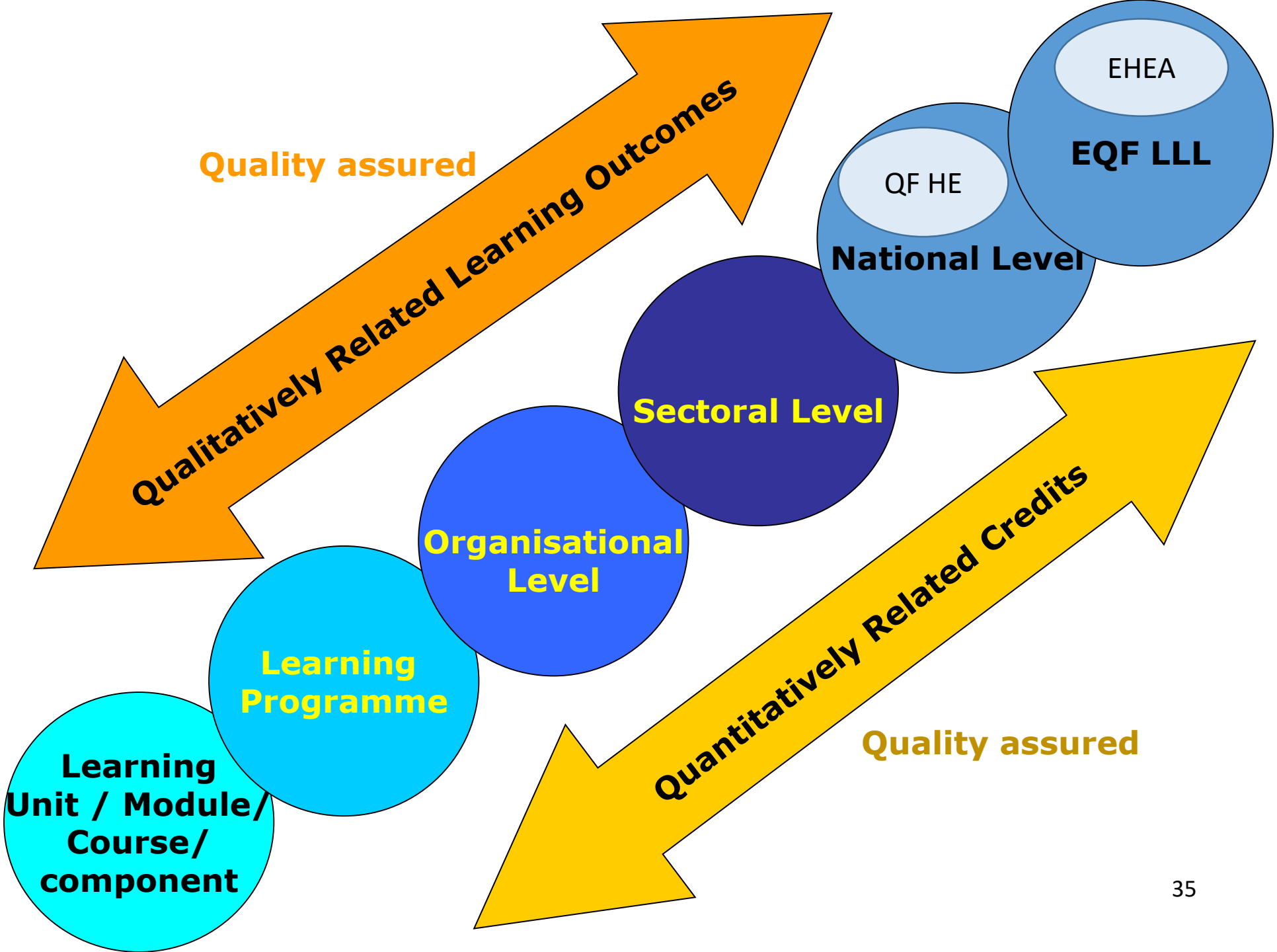

Quality assured
Qualitatively Related Learning Outcomes
EHEA
EQF LLL
QF HE
National Level
Sectoral Level
Organisational Level
Learning Programme
Learning Unit / Module/ Course/ component
Quantitatively Related Credits
Quality assured

**Example: Qualifications Framework (NQF) – Level 6 (range: 1-8)**

Level 6

| Level 6<br>The learner | Knowledge<br>Analysing<br>Knows to | Skills<br>Organising values into priorities (Prioritising)<br>Can do what | Attitude / Autonomy<br>Adaptation<br>Can do how | Attitude / Responsibility<br><br>Can do how? |
|---|---|---|---|---|
| Learning Outcomes 6 | Procedural Knowledge<br>Break down material or concepts into **component parts** so that its broad subject-specific structure can be understood;<br>Identify **subject** (discipline, issue, problem, profession)-**specific techniques and methods**;<br>Outline **criteria** to determine **appropriate procedures** | **Distinguish** between facts, opinions and interferences;<br>**Illustrate** a critical understanding of theories and practices of the environment by contrasting different value-systems;<br>**Make limited judgements** about the value of ideas and materials | Use well developed skills, and be able to modify/change patterns to **fit special requirements**;<br>Identify **research gaps**;<br>Develop initial **research questions** | The learner possesses awareness of **ethical issues**;<br>The learner is aware of their personal responsibility and professional **codes of conduct** |
| **Key terms** | Analyse, break down, compare, contrast, diagram, deconstruct, differentiate, discriminate, distinguish, identify, illustrate, infer, outline, relate, select, separate<br>Component parts, subject-specific techniques and methods, appropriate procedures | Appreciate, cherish, treasure, demonstrate, initiate, invite, join, justify, propose, respect, share<br>Compare, relate, synthesise<br><br>(NB: This is done by contrasting different values, resolving conflicts between them, and creating a unique value system. The emphasis is on comparing, relating, and synthesising values, see also level 5) | In principle can adapt, alter, change, rearrange, reorganise, revise, vary | |
| Learning objective 6 | Elementary Strategic knowledge, **Proficiency** in a subject (discipline, issue, problem)-specific field in an educational / training / professional environment (structure) | | | |

| National Standard | Curriculum Development HE Programme | Curriculum Development Modules |
|---|---|---|
| **Benchmarks**<br>**European QF LLL, EQF for HE qualifications…** | **Benchmarks**<br>**Validated programmes in Business Studies inside or outside the institution and the country** | **Benchmarks**<br>**Validated modules in Business Studies inside or outside the institution and the country** |
| **LO Generic First Degree Qualification (Level 6)** | **LO Discipline- (Subject-) Specific (Example: Programme Learning Outcomes of General Business Studies)** | **LO Study-Programme Specific Components (Example: Module Management Tools)** |
| **Procedural Knowledge**<br>The graduate with a First Degree …<br>-has acquired the knowledge to break down material or concepts into **component parts** so that its broad subject-specific structure can be understood;<br>-can identify **subject** (discipline, issue, problem, profession)-subject **specific techniques and methods**;<br>-outline **criteria** to determine **appropriate procedures** | **Procedural Knowledge**<br>The graduate of the programme General Business Studies…<br>-has acquired proficiency in principles of Business Studies through learning and teaching<br>-can analyse the principles to identify their constituent parts by applying scientific techniques and methods in the light of various types of businesses<br>-can relate the components to reveal the elementary processes of key business functions within a micro and macro environment according to the business mission | **Procedural Knowledge**<br>The graduate of the module Management Tools (MT) as a part of the programme General Business Studies…<br>-has acquired proficiency in management tools for a business organisation<br>-can design a strategy and develop business organisations strategically<br>-can identify the characteristics of various tools as regards different types of business organisations and environments<br>-can contrast various strategies to propose appropriate procedures |
| **Generic Skills**<br>The graduate with a first degree…<br>**-can distinguish** between facts, opinions and interferences;<br>**Illustrate** a critical understanding of theories and practices of the environment by contrasting different value-systems;<br>**Make limited judgements** about the value of ideas and materials | **Subject Specific**<br>The graduate of Business Studies can…<br>-relate theory to practice by taking into account various environments and types of organisations<br>-can demonstrate alternative routes to business success according to economic principles<br>-can critically compare the routes and justify proposed ideas and materials in line with the value system of the business being aware of facts and figures, fake news and realistic objectives | **Subject Specific**<br>The successful learner of the module MT…<br>-can relate management tools to the environment in which they can be used<br>-can interpret strategic issues in different contexts<br>-can realise how strategy development can be seen<br>-can appreciate the implications for strategy development<br>-can manage strategically business activities / projects |
| **Autonomy in Activities**<br>The graduate with a first degree…<br>-can use well developed skills, and is able to modify/change patterns to **fit special requirements**;<br>-can identify **research gaps**;<br>-can develop initial **research questions** | **Autonomy in Activities**<br>The graduate of Business Studies autonomously…<br>-can select between a range of strategies to adapt the business organisation to changing markets<br>-can identify significant future needs on the basis of researched gaps<br>-can organise and guide himself or join others to share opinions and ideas in both day-to-day and scientific work | **Autonomy in Activities**<br>The successful learner of the Module MT autonomously…<br>-can apply techniques of strategy analysis<br>-can use different viewpoints on strategy to explain observable processes in organisations<br>-can explain implications of different scenarios and different strategies<br>-can initiate corrective actions |
| **Responsibility for Activities**<br>The graduate with a first degree…<br>-is aware of the personal responsibility<br>-possesses awareness of **ethical issues**;<br>-acts according to general and professional **codes of conduct** | **Responsibility for Activities**<br>The learner of Business Studies …<br>-is aware of the potential outcomes of strategies proposed<br>-can rearrange work to allow individuals to develop<br>-respects the code of conduct of businesses in line with the mission statement of the business organisation<br>-make decisions in the light of suitability, acceptability, feasibility and sustainability | **Responsibility for Activities**<br>The learner of the Module MT…<br>-can demonstrate the impact of national and organisational culture on strategy formulation and implementation<br>-can communicate transparently to allow others to come to solutions respecting organisational and national cultures<br>-can design plans for staff development<br>-can manage change transparently in a cooperative manner |

# Example: Postgraduate Computer Science Degree (Declan Kennedy)

On completion of this programme the student will 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 an 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

| Student Subject | Does what? Active verb | Directed to? Object | How? Specification/Modality |
|---|---|---|---|
| …will be able to… | perform | academic industrial environments | solve problem |
| | Use, manipulate, create | computational systems | large |
| | Work | team member | effectively |
| | Organise, pursue | scientific or industrial research project | |
| | Write | theses, reports | professional standard |
| | Prepare, present | seminars | professional standard |
| | perform | Time management | independent, efficient |
| | Use, display | IT skills , computer literacy | mature |

# Example: undergraduate engineering degree

On completion of this programme, the student will 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 specifiec 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

| Student Subject | Does what? Active verb | Directed to? Object | How? Specification/Modality |
|---|---|---|---|
| …will be able to… | Derive, apply | Solutions | from knowledge of sciences, engineering s., technology, mathematics |
| | Identify, formulate, analyse, solve | engineering problems | |
| | Design<br><br>Conduct<br>Anaylyse, interpret | System, component, process<br>Experiments<br>data | meet specified needs |
| | Work | Engineering community, wth society at large | Effectively |
| | Communicate | Engineering community, with society at large | effectively |

# Example of Mapping

| PRLO | EduComp 1 | EduComp 2 | EduComp 3 | EduComp 4 |
|---|---|---|---|---|
| Derive, Apply | | | x | x |
| Identify,<br>Formulate<br>Analyse<br>Solve | x | x | x | x |
| Design<br>Conduct,<br>Analyse<br>Interpret | | x | | x |
| Work | | x | x | x |
| Communicate | x | | x | x |

NB:
PLO = Programme Learning Outcome
EC = Educational Component 1, 2…etc….
LO = Learning Outcome

# Objectives of competence-oriented assessment

**SMART**

- Specific
- Measurable
- Adequate
- Relevant
- Timely

**MEANS**

- Unambiguous
- Feasible
- Acceptable
- Realistic, competence oriented
- In which / at which time

**Potential Conflicts**

# Competences: Input, Application and creation of knowledge

1. Level descriptors
2. Competences according to Weinert (2001)

   To

   - analyse and structure (cognitive)
   - make decisions (cognitive, motivating / intentional / social)
   - transfer (cognitive, motivating / intentional)
   - act entrepreneurially (cognitive, motivating, intentional, social)
3. Assessment
   - oral examinations
   - Presentations
   - Papers
   - Log-books
   - Portfolio
   - Simulation
   - Computer supported forms

# Assessment Criteria
# Potential Conflicts (Examples)

**Smart criteria**

- Relevance versus Measurable
- Measurable versus Suitability /Fairness
- Relevance / Realistic versus demanding /adequate

  versus timeline

**Learning outcomes**

- Ability to work in teams
  - Group work?
- Ability to speak
  - Written examination?
- Proposals to act
  - Level bachelor thesis
  - 6-Weeks

# Business in Context (2004/2005)

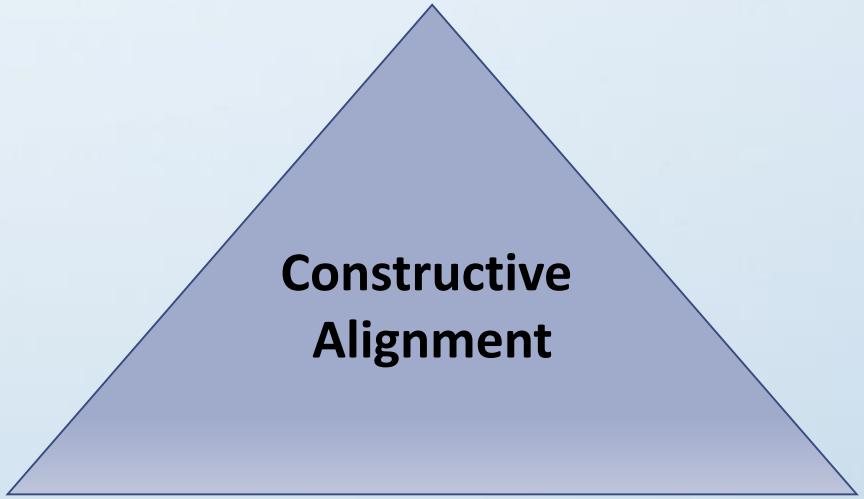
## Assignment

| Criteria | Weighting % | 70%+ | 60-69% | 50-59% | 40-49% | Fail |
|---|---|---|---|---|---|---|
| **Generic: Communication** | 5 | Communicates to reader succinctly with very good clarity and coherence. There is good physical presentation. | Small element of distinctive coherence and structure and presentation missing. | Clear presentation of basic arguments and structure. Poor elements can be compensated by other good work. | Some element of coherent argument and structure. | Difficult to read and follow arguments. Very untidy physical presentation. |
| **Knowledge & Understanding** | 20 | Comprehensive, clear demonstration of required concepts and practical knowledge and understanding. Wide reading used | Mainly clear and comprehensive: small element missing or elementary. | Basic knowledge and understanding of material across board or incomplete compensated by good elements. | Elementary knowledge and understanding displayed. Incomplete. | Demonstrates no or very limited knowledge or understanding or required material. |
| **Analysis** | 30 | Demonstrates clear incisive ability to assess range of information analytically. | Demonstrates overall effective analysis of material, with some element missing allowed. | Basic analysis of material and comparisons. | Mainly descriptive: little analysis. | Descriptive only - no analysis. |
| **Synthesis/ Creativity/ Application** | 10 | Distinctive display of creativity and ability to synthesise material | Significant element of synthesis and creativity. | Small element of sunthesising arguments and showing creativity displayed. | Limited/elementary creativity and synthesis. | No creativity or synthesis of material displayed. |
| **Evaluation** | 30 | Demonstrates clear, incisive ability to evaluate information in all forms. | Some (significant) element of incisive, clear eveluation, above basic level. | Basic evaluation of information and appropriateness of concepts and models. | Only elementary evaluation of material presented. | Extremely limited evaluation of material - both practical and concepts. |
| **Assignment Parameters** | 5 | Follows parameters/guidelines exactly as asked. | Small element of guidelines missing or inadequate. | Satisfactory, basic adherence to all guidelines or compensation by some distinctive element. | Small element of parameters/guidelines followed. | Parameters not followed. |
| **Total** | 100 | | | | | |

# THE BERMUDA TRIANGLE

**Learning Outcomes**

statements about ksc of the learner




**Assessment**

criteria & methods to evaluate the learner´s progress and ascertain the achievement of the LO

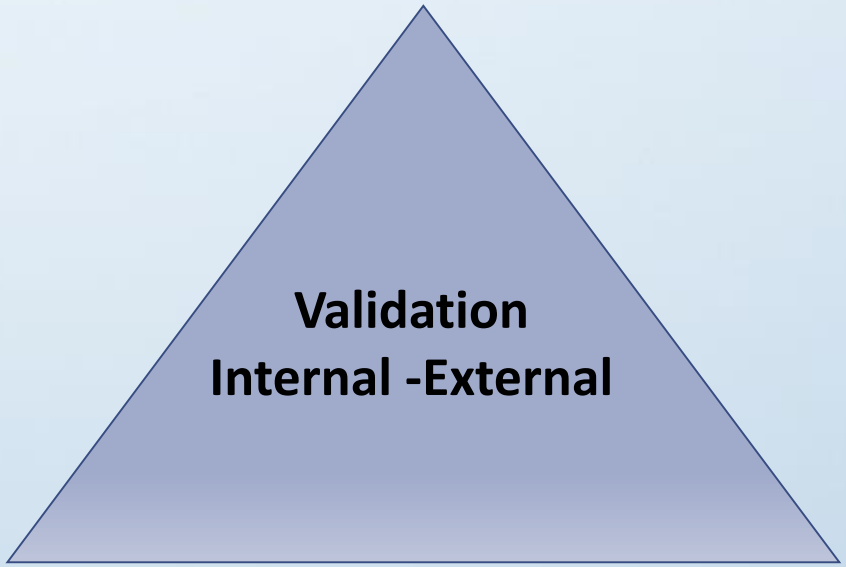
**Workload**

estimation of what is needed to cope successfully with the volume of learning and teaching in relation to 60 credits per full-time academic year

# THE BERMUDA TRIANGLE

**Learning Outcomes**
***Qualifications/-framework***

Formal
Non-formal
Informal
Education/Training-system




**Assessment**
***Grad(e)-ing/ -system***

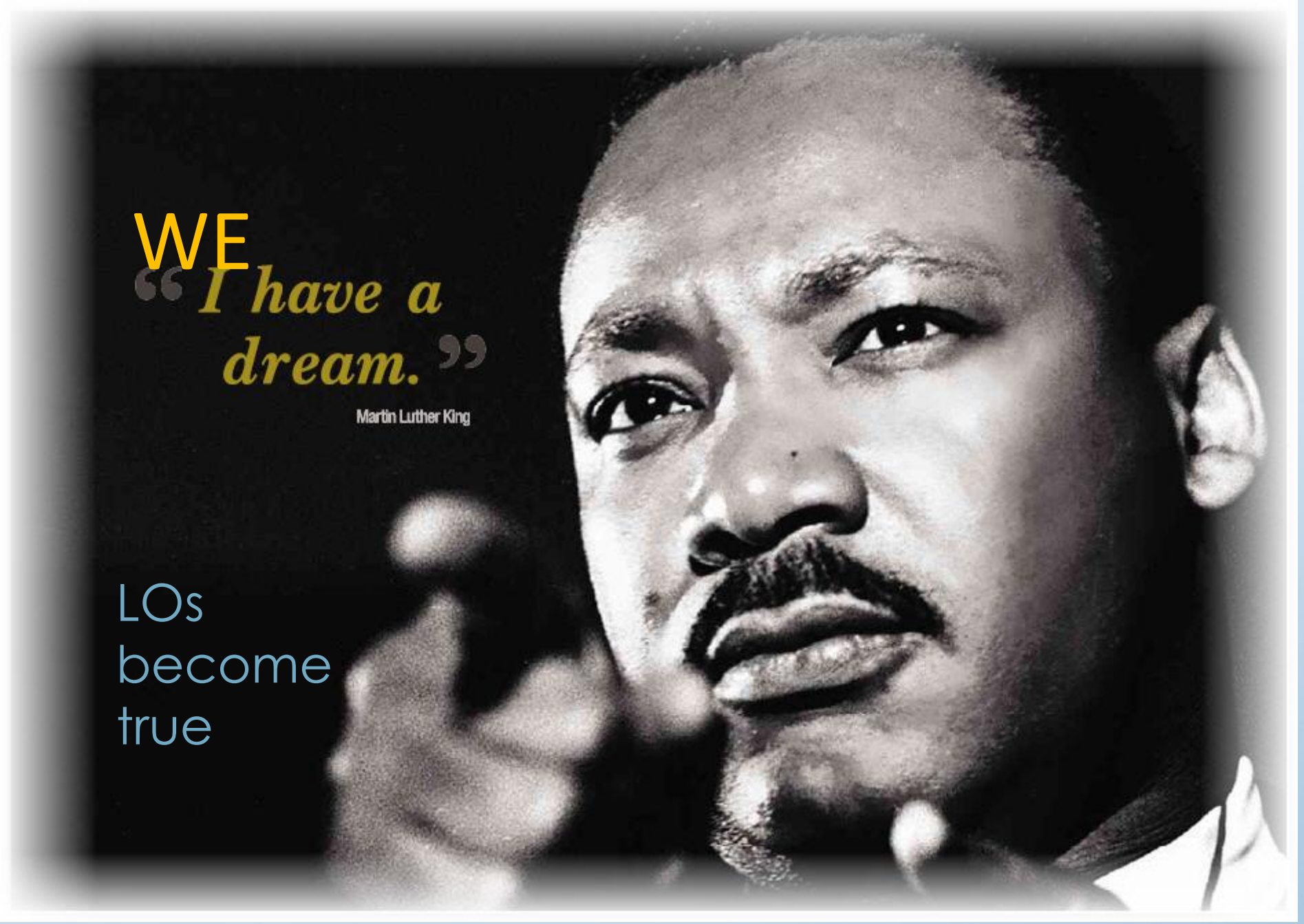
**Workload**
***Credit/-system***

# Think Point

- What else is needed?

- Train all stakeholders
- Define your taxonomy according to… e.g. updated version of Bloom´s for a sector, for your institution, for your programme…
- Adjust your Education & Training System


it is possible to put lipstick on a pig – but it stays a pig.
Achieving a common understanding of the Bologna Reform is much more than putting on lipstick – and much more than lipservice


WE
“I have a dream.”
Martin Luther King
LOs become true


THE END
or
THE BEGINNING ?