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PHARMACY EDUCATION
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American Association of Colleges of Pharmacy
Discover • Learn • Care: Improve Health
Report on Association of Biochemistry Course Directors (ABCD) Meeting
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Flexner Report

- To a remarkable extent, the present-day training in the health professions in North America, including pharmacists, is a consequence of the Flexner Report published in 1910.¹ For example, among the recommendations are:

- A clinician should receive at least 6, (preferably 8) years of post-secondary formal instruction, nearly always in a university setting.

- Medical training should adhere closely to the scientific method and be thoroughly grounded in human physiology and biochemistry.

More Than 100 Years Later We Ask: Why Biochemistry (Basic Sciences) in the PharmD Curriculum?

• The P1 and P2 years can represent a hurdle rather than a foundation to help students understand clinical observations and improve their ability to make clinical decisions.\(^2\)

• Clinicians who train PharmD students in the P3 and P4 years do not incorporate basic science in their courses so connections between basic science and clinical decision making are not reinforced.

Is it necessary for students to learn and retain biochemical (basic science) knowledge?

• **Glass Half Empty** - Initially, the answer appears to be **NO** as ~25-33% of information is “lost” in the first year and this loss continues with time.³

• **Glass Half Full** - However, a significant amount of knowledge (~50%) is retained even after many years.³

• We need to make sure that the knowledge that is retained by students is what is most critical.

Why the biochemistry is important in The education of PharmD students

• What is relevant is that training in biochemistry (basic sciences) has been demonstrated to enhance the ability of students to develop complex thinking and abstract concepts (develop semantic networks) that allow them to integrate knowledge.4

• Biochemistry (basic science) knowledge can help hold together a network of clinical concepts with enhanced stability – retention is improved when information is understood.5

Integration of Basic & Clinical Sciences

• Integration of basic and clinical information is an activity that occurs within the learner.

• Transfer of basic science knowledge to clinical relevance is usually done by students on their own.

• Clinical concepts can be viewed as nodes linked by basic science connectors.\(^6\)

• Eventually the connectors may not be consciously recalled but the semantic links between the nodes remain intact.\(^3\)

Integrated Curriculum

- Contextualization (relates subject matter content to real world situations) of basic science with clinical concepts is not the same as true integration (bringing together traditionally separate subjects so that students can make connections across the curricula).

- Integration of basic science with clinical concepts needs to be done in each lecture, not at the course or curriculum level.

- Our goal should be help students make the basic science connections between the clinical nodes.
Acknowledgement

• Many of the above concepts are based on the comments of Nicole N. Woods (University of Toronto) at the 2013 ABCD meeting in Santa Fe, NM
Passive vs. Active Learning: How to Deliver Biochemistry

• There was no consensus at the ABCD Meeting on the best approach to teach biochemistry and it appears to be very dependent on the quality of the students and the faculty involved, and the financial, human and physical resources available at each school:
  - Classical faculty lecture (passive?)
  - Problem based learning (active)
  - Team based learning (active)
  - Hybrids of the above (passive & active)
Classical faculty lecture

- Lecture (video of lecture)
- Handouts
- Textbook
- Tests
- Most efficient (not necessarily the best)

**Outcome** – ability to master course objectives and development of knowledge base
Problem Based Learning

• “Private Universe” of students (including misconceptions) are revealed since they must verbalize their thoughts to their peers – provides knowledge gap discovery

• Students teach themselves - reflection & self assessment

• Labor intensive/costly since it requires skilled instructors and tutors, quality case study problems and the appropriate physical space for small groups

Outcome – same as classical + ability to “reason”
Team Based Learning

• Very different than problem based learning
• Involves set teams of students (6-10)
• Students need to “learn” material before session – team testing
• Students need to ask and answer the important questions with coaching by instructor(s)
• The team gets graded as a group
• Individuals get graded using exams

Outcome – same as classical + critical thinking, integration of subject material and improved interpersonal skills
Hybrid Approaches

- Some schools use a combination of passive and active learning, e.g.,
  - require viewing of 10-15 min modules (4-6 modules per week) made available online for self-study
  - in classroom: students are quizzed with multiple choice questions to check for basic understanding
  - classroom used for integration and application of information in modules using case-based questions and small (6-10) discussion groups
  - students can get extra help from faculty before or after in class meeting
  - formal testing
Final Points

• There is no BEST way to teach biochemistry (basic sciences) to PharmD students.

• A “tailored” biochemistry course should be taught in the PharmD curriculum even if an undergraduate course in biochemistry is a pre-requisite for admission.

• There is a need to develop a consensus on the content of the pharmacy-biochemistry learning objectives.