Mechanisms for Integrating Emerging Tools, Technologies, and Techniques

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Implementation

How are emerging and new tools, technologies, and techniques being integrated in real-time into research programs?

Overaching Goals

Nurture true innovators

Train good scientists

Competing curriculum concepts:

- Core competency in all aspects of neuroscience
- Students need to specialize early
- Students need to learn concepts from courses
- Learning best occurs in the **lab**

Traditional Programs

Core courses in

- Neuroanatomy
- Systems neuroscience
- Molecular neuroscience
- Cellular Neuroscience

Mandatory ethics, stats courses

Mandatory number of elective courses

2-3 Laboratory rotations

Limitation of traditional programs

- Core courses are often large survey courses
- Little emphasis in core courses on best practices, which are taught separately
- Little exposure to translational issues and needs
- Laboratory rotations are too short to master complex techniques

Structural curricular changes to address these limitations

- Tutorial courses in small groups
- “Boot camps”
- A broader menu of electives
- Mandatory attendance to cross-disciplinary seminars, symposia

Tutorial courses in small groups

- Need to be true “tutorials”
- Not simply small group courses
- Need to gain Faculty “buy in” and requires relevant expertise
- Probably best way to develop deep knowledge if well implemented

“Boot camps”

- Usually at the onset of program but could be repeated as needed
- Useful to bridge different levels and areas of expertise
- Good opportunity to instill a sense of best practices early on
- Difficult to include a “hands on” component in large programs

A broader menu of electives

- Necessary component to develop in depth competencies in emerging technologies
- Requires local Faculty expertise
- Can have a laboratory component
- Implementation may require easing core requirements

Cross-disciplinary seminars, symposia, workshops

- Implemented throughout the entire graduate program duration
- Leverage expertise outside the institution
- Need a source of funding
- Should become part of the curriculum to be effective

Content changes to address the limitations of traditional programs

- Integrate the teaching of best practice in ALL courses
- Integrate awareness of translational issues in ALL courses
- Regular review of core course content for integration of current and emerging technologies
- May require major attitude changes

Challenges

Balance between “awareness” and “knowledge”

- Awareness: necessary and applies to all
- Knowledge: best acquired in lab setting

Challenges

Opening programs to a range of students and Faculty with various background to gain access to complementary expertise can create “cultural” and practical issues such as traditional differences in stipends, teaching, and career expectations

Practical implications

- Programs need to re-evaluate themselves
- Support from administration for curricular “enhancement” that requires funding
- Programs should resist the temptation to increase course load; laboratory training is paramount
- Address differences in “cultures” heads

Role of funding agencies

- Critical: they are effectors of change !

- Require mechanisms to enhance new competencies as part of TG, including activities that may require financial support from institutions

Who are we training?

- Extremely enthusiastic students!
- A new breed….