SIMULATION IN HIGHER EDUCATION PLANNING: WALK BEFORE YOU RUN

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ABSTRACT

A variety of simulation models exist for higher education planning applications. These models tend to be general and global in nature. The sophisticated models appear to provide quantities of detailed information in preformated, attractive reports. An introductory survey frequently influences decisions to adopt a sophisticated model, before an institution has really learned what modeling is, how to use it and how to adapt to it.

Use of a trivial simulation model should not be overlooked as an aid in the planning process. Such a simulation can provide valid, understandable, useful, timely information for the planning process. It may also provide a basis for critical WHAT IF assessments. Furthermore, a trivial model can help an institution learn the how, when, where and why of planning simulation before trying to run, with a sophisticated, and perhaps unwieldy, model.

Contrasting case studies of simulation applications will be used to illustrate uses, misuses and problems associated with trivial and sophisticated simulation models used in planning for higher education.

INTRODUCTION

Simulation models have been available to higher education administrators as a supplement to the planning process since the late 1960's. The generally available "packaged" models appear to segregate themselves into two broad categories: sophisticated and trivial. Neither category is without its advantages or disadvantages. In either situation, however, it is essential that the administrators employing simulations know how to use these tools to aid in the planning process.

It is the purpose of this paper to investigate the status of two resource allocation models, one sophisticated and one trivial, as applied in institutions of higher education. The study is intended to illustrate uses, misuses and problems associated with the application of the two classes of models given a significant period of use via two case studies. The study is not to assess the models per se, but to see what happened as a result of their application in selected cases.

To place the two cases into proper perspective, it is necessary first to describe the planning process in higher education and to develop a general understanding of simulations used in higher education planning. The CAMPUS model will serve as the base for the sophisticated case study, while the HELP/PLANTRAN model will be used in conjunction with the trivial model case. The basic properties and purposes of the two models will be presented before investigating specific applications of them.

HIGHER EDUCATION PLANNING

THE PROCESS

Planning in higher education is fundamentally no different than that activity in any other organization. The difference, if any, may be that there appears to be a growing emphasis on planning, especially long-range planning in higher education. (2)

Shuck views planning from the perspective of statewide coordination, suggesting the following steps in the process:

1. Goal setting
2. Statistical representation, quantification and data gathering
3. Model building

The desired result of the above is a commitment by management to use resources for chosen ends. (7)

The aspect and importance of goal setting is underscored repeatedly by Cameron Fincher who feels more planning in the future must be based on goals than has been the case in the past. (2) He states:

> "It is crucial . . . that planning be viewed in terms of objectives that are to be accomplished. This is true of educational planning at all levels, be it departmental, institutional,

> consortium, commission, or statewide level. There is the further implication that unless planning is conducted in terms of objectives that have been systematically formulated, the planning process will necessarily fall back on projected trends that cannot easily continue. It would seem, therefore, that the sophistication of planning is limited by the adequacy of planning goals. It is not enough to know how we plan; it is necessary to know what we are planning for." (2, page 757)

SIMULATIONS IN HIGHER EDUCATION PLANNING

The use of simulation models is a relatively recent phenomenon in higher education. Literature on the topic begins to appear only in the 1970's. In fact, the earliest surveys show only two operational simulation models in the area of resource allocation in 1970. (4) By 1972, Wartgow identified 37 users of three commercially available planning models. (8)

Planning models are available from a variety of sources. Some are commercially available, some are in the public domain or available to members of associations and others have been developed in house for specific institutions. Figure 1 indicates models currently available or in use by category. Of the available models RRPM, CAMPUS, SC/SEARCH and HELP/PLANTRAN have seen relatively significant application.

FIGURE 1

Resource Allocation Planning Models

Commercially Available	Public Domain or Association Sponsored	Specific Institution
CAMPUS*	Federal Planning Model (NCHEMS)***	UCLA
SC/SEARCH**	Postsecondary Education Financing Model (NCHEMS)***	University of Utah
HELP/PLANTRAN**	RRPM (NCHEMS)****	

* For assessment see Hussain, 1976 and Wartgow, 1972.

** For assessment see Wartgow, 1972.

*** For assessment see Dresch, 1975.

**** For assessment see Hussain, 1976.

There is further agreement that RRPM and CAMPUS are complex, sophisticated models, with CAMPUS being the more complex of the two. SC/SEARCH and HELP/PLANTRAN are models of a simple nature. CAMPUS and HELP/PLANTRAN are the focus in the remainder of this paper due to wide acceptance. (4, 5, 8)

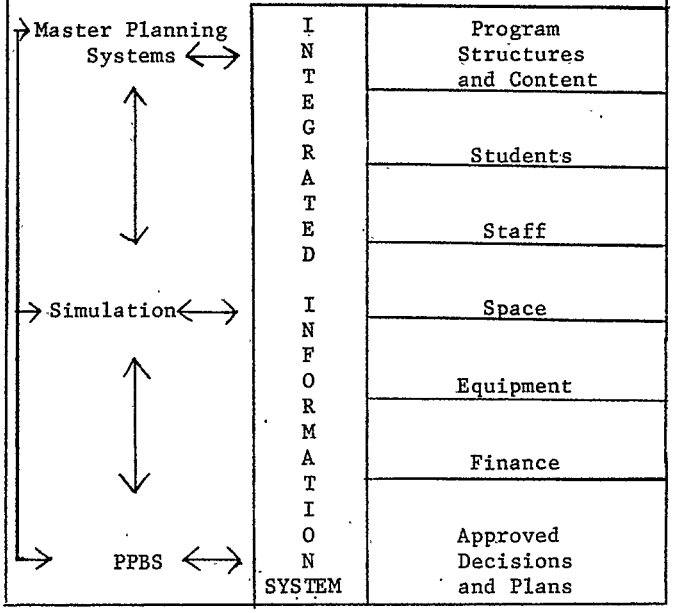
The sophisticated-trivial, complex-simple distinctions need some explanation. The designations are not intended to connote degree of acceptability, but rather a difference in numbers of variables and basic relationships. A sophisticated or complex model would have many variables and relationships while a trivial or simple model would have few variables and relationships. Note that "there is a distinction between 'complicated' models and 'comprehensive' models. A comprehensive model need not be complicated . . . too many models are unnecessarily complicated and insufficiently comprehensive." (6) Meadows emphasizes, "The essence of any good model, . . . is insightful simplification, the ommission of trivia, and the inclusion of just what is important for solving the problem at hand." (6)

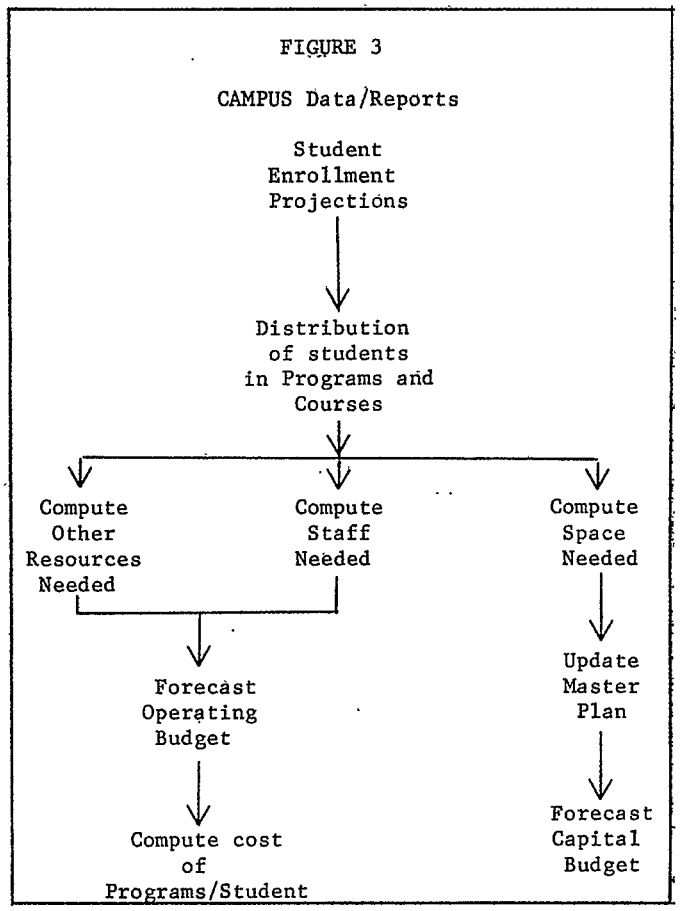
CAMPUS. The CAMPUS model, Comprehensive Analytical Methods for Planning in University/College Systems, was developed originally by R.W. Judy and J.B. Levine under a Ford Foundation grant beginning in 1964. The model was further developed and marketed through the Toronto, Ontario firm, Systems Research Group (now SDL.)

As the model evolved it became modular and flexible but highly dependent on detailed activity level input to achieve its high degree of objective orientation. An entire set of preformated reports is produced by the model. The general flow of CAMPUS and an idea of its results can best be seen in Figures 2 and 3.

FIGURE 2

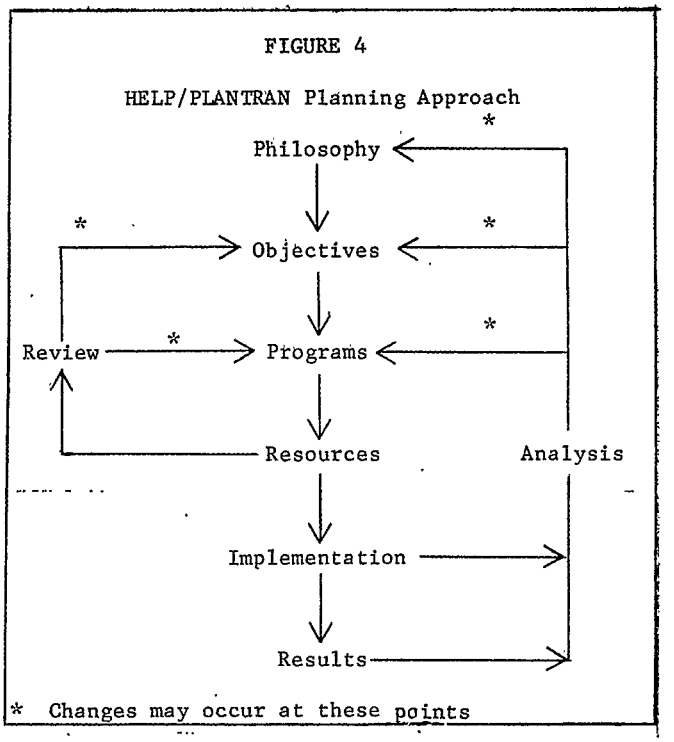
CAMPUS Planning Approach





Figures 2 and 3 are adapted from SRG, Seminar (Colorado Commission on Higher Education, 1972.)

HELP/PLANTRAN. The Higher Education Long-Range Planning System was developed under an U.S. Office of Education grant to the Kansas City Regional Council for Higher Education in 1968-1969. As with CAMPUS, the original version is in the public domain. The Midwest Research Institute of Kansas City added a planning language, PLANning TRANslator, to HELP and now markets the package. The model is a long-range budget simulator, calculating each line item for cost or resources for each year, up to 10, of the planning cycle. Simple relationships can be stated. Line items for futures can be increased by an absolute amount, by a percentage amount, or to a ceiling value. Line items can be calculated for different levels of aggregation including course level. The HELP/PLANTRAN planning approach is summarized in Figure 4.



Adapted from MRI Plantran Planning Translator; A Simulation Modeling System for Long-Range Planning, (Kansas City, Missouri: MRI,1970) p. 3.

CASE EXPERIENCES

SOPHISTICATED MODEL - CAMPUS

Case A, an institution adopting the CAMPUS model in 1972, ceased using the model in 1972 after the successful acceptance of its initial use. The first task faced by the institution was to implement the model on its computer - a six months task. Another six months were spent in gathering data for a small campus in a multi-campus system by 1 3/4 FTE administrators. The purpose of the initial operation of the model was to produce a master plan for the small campus, the main institution and other related decision makers. At this point work was initiated to gather the necessary data for the main campus of the institution. The increased size and complexity of the main campus significantly increased the data required for the model. The vastly increased number of variables required and an inadequate source of good data lead to abandoning the project.

No further effort has been made to revive use of CAMPUS. Two of four primary administrators involved in the initial decision to implement CAMPUS remain at the institution in planning capacities. One reason provided for not continuing efforts with CAMPUS was that less detail has been required by planning officers since the initial implementation.

TRIVIAL MODEL - HELP/PLANTRAN

Case B, an institution acquiring HELP/PLANTRAN, never got to an operational mode after three years of less than quarter-time effort by a single individual who has since left the institution. The trial runs of the model resulted in information deemed too broad and not meaningful. Planning was not a priority at this institution during the trial period. The general attitude was that the model was available, at no initial cost, and it might be nice to see if it produced

anything useful. The model is still available to the university but no one is trained to use it at this time.

SUMMARY AND CONCLUSIONS

Indications are that long-range planning is an increasing factor in the administration of higher education. Simulation models, trivial or sophisticated, are tools which can contribute to the planning process. The selected institutions have however abandoned the use of any simulations in favor of traditional, manual planning techniques as their need for long-range planning increased.

It would appear in either case, trivial or sophisticated, that unless administrators are prepared to deal concretely with objectives at all levels and the measurement of them, any application of simulations is bound to fail. Certainly in the case of the HELP/PLANTRAN application no thought was given to the objectives of the institution and the objectives of the model prior to use. An adequate match is unlikely to happen by chance. In the case of the sophisticated model, input data generation became an initial limiting factor and, in the long-run, the planning requirements changed; both factors contributed to discontinued use of the simulation as a planning aid.

Simulations cannot be a magic solution to planning. The computer simulation will not run favorably without adequate forethought given to objectives of both the planning operation and the institution itself.

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