September 1978

Higher Education Learning Project (Physics) Books

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Higher Education Learning Project (Physics) books, **Individual Study in Undergraduate Science, Small Group Teaching in Undergraduate Science, Practical Work in Undergraduate Science,** and **Students' Reactions to Undergraduate Science,** the Nuffield Foundation, 1977, available from Heinemann Educational Books, 22 South Broadway, Salem, NH. Price: $15.65 each. (Reviewed by Robert G. Fuller).

The books in this small collection of paperbacks deal with many of the issues confronting physicists who teach undergraduates. These books are the result of several physicist-years of studying various aspects of teaching in undergraduate physics programs in the United Kingdom. Each book includes references to related books and articles.

I think that these books make an essential contribution to the literature about teaching physics at the university level. For too long many of the physics departments that I know have acted as if the only way to evaluate teaching was to give a multiple-choice questionnaire to students at the end of each semester and get some numerical rating for each instructor. The fact that teaching has many physical observables has been systematically ignored by physicists. The HELP books authors attended laboratory classes and they looked and listened. They interviewed students and they looked and listened. Then they used the results obtained from these observations to make suggestions about how teaching science to undergraduates can be improved. I hope these books will help bring the study of college physics teaching out of the dark domain of the unobservable.

It is the observational character of these books that also is one of their weaknesses I think. I happen to find it helpful to have a theoretical model or construct at my disposal when examining various teaching alternatives. These books provide very little introduction to theories of learning, of interaction analysis, or of cognitive development. Each of these books tends to meander through some grove in the forest of undergraduate physics teaching. Let us take a short trip through them.

Individual Study in Undergraduate Science was edited by Will Bridge and Lewis Elton (232 pages). The bulk of this book consists of case studies of a variety of forms of individualized instruction, including Keller Plan courses. The last third of the book deals with the general aspects of using an individualized system of instruction. This portion contains many suggestions about the operational details of an individualized course and one section includes a number of instructional proverbs, e.g., "Different kinds of things are learned in different ways." "The problems are different for different students." "Errors and confusion are natural and normal." "Success is more potent than failure." "Innovations must expect to be misunderstood," etc.

This book is best for you if you and your department colleagues are interested in exploring the many possibilities of individualized instruction. But if you already know you want to try the Keller Plan then there are books available at a fraction of the cost of this one that will be more helpful.

Students' Reactions to Undergraduate Science is by Joan Bliss and Jon Ogborn (160 pages). The transcripts of interviews with 115 physics students from ten different universities are analyzed. Each student was encouraged to tell about one good learning experience and one bad learning experience. The characteristics of the good and bad stories are discussed and some general comments are made. It seems to me that many of the comments offered by the authors have relevance to physics teaching in the universities in this country also. But more than that, I think the interview model so well explained in this book is an effective tool for analyzing a teaching program. Any physics department that wants to get serious about the improvement of its teaching is urged to study this book.

Small Group Teaching in Undergraduate Science was edited by Jon Ogborn (208 pages). While this book is focused primarily on the tutorials held in the U.K. universities, it offers many insights that can improve the teaching in the discussion sections so common in our large universities. Introductions to analyses of group processes, of technical language, and of questions are given. Lesson plans for skill building sessions are included. Chapters 6–10 of this book should be read by all the physicists who are required to teach recitation sections.

Practical Work in Undergraduate Science was edited by Jon Ogborn (216 pages). This book is an excellent survey of physics laboratory work for science majors. I feel that it is flawed by the absence of any reference to the uses of laboratories for the development of reasoning as represented by the recent influence of the work of Jean Piaget on the teaching of physics in this country. Nevertheless, this book contains a wide range of good information about physics laboratory work. Suggestions are made about the kinds of decisions which are necessary to improve physics laboratories. Most physics laboratory courses that I have encountered show no clearly defined purpose or overall planning. Chapter 9 of this book offers some very practical information that can help individuals and physics departments plan their laboratory work so that it will be more effective.

In conclusion, these books belong in every physics department library to serve as references for all the teaching committees of the department. If you happen to be the type of person who likes to wander through new fields before beginning a new venture, then these books are also for you. For the more goal oriented person, materials, more narrowly focused, are available at a small portion of the cost of these books. The biggest disadvantage of these books is the exorbitant price of $15.65 for a paperback book of about 200 pages!

Robert G. Fuller is Professor of Physics at the University of Nebraska–Lincoln. He has taught in lecture-recitation courses, Keller Plan classes, and Piagetian-based laboratories. He was once observed observing students in a physics class.

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