

Summary Report on Building Blocks, with Comments

SUMMARY REPORT (presented Wed 2003 Jan 29)

Five working groups reported on Tuesday 2003 Jan 28. This summary was an assessment of contributions from the groups, prepared by Nick Abbott and Jeff Reimer. The report has been modified slightly to reflect Wednesday morning discussion by the full workshop audience.

A. Common Themes

0. Biology is a foundation science
1. Agreement that the need for curriculum change goes beyond biology
 - a. Diversity of employment opportunities for ChEs
 - b. Public perception of “chemicals”
 - c. Recognition of molecular-level understanding
 - d. Competition for best students
2. Need to engage university departments of the enabling sciences in change
3. Infuse ChE curriculum with contemporary examples that integrate principles of ChE
4. ChE involves analysis, design, and synthesis
5. Need to articulate to freshmen the intellectual challenges and professional opportunities
6. ChE includes multi-scale descriptions of materials and phenomena
7. Agreement on the desired attributes of the ChE grad
 - a. Experience in labs
 - b. Communication skills
 - c. Problem solving skills
 - d. Etc.
8. Curriculum should be designed for flexibility

B. Building Blocks

1. areas of agreement
 - a. the enabling sciences are:
 - i. biology
 - ii. chemistry
 - iii. physics
 - iv. math
 - b. there is a core set of ChE principles
 - c. molecular-level design is a new core principle
 - d. ChE contains both product and process design
 - e. There is a need for 1st year ChE experience
2. proposals
 - a. case study learning
 - b. vertical integration
 - c. molecular-level design as an organizing principle
 - d. single-room learning
3. Other Ideas
 - a. benefits of alternative terminology in curriculum revitalization
 - b. student as a customer (?)

DISCUSSION AFTER THE SUMMARY REPORT (Wed 2003 Jan 29)

- Alternatives suggested for ‘customer’ in B.3.b were
 - partner
 - employer as partner
 - participant
 - constituent
 - ally
- “employers, students, and alumni are important voices in curriculum revitalization”
- Regarding biology
 - We should state explicitly that biology is a full enabling science.
 - What do we mean when we say, “biology”? We need to elaborate components of biology that are most important to the curriculum – quantitative, e.g. cellular, molecular, biochemistry, genetics, microbiology (+ -)
 - Hard work will be required to integrate biology fully into the curriculum

DISCUSSION AFTER INDIVIDUAL GROUP REPORTS (Tue 2003 Jan 28)

General reactions, and themes observed in the reports

- Ambitious
- Excited
- Focus on content (vs. label) was useful
- Attention to new ways of organizing principles
- Multiscale, process/products, synthesis/analysis
- ChE outreach into science curriculum
- Get started sooner in curriculum; what would students say? (students participate in workshop?)
- Remain with some present content but arranged, motivated, connected, differently – integrated.
- Not too much bio emphasis- less than expected
- Accepted bio as a fully included in ChE
- Reintegrate physics; re-examine math & computation
- Med schools have used problem-based approach – what can we learn?
 - Still, med school is post-grad
- We considered skills explicitly as a building block
- Want workshop report soon for use at discussions w/ science depts.
- Why not a 5-yr ChE program? (bite the bullet)
 - Constraints @state universities; market pressures
- Missing – relationship w/grad training
 - How affecting the TAs?
- Concern w/ losing traditional ChE
 - Alternatives in packaging & delivery, not content
- No mention of U.G. research
 - But introducing new elements – e.g. molecular level design
- 1960 was big reorganization/shift

- It will be a MAJOR project to do this
- Just-in-time subject matter for large parts of curriculum (case study, etc.)
- Molecular-level design
- Vertical integration
- Student-based input on workability of curriculum
- Math to use fewer courses? (UCSB ChE took over math for a while out of dissatisfaction) (Iowa had a more positive experience with Chemistry Dept.)
- Teach biology & chemistry at compatible level
- Replace traditional course w/short modules
- Satisfied w/ChE content; concern w/ packaging & delivery – but also additional content
- More faculty cooperation intra/inter-dept.
- Avoiding traditional terms was USEFUL. Continue in course design
- Need traditional words to sell it?
- Avoid traditional words to sell it?
- Relabel/redesign to appeal to students
- Accountability to transfer students
- Could some integration techniques be 1st tried @ grad level?
- Trying to create “warehouse” of labs @ Berkeley, not tied to a class
- Pitt has big room w/ comp. for all UG classes. Not enough by itself.
- Foundation Coalition has some experience w/ similar approach
- Alabama ChE had some freshman year success interacting w/ chemistry & physics departments
- Didn't hear about effect of new technology (IT) on teaching
- Long-term issues besides bio; is this workshop a model for future curriculum tuning/adaptation
- Vision – identify stakeholders for feedback; develop the blocks – whom to ask?
- Ensure that we continue to engage the broader community of ChE
- On H.S. student level – diverse inputs to ChE – we need to characterize DATA
- Get professional help to market to students?
- We work w/ American Chemistry Council on public relations campaign?
- What if H.S. students could associate chemistry with “neat technology”?