

AN EXPERIMENT IN COMPUTER-AIDED INSTRUCTION IN REGIONAL ECONOMICS: COMMENT

Joan G. Haworth*

Computerized model simulation is appropriate whenever the time devoted to non-critical details of a model is too large to be presented orally, whenever the tools necessary to construct the model in class are too sophisticated for most student backgrounds, and whenever any parametric changes in the model require tedious repetition in order to determine the results. Obviously when an instructor hopes for an in-depth study of the impact on the economy of a particular theory then the computerized simulation is made to order. It is very encouraging to those who watch the innovative progress in education to see the work of professors such as Dr. Nicholas. Students in these classes are likely to be highly motivated, they can choose their own work pace and the models to be examined can be subjected to a variety of parametric changes, making them far more realistic.

In the sample models which Nicholas presents the students were asked to be concerned with the impact of different parameters and differences between results when parameter magnitudes were changed. When the actual model is discussed in class it is not necessary for students to know computer languages in order to intensively study any good model unless he is required to construct his own model whose equation form and variables are different from those already in the computer. Since the languages are an unnecessary tool in any model simulation perhaps FORTRAN or COBOL would also be good languages to use since programs can be easily transferred to other classes and other institutions. The chief advantage of APL is its ease in obtaining English replies to a student's question.

Good computer-assisted instruction (CAI) has several characteristics which can be used to describe Nicholas' work. First, the computer program instructions must be clear and easy to follow. Apparently LEARN does an adequate job of handling this criteria if student enthusiasm cited in his paper is any measure. The technical details of the models developed by Nicholas are not described in his report but apparently follow the text's theory. In the LANDUSE model the B matrix, which describes quality weights for different land parcels, appears to be based on the assumption that these quality weights will be constant on a given plot of land for any of the several possible land uses. Since heavy manufacturing would view a nearby railroad differently than low density housing planners, the model should be changed to calculate the B matrix given a conditional probability for each land use.

Second, the models must be able to be manipulated in a variety of ways to relate the model to the theory. Nicholas describes what most CAI users and developers have seen - that students get more deeply into the testing and analyzing of a theory than is possible without model simulation.

The mathematics of the various models, from LOCATION and LAND-USE to URBAN1 and URBAN2, is probably not presented in the students' output and hence, probably not understood by students much better than when no computer is involved. However, as Nicholas indicates, the intensive work with the models seems to make the students much better analysts. Students

* The author is an Assistant Professor of Economics at Florida State University.

have had more experience with the models and have seen it react to many more parameter shifts than a non-computerized model would be able to show easily.

Third, the output must be clearly labeled and easily referenced by researchers who need to know what changes in input caused which changes in output. We do not have samples of these output. Absence of good documentation for the user of the program is probably one of the greatest reasons for the disfavor that CAI occasionally finds so most producers are conscious of this need. Obviously, provision must also be made to keep the programs maintained and current as computer systems change in any one location.

Finally, the program should be easily and rapidly accessed and the time sharing system described at Florida Atlantic University solves that problem, according to Dr. Nicholas. In some systems it is not possible to allow several students to access a program simultaneously. Since learning in groups is common and may even be necessary to certain CAI cases this potential problem needs to be investigated at each institution.

In conclusion, the Nicholas model-simulation experiment is exciting to those who have wanted to try computerizing various models but have not yet attacked the problem. This computerization is useful both for instructional purposes and for research since a variety of policy options can be tested easily by simulation within a model and their impact analyzed more quickly.

His work also provides us with the opportunity to plea for better information exchanges among regional scientists in their programming attempts. Other computerized, theoretical models which may exist are not well known or used. Sharing the knowledge of existence, of course, is not really sufficient. It is essential that programs be well enough documented to be used by others without the programmer's help and that other people be urged to try the models. Only then can good control and test groups be developed to test the worthiness of computerized model simulation for economics.