Development of Competency-based Pharmacy Education

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Why Competency-based Education ?

- Preparation for professional life: effective treatment, patient safety
- Accountability: It is considered no longer acceptable to simply *assume* that competence is automatically reached by education and training
- Explicit demonstration of competence is required to satisfy accreditation and/or governing bodies
- The concept of competency-based education is developing since the 1960's for professional (and vocational) higher education:

teacher education	Whitty & Wilmott (1991)
medicine	Frank et al. (2010)
dentistry	Spielman et al. (2005)
psychology	Falender & Shafranske (2012)
pharmacy	Bates & Bruno (2008)

Professional competence

- Psychology: "the overall or integrated professional abilities"
- Medicine: "The array of abilities across multiple domains or aspects of physician performance in a certain context. Statements about competence require descriptive qualifiers to define the relevant abilities, context, and stage of training"
- Competence is multi-dimensional, dynamic, contextual and developmental. It changes with time, experience, and setting
  - Competence is *progressive*: For each aspect or domain of competence, the spectrum of ability varies from novice to mastery. At any given point in time, and in a given context, an individual will demonstrate greater or lesser ability

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Competencies and learning outcomes

- Competencies are the various ingredients of professional competence, specified as *observable abilities* of a pharmacist, integrating multiple components such as knowledge, skills, values and attitudes, expressed as behaviour
- Learning outcomes are the *observable results* of CBE and can be defined in terms of knowledge, skills and behaviour of students at specified stages of the curriculum
- Learning outcomes can be ordered in different domains and different developmental stages to ease curriculum development
  - domains: *e.g.* patient care, compounding
  - stages: *e.g.* bachelor, master

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Competency based pharmacy education

- Broad guidelines are given in worldwide or national contexts, but specification is necessary to accommodate differences in position and professional profiles of pharmacists in different countries
  - FIPEd Global competency framework (2012)
  - AACP-CAPE Educational outcomes (USA: 1992, 1998, 2004, 2013)
  - AFPC First professional degree outcomes (Canada, 2010)
  - GPhC Standards for initial education of pharmacists (UK, 2011)
  - Nationwide collaborative standards (Australia, 2015)
  - Phar-QA project (2013-2016) → European Competency Framework (2016)
- Specification of competencies can be used to guide the construction of new curricula or the 're-engineering' of existing curricula

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Curriculum design for CBPE

Design

1. Identify the required competencies and professional requirements
   Collaborate and discuss with stakeholders inside and outside academia
2. Explicitly define the required learning outcomes and their domains
   Take into consideration differentiation en specialization

Structure

3. Define 'milestones' along the developmental path for the competencies
   Consider the extent of integration of knowledge, skills and attitudes

Content

4. Select feedback and assessment tools to measure progress of students along the predefined milestones
5. Select teaching-learning activities, student experiences and instructional methods. Consider constructive alignment with assessment
6. Evaluate whether intended outcomes are realized (iterative process)

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Tips 1-3: curriculum design

1. • Identify the required competencies and professional requirements
   • Collaborate and discuss with stakeholders inside and outside academia
2. • Explicitly define the required learning outcomes and their domains
   • Take into consideration differentiation en specialization

Tip 1: Use a competency framework
Phar-QA, FIP global framework, CanMeds

Tip 2: Consult all your stakeholders
Alignment to professional and healthcare needs

Tip 3: Think forward (scenario's)
Your 1st-year students will enter practice in 5-10 years from now !!!

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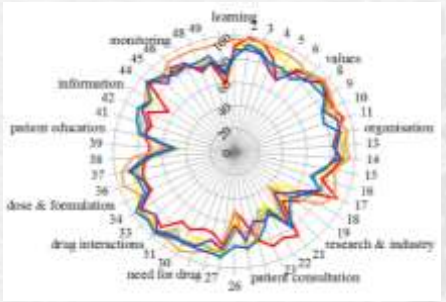
European competency framework

Personal competences

01-06	learning and knowledge
07-11	values
12-19	communication and organization
20-24	research and industry

Patient care competences

25-27	patient consultation
28-31	need for drug reatment
32-34	drug interactions
35-39	drug dose and formulations
40-42	patient education
43-45	information
46-50	monitoring of drug therapy



Competency score for community pharmacists (green), hospital pharmacists (orange), industrial pharmacists (red), pharmacists in other professions (purple), students (blue) and academics (yellow). *Source:* Atkinson J et al.: Pharmacy 2016, 4(3), 27 [online]

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Tips 4-7: curriculum structure

3
- Define 'milestones' along the developmental path for the competencies
- Consider the extent of integration of knowledge, skills and attitudes

4
- Select feedback and assessment tools to measure progress of students along the predefined milestones

Tip 4: Integrate content and skills as far as possible
From isolated to combined to integrated

Tip 5: Appoint curriculum coordinators
Skills consultants (Utrecht), stream coordinators (Monash)

Tip 6: Adopt frameworks for cognitive and skills development
Performance level, professionalism

Tip 7: Less is more, in particular for summative (high stake) assessment
To prevent overburdening and burnout

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Knowledge domain: pharmacokinetics

MASTER (patient profile): The student .....
..... is able to calculate pharmacokinetic parameters from plasma-concentration time data, using nonlinear regression techniques (1- and 2-compartment models);
..... is able to design dosage schedules for multiple oral administrations and infusions, taking into account individual patient characteristics;

MASTER (product profile): The student .....
..... is able to use pharmacokinetic models and calculations evaluating the release characteristics of dosage forms;
..... can explain in detail the mechanisms of drug absorption in relation to the characteristics of administration forms (tablet, slow-release, subcutaneous).

BACHELOR: The student.....
..... is able to calculate pharmacokinetic parameters from plasma-concentration time data, using linear regression and curve-stripping techniques (1- and 2-compartment models);
..... is able to design dosage schedules for multiple oral administrations and infusions;
..... is able to explain absorption, distribution, metabolism and excretion mechanisms for drugs in relation to their physicochemical properties.

YEAR 1: The student .....
..... can calculate primary pharmacokinetic parameters (Cl, V_d, k_a, F) from plasma-concentration time data after single dose administration (1-compartment model only);
..... can mention the main sources of variation of pharmacokinetic parameters and can explain how these variables affect the plasma concentration time-curve.

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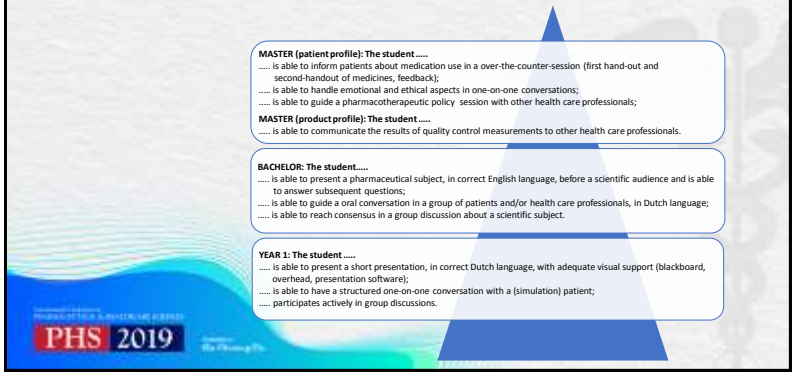
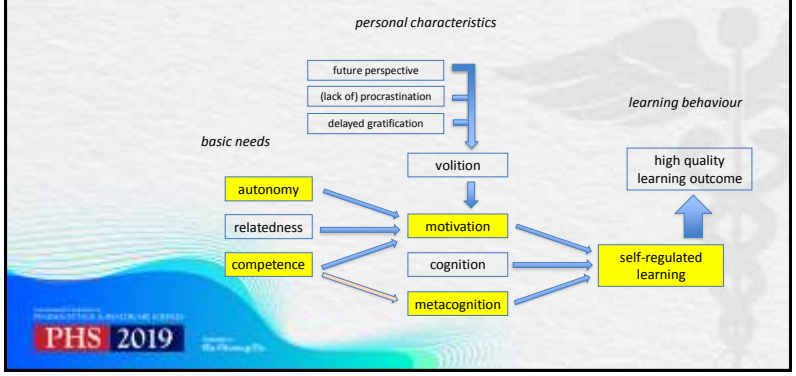
Skills domain: oral communication



A model for effective learning



Educational concepts and consequences

Motivation (Ryan & Deci, Reeve): self-determination theory

- *Autonomy:* experiencing a sense of volition and psychological freedom in studying
  → autonomy-supportive teaching
- *Competence:* the feeling of being able and being effective in one's own studying
  → competency-based education
- *Relatedness:* experiencing a sense of closeness and friendship in studying
  → collaborative and cooperative learning

Metacognition (Flavell, Veenman)

- Insight in own knowing and learning, based on self-reflection
  → SWOT analysis, personal development plan

Self-regulated learning (Zimmermann)

- The ability to adapt learning (knowledge, skills) to circumstances
  → goal-directed learning, deliberate practice

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Tips 8-9: constructive alignment

5. • Select teaching-learning activities, student experiences and instructional methods. Consider constructive alignment with assessment
6. • Evaluate whether intended outcomes are realized (iterative process)

Tip 8: Use authentic assessment tasks

OSCE, OSPE = Objective Structured Clinical (or Practical) Examination
Simulations: Pharmacy game Gimmics®
EPA = Entrustable Professional Activities

Tip 9: Use curriculum mapping for internal quality enhancement

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Assessment continuum

POSTGRADUATE: real working life
* Assessment in work environment: community pharmacy (2 years), hospital pharmacy (4 years);
* Continued education (CE) and Continuous postgraduate development (CPD).

MASTER: complex skills in context
* Testing of knowledge, skills and behaviour is fully integrated (contextual) in courses;
* Increased attention for authentic tasks (patient care, medication policy, compounding), role-playing (patient interviews) and serious gaming (e.g. GIMMICS);
* Blended learning: clerkships in community pharmacy, hospital pharmacy and/or industry;
* Research project (individual).

BACHELOR: skills in isolation
* Assessment of knowledge is tested in individual tests (midterm, final) and group work (papers, project results) in the context of courses;
* Skills (calculations, compounding, laboratory skills, oral and written communication, management, ...) are tested or assessed in the context of courses, but ....
* If skills are assessed as 'insufficient' individual additional training and re-testing of separate skills is offered in the skills lab.

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Focus on learning, not on teaching

John Biggs

- The teaching-learning environment comprises all components in the teaching system:
  - the curriculum and its intended outcomes
  - the assessment tasks
  - the teaching methods and teacher behaviour
  - the physical environment and the regulations
- Use constructive alignment to design students' assessment, learning activities, focusing on level-3 teaching

Level 2. Focus: what the teacher does
Learning is a function of teaching. The possibility is entertained that there may be more effective ways of teaching than what one is currently doing. Learning is seen as more a function of what the teacher is doing than of what sort of student one has to deal with.

Level 3. Focus: what the student does
Learning is the result of students' learning-focused activities, resulting from their own perceptions and inputs, and of the total teaching context. Focus must be on all components in the systems.

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Level-3 teaching requirements

Student requirements → role of students (self-determination, empowerment)

- Motivation, competencies
- Autonomy, self-regulated learning
- Relatedness, sense of belonging

Teacher requirements → role of teachers (professionalization)

- Deep content knowledge
- Reflective teaching, experience
- Ability to handle level-3 theory and practice

Constructive course alignment → role of educational specialists

- Content, feedback, assessment
- Teaching-learning activities

Efficient teaching is not always effective teaching

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Effective teaching

Content/context:
Authentic learning (*e.g.* cases)

Teaching/learning environment:
Inquiry based
Problem- and project based
Collaborative
Cooperative

Teaching/coaching:
Autonomy supportive
Organize and stimulate reflection

Efficient teaching is not always effective teaching:

Controlled motivation → efficient
Autonomous motivation → effective

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Tips 10-12: facilitating and supporting

Tip 10: Assure management continuity
- Course/curriculum director, management team

Tip 11: Develop educational expertise and specialization
- e.g. communication, assessment

Tip 12: Develop Scholarship of Teaching
- (inter)national networks, training
- exchange of good practices

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