

## Using Flow Diagrams to Learn Cell Biology

*Thomas Fogle*

*Department of Biology, Saint Mary's College  
Notre Dame, Indiana 46556*

Beginning students who are learning basic features about eukaryotic cell biology often have difficulty integrating concepts. Synthesis of knowledge presupposes an understanding of the basics. Flow diagrams, together with an accompanying list of questions, promote review and encourage students to search out new conceptual relationships that are not otherwise obvious. Using a sequential set of diagrams, each one adding more detail, students develop a richly dynamic view of cellular biology. In the process, there is a sense of self-discovery about how ideas fit together. Students can be challenged with “thought experiments” in which they follow paths in the flow diagram to hypothesize outcomes. That is, flow diagrams have heuristic properties.

Flow diagrams are most successful when used as a capstone for review and synthesis rather than the initial introduction to the concepts. An introductory flow diagram on cytological/physiological aspects of the cell becomes the framework for building additional knowledge. Linked to the initial flow diagram are the processes of cell respiration, photosynthesis, and gene expression, in that order. Completion of the series of diagrams results in a complexly integrated view of the cell that has been constructed by a stepwise linking of concepts and terms.

The advantages of flow diagrams are that: (1) class time is spent laying the groundwork and student time is spent on developing higher-order understanding; (2) students find this to be a very helpful way of pulling it all together; and (3) new conceptual relationships are discovered that are not evident from classroom or text learning.