



# PROGRAMME DESIGN & ASSESSMENT

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Coherence, Sequence and Integration in a  
Programme

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Author: Geraldine O'Neill

Email: [geraldine.m.oneill@ucd.ie](mailto:geraldine.m.oneill@ucd.ie)

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## Coherence, Sequence and Integration in a Programme

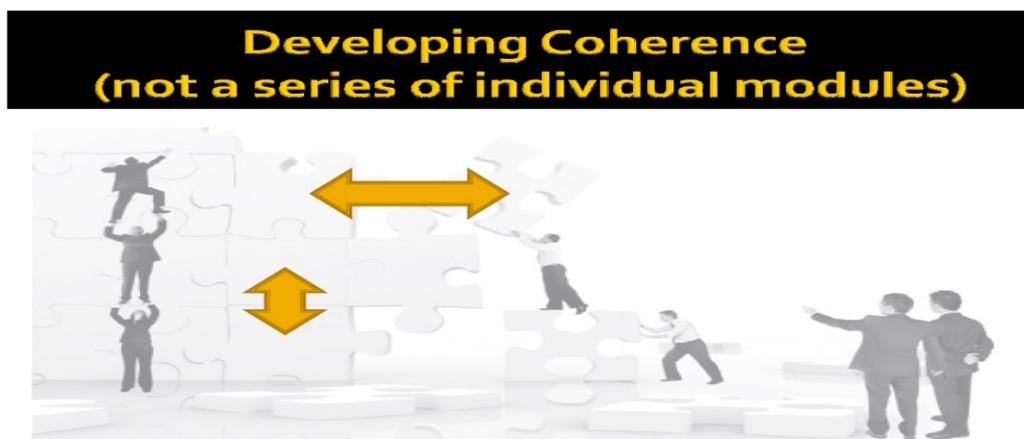
*Geraldine O'Neill.*

Having established a need for a programme, set out a programme's educational philosophy/models and had an initial attempt at the programme outcomes, then it is time to consider the relationship of the programme's components. This is an often neglected aspect of curriculum design:

*'Most curricula are unfocused...There is a notable absence of structure and coherence'. Gardiner, 1996 (cited in Diamond, 1998, p85)*

In some contexts, where there has been a focus on module design, the curriculum can often be limited to collection of all the modules and as a result lacks coherence. The challenge is therefore to develop some coherence in the relationship between these modules (Figure 1).

*Figure 1: Developing coherence between modules*



In order to address this challenge, Ornstein and Hunkins maintain that this aspect of the curriculum design should be to achieve: A) Scope, B) Sequence, C) Continuity, D) Integration, E) Articulation and F) Balance (Ornstein & Hunkins, 2009, p186-190).

## A. SCOPE

Scope refers to the breadth and the depth of content in a curriculum. This content must include both the knowledge domain and other aspects, such as, affective (values and attitudes) and where appropriate Psychomotor (motor) skills. This is often described as the discipline-specific and generic skills required in a curriculum. The challenge in recent years, when deciding on the Scope of a programme, has been the huge information explosion in the last 20-30 years (Figure 2). In parallel, there has been an increased availability of resources on-line. The key question can often be down to: *What does the teacher cover?* versus *What does the student seek out and do?*

Figure 2: The Information Explosion;

[http://astech.library.cornell.edu/ast/phys/additional/images/journals\\_lg\\_1.jpg](http://astech.library.cornell.edu/ast/phys/additional/images/journals_lg_1.jpg)



Educators have adopted a few different strategies in how they have handled this information explosion. For example by:

- Reducing content
- Ignoring certain content
- Excluding, or alternatively focusing on, new content
- Integrating existing content into Themes
- Linking with Graduate attributes to guide content
- Increasing the emphasis on life-long learning and information retrieval skills.

There is a danger in trying to achieve a very wide Scope in a curriculum that *'as students race through the topics they have less opportunity to engage in the process of sorting, comparing, prioritizing and critiquing... ideas'* (Clark and Linn, 2003). A balance needs to be found on how much to cover. It has also been noted that information overload can lead

to a more surface approach to learning, where students then fail to remember the information at a later date. Knight (2001) also maintains that:

- More complex learning (including creativity) depends on their being slack and space or spare capacity in the system;
- There should be opportunity for depth study;
- Curriculum should not be overcrowded; and
- time for strategic thinking, reflection, planning and portfolio making should be written into a programme

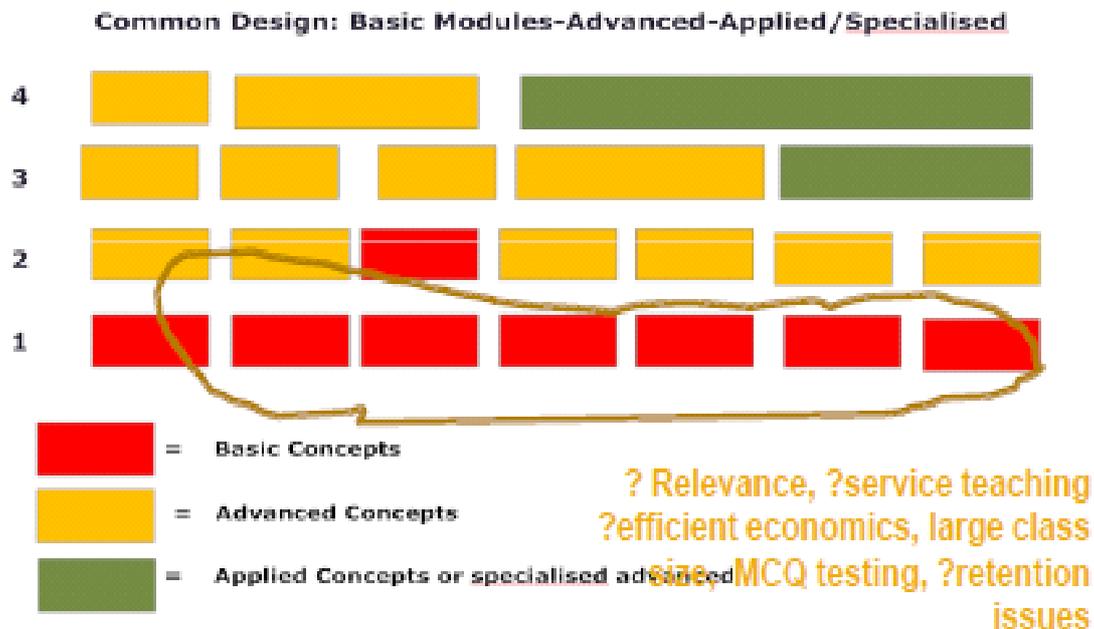
## B. SEQUENCE

The Sequence in a curriculum focuses on the order in which things occur. One approach to Sequence is the based on the logic of the subject matter, , another approach is based on the way individual process knowledge (Ornstein and Hunkins, 2009). Four different ways of approaching the design of this can be:

- Simple to complex learning
- Prerequisite Learning (bits grasped before others)
- Whole to part (Inquiry/PBL /concept)
- Chronological learning (Historical/developmental)

These areas are not mutually exclusive, for example, simple concepts can be introduced in the early years of a curriculum building onto more complex (advanced) concepts in later years. This does not exclude a programme from introducing a more inquiry-based approach in some aspect of the early years of a programme. One danger with the over-emphasis on the simple to complex approach as the only organizer is that the early years of a programme can be un-interesting and very heavily laden with facts (see Figure 3)

Figure 3: A Common Design with associated difficulties



There is a range of literature (See Table 1) that highlights different assumptions and suggestions for sequence in a curriculum and whereas there is no prescription on what is ideal for any one programme, there should be a discussion on the sequence of a curriculum by the programme design team.

Table 1: Overview of Literature on Sequence in the Curriculum

There is a long-standing controversy over whether the sequence of content and experiences should be based on the <b>logic of the subject</b> or the <b>way individuals process knowledge</b> (Ornstein & Hunkins, 2009, p187)
Content can be sequenced by <b>time</b> (history course), <b>spatial relationships</b> (country in geography); <b>species</b> : simple to complex (biology); <b>forms of expression</b> (art: drawing, painting, sculpture) (literature: poetry, prose, drama); <b>functional systems</b> (respiratory, digestive: medicine); <b>processes</b> (human resource management: life cycle of employee for recruitment to retirement) <b>or a combination</b> of some of these (Toohey, 1999, p92)
Content is optimally organised around in a sequence from <b>simple to complex</b> components (Ornstein & Hunkins, 2009, p187)
Unpractised skills atrophy quickly, particularly core skills such as computation and writing (Diamond, 1998, p84)
Course content and its flow of topics are the kind of <b>logical relationship</b> we as teachers like to construct, combined with what we think the is the <b>order that</b>

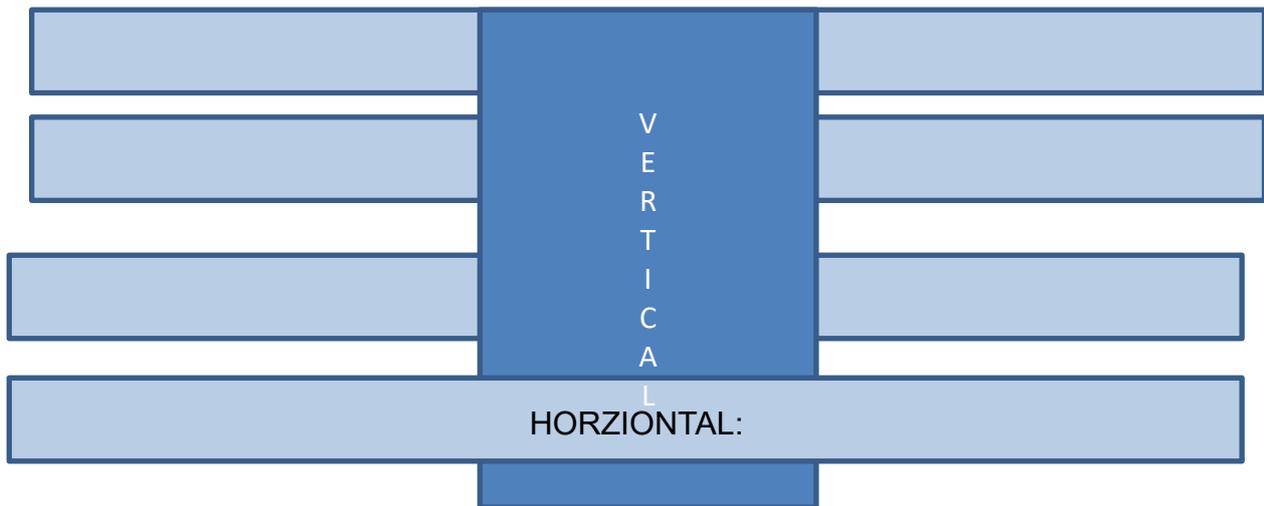
<p><b>student might find easiest</b> to study (Open University, 1999; Learning, Curriculum and Assessment Study Guide)</p>
<p>Cognitive psychologists have urged that the curriculum be arranged so that <b>content or experience is presented first</b> in an overview (Ornstein &amp; Hunkins, 2009 p188)</p>
<p>Socially critical model: Content is drawn from <b>significant social problems of the day and organised around themes</b>, investigations or projects. (Neary, 1999, p65)</p>
<p><b>Student should chose and sequence</b> their own topics in their curriculum, i.e. a negotiated curriculum (Neary, 1999, p111-114)</p>
<p>Perry's model (1998) is concerned first with how (College) students move from a <b>dualistic (right versus wrong) view of the universe to a more relativistic view</b>, and second, how students develop commitments within this relativistic world. There is a strong learning connotation in Perry's model since students <b>cannot understand or answer questions which are in a developmental sense too far above them</b>. (Wankat &amp; Oreovicz, accessed March 2009  <a href="https://engineering.purdue.edu/ChE/AboutUs/Publications/TeachingEng/chapter14.pdf">https://engineering.purdue.edu/ChE/AboutUs/Publications/TeachingEng/chapter14.pdf</a>)</p>
<p>Curriculum should be designed to <b>mirror the professional development of skills from a novice to expert</b> (Eraut,1994; Dreyfus &amp; Dreyfus,1986)</p>

## C. CONTINUITY

Whereas Scope is often associated with Horizontal curriculum design, Continuity is often described as the vertical integration of the curriculum design (See Figure 4) . Continuity in a curriculum provides student opportunities to revisit knowledge and skills in more depth as they progress through the years. *Students succeed best ....when such skills (higher order) are reinforced throughout their educational programme. Student learn best... when they are required to synthesize knowledge and skills learned in different places....*(AAHE, 1996, pp5-8).

Continuity can be in the subject matter, but can also be in other skills such as team-working, problem-solving. Assessment procedures should reflect this developmental approach, by requiring students to achieve higher-order cognitive competencies, for example, to judge, debate issues. Alternatively, assessments can require students to build higher levels of responsibility or autonomy in a skill, i.e. peer/self assessment.

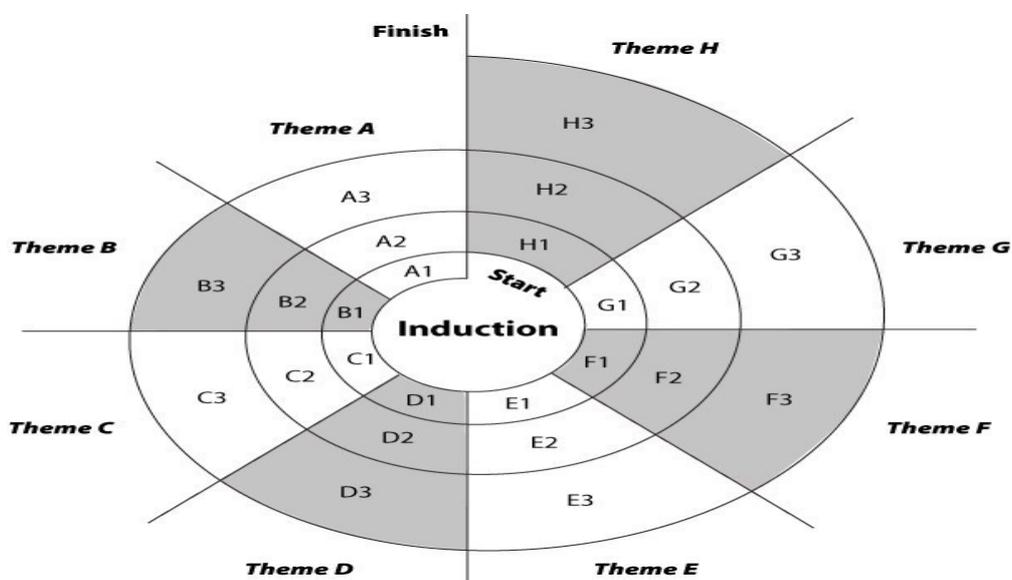
Figure 4: Vertical and Horizontal Curriculum Design.



One classic example of a curriculum design model that gives particular attention to Continuity is the 'Spiral Curriculum' (See Figure 5) . This idea builds on Bruner's (1971) work that emphasizes building on prior knowledge.

Spiral curriculum organizes the programme into themes that require further depth as students progress through the programme. This approach is popular in many health science curricula.

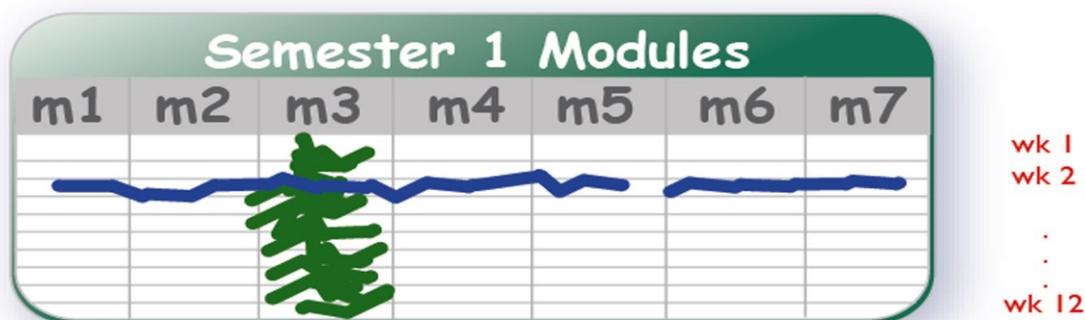
Figure 5: Spiral Curriculum.



Adapted by Diane Cashman  
from Neary, 2002, p 104

Another approach to continuity, seen in some programmes, is to develop a core module that builds through-out all years of the programme (see m3 in Figure 6). It exists vertically throughout the programme but draw together some of the horizontal relationships (Intergration). This model has also been used to develop some core generic skills vertically into curricula, i.e. Enquiry-based learning (O'Neill & Moore, 2008).

Figure 6: Vertical Development of One Core Module (m3) throughout the Programme.  
(O'Neill & Moore, 2008, diagram designed by Diane Cashman)



## D. INTEGRATION

Integration is concerned with the linkages of information in order that student can develop a holistic overview of the curriculum. Integration of knowledge has been described by some as more than just making links within a curriculum, but as linking curriculum to real-world themes (Ornstein and Hunkins, 2009). Modularisation has been criticised for its lack of attention to integration.

*Integrative learning 'comes in many varieties: connecting skills and knowledge from multiple sources and experiences; applying theory to practice in various settings; utilising diverse and even contradictory points of view; and, understanding issues and positions contextually (Huber and Hutchings, 2004, p. 13).*

Knowledge integration is linked with the idea of Continuity as Clark and Linn (2003) maintain that knowledge integration takes time, energy, varied activities and many opportunities to make connections. *Student learn best... when they are required to synthesize knowledge and skills learned in different places..... (AAHE, 1996, pp5-8).*

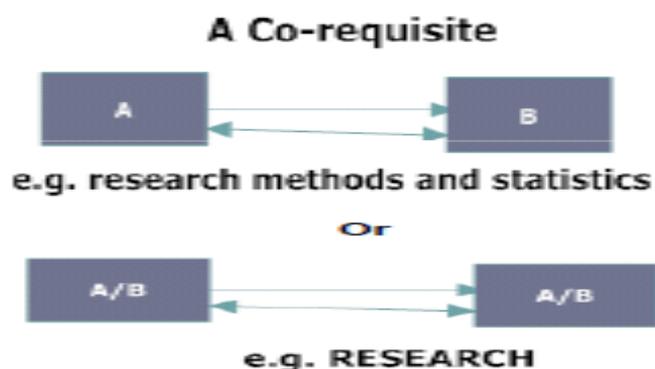
Assessment approaches that facilitated this integration include:

- Capstone/synoptic assessments;  
[http://www.qcda.gov.uk/libraryAssets/media/synoptic\\_assessment-report\\_for\\_qca\\_pdf\\_05\\_1620.pdf](http://www.qcda.gov.uk/libraryAssets/media/synoptic_assessment-report_for_qca_pdf_05_1620.pdf)
- Case studies
- Portfolios
- Projects
- Concept maps  
<http://cmap.ihmc.us/Publications/ResearchPapers/TheoryCmaps/TheoryUnderlyingConceptMaps.htm>.

In some US programmes, it is common to see Capstone modules at the end of a programme to assist in synthesis of programme outcomes. (see <http://www.answers.com/topic/capstone-courses-in-higher-education>). Traditionally in Irish Higher education, it is the research project that is the large module at the end of a programme. A research project, usually draws together the enquiry skills developed in a programme, however the content is more specialised (more depth) and its purpose may not necessarily be to integrate previous knowledge. It may need a different approach to achieve this outcome.

At a more micro-level, it may be possible to consider how some individual modules can be drawn together in a more integrative manner, for example, through combining modules or making them as co-requisites to each other (Figure 7)

*Figure 7: Integrating two modules.*



## E. ARTICULATION

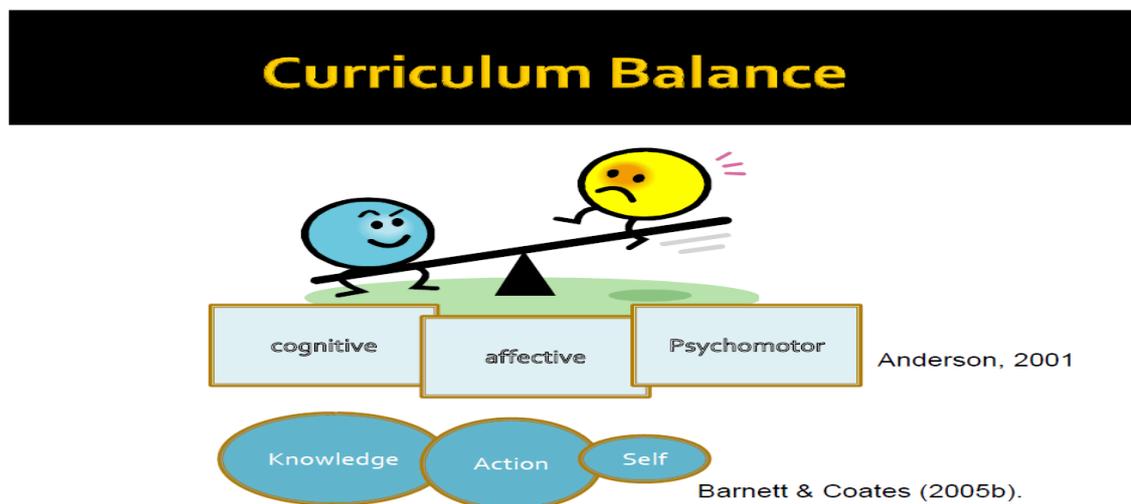
There is a need in a programme to articulate the horizontal and vertical relationship of a programme to the various stakeholders. The students should receive some indicator of how they will be progressing through the programme, i.e. in student handbooks, used in

class, on web, etc, Some ideas for mapping of curriculum can be seen in resource ([Mapping Graduate Attributes](#)).

## F. BALANCE

Finally, as mentioned earlier, it is important in a programme to balance the discipline knowledge with other more generic skills (Figure 8). Anderson (2001) describes this divide as, cognitive, affective and psycho-motor, whereas Barnett & Coates (2005b) puts forward the idea of a curriculum focused on knowledge, action and self.

*Figure 8: Balance in the Curriculum*



Institutional and Discipline/Subject graduate attributes help to map a variety of teaching/learning and assessment approaches. This approach may help to maintain a balance in the curriculum ([RES 2.1 Mapping Graduate Attributes](#)).

In conclusion, in the early stages of a programme's design, it is important to consider how the programme's components are organised and relate to each other. These should be organised in order to achieve maximum cohesion, integration in a programme.

In addition to some of the ideas in this resource, Ornstein & Hunkins (2009) suggest that the programme team should:

- Reflect on the educational philosophy and the curriculum models of the programme (i.e. Do you/your team believe basic concepts must be done first?)
- Consider the students needs (Do students see relevance of materials in first year? Are they straight from School or more mixed group?)

- Sketch out the various designs (what are the relationships, good overlaps?)
- Cross check with aims/outcomes/learning experiences/evaluation
- Share design with others (Ornstein & Hunkins, 2009)

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