

The More Inclusive Course Proposed in 2002 and Executed in 2003

Judith E. Heady, University of Michigan-Dearborn, MI 48128

ABSTRACT

In 2002 I reported about my plans to teach development using three books, current literature, and the usual group original research projects for laboratory. I made the decision to use books in addition to current literature after two classes where students had trouble connecting the concepts discussed generally with the research as reported. The three books previewed in 2002 were all helpful both as readings and as resources to accompany the papers. In the course I used eleven papers, mostly primary research, along with thirteen text assignments. Each class period students came prepared by answering questions about the current reading and singly or in small groups wrote out their answers on the board. I checked the answers, students read what they wrote, and we discussed each paper section or text topic. Many times I added additional material from other sources that explained the work or extended the research with information from other publications. I collected their written critiques each class period and returned them with comments. I will be reporting on student reactions to the teaching, pre- and post-test results, my analysis of the course, and more details on several topics. The SDB-education page has a link to my web site.

BOOKS USED:

- Carroll, Sean B., Jennifer K. Grenier, and Scott D. Weatherbee** 2001 *From DNA to Diversity: Molecular Genetics and the Evolution of Animal Design* Blackwell Science, Oxford
- Slack, Jonathan** 2001 *Essential Developmental Biology* Blackwell Science, Oxford
- van der Weele, Cor** 1999 *Images of Development: Environmental Causes in Ontogeny* State University of New York Press, Albany

CURRENT LITERATURE USED:

- Ransick, Andrew & Eric H. Davidson** 1993 A complete second gut induced by transplanted micromeres in the sea urchin embryo, *Science* 259, 1134-1138
- Nishida, Hiroki** 1992 Regionality of egg cytoplasm that promotes muscle differentiation in embryos of the ascidian, *Halocynthia roretzi*, *Development* 116, 521-52
- Gurdon, J.B. et al.** 1999 Single cells can sense their position in a morphogen gradient, *Development* 126, 5309-5317
- Lane, Mary C. & Michael D. Sheets** 2002 Primitive & definitive blood share a common origin in *Xenopus*: A comparison of lineage techniques used to construct fate maps, *Developmental Biology* 248, 52-67
- O'Rourke, Meredith et al.** 2002 *Twist* plays an essential role in FGF and SHH signal transduction during mouse limb development, *Developmental Biology* 248, 143-156
- Thisse, Christine & Leonard Zon** 2002 Organogenesis - Heart & blood formation from the zebrafish point of view, *Science* 295, 457-462
- Causeret, F. et al.** 2002 Slit antagonizes netrin-1 attractive effects during the migration of inferior olivary neurons, *Developmental Biology* 246, 429-440
- Boyl, Pietro P. et al.** 2001 Forebrain and midbrain development requires epiblast-restricted *Otx2* translational control mediated by its 3' UTR, *Development* 128, 2989-3000
- Hughs, Cynthia & Thomas Kaufman** 2002 Exploring Myriapod segmentation: The expression patterns of *even-skipped*, *engrailed*, and *wingless* in a centipede, *Developmental Biology* 247, 47-61
- Piotrowska, Karolina & Magdalena Zernicka-Goetz** 2002 Early patterning of the mouse embryo - contributions of sperm and egg, *Development* 129, 5803-5813
- Davidson, Eric et al.** 2002 A genomic regulatory network for development, *Science* 295, 1669-1678

CLASS ACTIVITIES:

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|--|------------------------------------|
| Preparing an analysis of each reading | Group laboratory research projects |
| Informal group sharing of responses [on board] | Research project presentations |
| Discussion | Formal research papers |
| Instructor previews, explanations, extensions | Notebook / journal |

COMPARISONS 1997; 1999; 2001; 2003

Student Learning	Student Reactions ¹	Group Projects
Improved pre- to post-test; 18/20 improved essay 1 to 2; 16/20 excellent participation	19/19 above avg ÷ excellent	All 7 groups worked well on projects; 2 groups less than avg dealing w/ data & exp repeats
Improved pre- to post test; 9/ 13 improved essay 1 to 2; 6/13 excellent participation	9/11 above avg ÷ excellent; 2 avg	3/5 groups worked well on projects; 1 group of the 3 less than avg w/ data & repeats
Less improvement pre- to post test; 9/14 improved essay 1 to 2; 7/14 excellent participation	8/12 above avg ÷ excellent; 1 avg; 2 below avg; 1 poor	4/5 groups worked well on projects; 1 group of the 4 less than avg w/ data & repeats
Post tests not done; 11/12 improved exam 1 to 2; 7/12 excellent participation, 5 good	11/13 above avg ÷ excellent; 2 avg	All 5 groups worked well on projects; 1 group less than avg w/ data & repeats

1 [liked best] “liked best the fact that we did not have to memorize terms instead of understanding the applications, methods, and overall aspect”; “this is the most enjoyable class I have taken at U of M so far”; “very interesting to read current research - I learned a lot”; [least helpful] “not having a ‘normal’ text book as a guide”; “I got a lot of experience with primary articles and lab in terms of research”; “primary articles are the way the world works, although it’s not easy”; a textbook might have helped me gain more knowledge”; “the best part was independent research”; “allow us to read professional articles”; “give more time to read and understand articles”

INSTRUCTOR ANALYSIS

- The short texts provided students w/ their own place to search for technique explanations & specific topics; & a framework for development
- The short texts provided a break from just reading the research papers
- The research papers provided more complete examples of actual experimentation & reasoning
- The improved ability to print papers [in color too] from the ERes cut down on frustration
- Doing both texts and papers allowed us to develop some topics in depth, but still discuss as many or more topics than previously
- Students were generally faithful about preparing for class [Analysis Format sheets]; sharing ans on the board; and participating in the discussion of the answers