2010 SfN Workshop on teaching neuroscience

Undergraduate Curricula and Graduate Expectations

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Organization of my remarks

• Case study to illustrate my points
  – Cognitive/systems training is just fine.
  – The debate is incorrectly framed. Subject matter of undergraduate curriculum is (almost) irrelevant.

• Some data from Wash U.

• Alternative priorities for undergraduate training.

Summary of (sad) case SM: BA psychology 1988:

– Ecological biology
– Cell Biology
– Molecular genetics – Calculus (1 semester)
– Cognitive psychology
– Learning and memory
– Social psychology
– Behavioral pharmacology
– Human Development & Social Relations
– Statistics
– Research design
– Independent studies (2)

Poor predictive validity of an undergraduate curriculum

– No chemistry
– No physics

Hypothesis from case SM
• Undergraduate curricula leaves gaps in the training of most/all prospective grad students. These gaps are not so important to eventual success in a different PhD field.

Undergrad background of Wash U Neuroscience PhD trainees (self report)

Majority perceive a gap
If I could change one, I would have taken more...

Cell Molecular
Systems/Cognitive/Behavioral
Quantitative/Physical
HAPPY

Are the gaps important to students?
Not so much (self report)

To what extent are coursework, major important for successful dissertation?
Undergrad major does not predict
ggraduate success (DBBS data)

Matching undergrad curriculum to
thesis project does not predict success

My conclusion: Matching curriculum
to graduate neuroscience education
is relatively unimportant
(but undergraduate training is essential)

Alternative priorities for undergrad
training
Priority 1. Stress auto-pedagogy

– Promote self motivation, self education.
  • Independent study
  • Involvement in experimental design, hypothesis formulation related to any science discipline
  • TURN EMPTY VESSELS INTO ACTIVE SEEKERS

The importance of stupidity in scientific research

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Summary

• Cognitive/systems undergraduate training can be just fine for any graduate program.
• Undergraduate curricula will leave gaps in the knowledge of all prospective graduate students.
• Stress undergraduate training that creates lifelong, independent learners—so that students feel confident filling their gaps when necessary.
• Help ensure that students understand the 99% perspiration required to create new knowledge.

Priority 2. Stress concepts & skills fundamental to all fields

• Critical thinking, how to read primary papers
• Hypothesis testing, experimental design
• WRITING; formulating an argument, REVISIING
  – Thick skin
• Research experience
  – Can students stand the 99% perspiration?