philippine studies

Ateneo de Manila University • Loyola Heights, Quezon City • 1108 Philippines

Science or Technology?
College Physics, Parts 1 and 2

Review Author: Francis N. Glover

Philippine Studies vol. 11, no. 4 (1963): 599—602

Book Reviews

SCIENCE OR TECHNOLOGY?

COLLEGE PHYSICS, PARTS 1 and 2. Prepared by a Committee on Physics. Quezon City, Philippines: Filipino Educators, Inc., 1963. xvii, 779 p.

The arrival of something long expected and eagerly awaited is always a pleasant occasion. Such an occasion is the appearance of the first textbook in college Physics by Filipino authors published in the Philippines.

A locally produced college physics textbook has long been awaited, if for no other reason than that the production costs of such a text will permit the book to be sold at a price within the limited means of the average college student. Good foreign books abound, but the price of these is usually such that in all but a very few schools the majority of students cannot afford to purchase the prescribed text. And physics, even with a text, is not exactly a "snap" course.

The local production of a text in college physics is however quite significant even apart from mere financial considerations. While we take it for granted that our school texts in Philippine History or National Language must certainly be locally produced, since foreign texts are simply not available in these fields, somehow it has been felt that advanced works in science must still come from abroad. "If it is 'blue-seal'," they say, "it must be better than the local brands." And yet in the field of science such a national inferiority complex is anything but desirable. Our young people embarking on a career in science must from the outset be convinced that by diligence and hard work they too can accomplish all that those of other nations have already attained in this land of promise. And the production of our own works in science, even at the early college level, will help much toward this healthful attitude. Clearly there is no such thing as Fili-

pino physics, just as there is no German, Russian or American physics. The sciences are universal; they are the common property of all nations. However, perhaps in the past in some quarters there was the vague misapprehension that not only is Filipino physics a misnomer, but likewise even physics by a Filipino. The appearance of advanced texts in the sciences produced locally is the best refutation of this misconception.

And yet, however much the reviewer welcomes the appearance of this first college physics text, as a physicist he can not help but wish that this first entry in the field contained more physics and less engineering.

There is a real difference between physics and engineering, just as there is a difference between science and technology. At times, perhaps, these differences may seem slight, but they are most real and important, especially in the field of education. Science is interested in *why* things behave, while technology is interested in *how* things behave.

Suppose you happen to be fortunate enough to own your own automobile. In that case you will probably want to have your own driver too, not so much to save you the trouble of having to drive in traffic, but in order to have someone to look after your car. A car is an expensive investment, and therefore you will want to have someone who can take care of it. Your driver-mechanic knows, or should know, how your car behaves, and whenever it misbehaves, he is supposed to know at once what to do to fix it. You don't really mind if he doesn't know a thing about any other model of car, as long as he is an expert for your own car. He doesn't have to know *why* your car works as it does, as long as he knows how to fix it when it doesn't work as it normally should. Finally you would never expect your driver to design a new and better car for you; just let him keep the old one in good shape and everybody will be satisfied. In brief, your driver is a *technologist,* not a *scientist.*

Now every good physicist has to know some engineering, but it is essential that every engineer know a good bit of physics. One could hardly build a better mouse trap unless he understood the basic theory underlying all mouse traps, and also perhaps was a bit acquainted with the psychology of mice. In the formation of our young people in college it is essential that every engineer have a good background in physics, and it is still more important that our young people going into pure science are not offered engineering under the guise of physics.

Now it is possible to have two text books, each teating the same subject matter, but each written from a different point of view. Take for example a book on Philippine history. If the book is written by a foreigner, it will probably state that in 1521, Magellan *discovered* the

Philippines. If it is written by a Filipino, it may well state that in 1521 the first white man arrived in the Philippines. Each statement is perhaps equally correct, but certainly each is made from a different point of view.

The difference of view point is just as significant in books written by physicists and engineers. The engineering text will give page after page of useful formulae. Names and definitions will abound. The *behavior* of material things is the main concern. The physics text will have far fewer formulae, but will contain instead a few general principles from which all the behavior of material things will be shown to follow. The physics approach seeks to know why things behave in terms of fundamental principles, and the fewer and the more fundamental the principles are, the better. The engineering approach seeks to know how things behave and describes this behavior in as systematic a way as possible.

The present book is a text book on physics. It is a good text, but unfortunately there is too much of the engineering approach and not enough of the physics approach to the subject matter. And should this be the only physics that our young engineers receive, it seems that their training will be deficient in comparison to the training given abroad.

The concept of momentum, and its time rate of change proportional to the resultant force is the central idea of classical mechanics, and almost everything else in classical mechanics flows from this basic principle. Of the four basic forces known today, one is gravity. Yet gravity and the time rate of change of momentum are treated in a single chapter, one out of the twenty three devoted to mechanics and its applications to heat and sound. From the physics point of view it would be far more desirable to print on pages of gold the chapter on momentum and its rate of change, and then to show that almost every other chapter in Part I is a particular application or extension of this basic principle.

While principles remain, fashions and styles change, even in physics. This is especially true in the question of units. The authors feel constrained to treat of the CGS, English, and MKS systems in both absolute and gravitational forms, while new books abroad for the past fifteen years have narrowed the field to English gravitational and the MKS absolute. The same situation pertains in the case of electric units, where the full panoply of units are marshaled, magnetic poles and all. Much of this could have been omitted, without the physics (or the student) suffering.

There are a few mis-statements, as for example, calling angular displacement a vector (p. 63), but the unity of physics seems to have been somewhat obscured by the great number of definitions and ap-

plications throughout the text. The content is there, but somehow the spirit of physics seems to have been lost in the engineering approach.

It is always so easy to criticize, and so much more difficult to construct. The authors are to be congratulated for what they have done. The book is a start, and there may be future editions of this same text. The book is the first response to a long felt need, and it will no doubt stimulate others to enter the field of text-book writing on the college level, an often thankless task and an almost always fiancially unprofitable undertaking. Yet the growth of our nation is intertwined with the growth of our economy and our technology. The present book is, hopefully, the first of a long series of technical publications which will follow in the days and years to come, and which will set the pace for the development of the economy of our nation.

FRANCIS N. GLOVER

IN THE TRACK OF THE ADMIRAL

THE VOYAGE OF THE NIÑA II. By Robert F. Marx. Cleveland, Ohio: The World Publishing Company, 1963. 249 pp. $4.95.

This account of an actual voyage, undertaken in 1962, will be of particular interest to arm-chair wanderers. Nine adventurers using a replica of Columbus' *Niña* attempted to follow the great admiral's track from Spain to the New World. The men sought to use only authentic materials—a 15th century astrolabe, flint and steel for fire making, an hour glass, and wooden water and wine barrels were among the items insisted upon.

The purpose of the voyage was to re-create history while quenching a thirst for adventure. "In the end, if not from the very beginning," organizer Marx writes, "it was for us, not a duplication of the Columbus voyage, for that was very quickly lost sight of, but an age-old struggle of man against his self doubts."

Marx, presently adventure editor for *The Saturday Evening Post,* gives a brief sketch of his early years and travels. He tells us that while digging through Spanish archives for data on sunken treasure ships, he met and joined forces with the owner of a nearly completed replica of Columbus' smallest vessel. With a hastily recruited and inexperienced crew they set out for the Americas.

Thirst and hunger constantly dog the crew of *Niña II.* Disorder reigns throughout the voyage, as might be expected in view of the