Finally, a recent journal article (Beck et al., 1977) reported that of forty-six departments of Agricultural Economics throughout the United States "almost two-thirds of the respondents (62 percent) identified agribusiness management as the program likely to experience the greatest growth in the near future." The basic skills needed to succeed in business would be (Flaumenhaft): (1) the ability to communicate, (2) the possession of human relations skills, and (3) the ability to solve problems. Interestingly, the skills in each of these areas is largely an art and none are unique to a BA or BS program. In fact, the skills are highly complementary and are needed in almost all fields.

Conclusions

Has not the time come for a degree that more clearly reflects the breadth of requirements at both the college and department level? Why not reward students who have met the requirements in both the arts and sciences with a degree that says exactly that.

This is not to say that we should eliminate the BA or BS degree from Land Grant institutions for those students who truly specialize in one of these areas. On the other hand, let's recognize those students who build a program in the liberal arts and in a scientific technical area with a degree that is worthy of the achievement.

This Bachelor of Arts and Sciences (BA & S) degree would seem to have merit in the Land Grant institutions in general and even more so in the departments of Agricultural Economics. For, has not the field of specialty of the agricultural economist recently combined the technical areas of agriculture with the more liberal arts areas of business? As we move into the '80s and beyond, is it not time to recognize basic changes and diversity in our curriculum and make others aware of it by initiating a degree that better reflects the training? Is a Bachelor of Arts and Science in Agricultural Economics an idea whose time has come?

References

1. Beck, Robert L. et al. 1977. Undergraduate programs in agricultural economics: some observations. **American Journal of Agricultural Economics.** 59.
2. Dressel, Paul L. 1963. **The Undergraduate Curriculum in Higher Education.** The Center for Applied Research in Education, Inc., Washington, D.C.
3. Flaumenhaft, Frank K. 1977. The undergraduate curriculum in collegiate business education, **College News and Views.** South-Western Publishing Co. Vol. 31, No. 1.
4. Hannah, Harold W. 1976. Agricultural education in retrospect and *prospect. Deans* and Directors Resident Instruction in Agriculture. RICOP, July.
5. Hess, Carroll V. 1969. Social science needs in agriculture and natural resources curriculum — The CEANAR Report. **American Journal of Agricultural Economics.** 51.
6. Manderscheid, Lester V. 1973. Guidelines for curriculum changes in agricultural economics. **American Journal of Agricultural Economics.** 55.
7. Spitze, R.G.F., 1962. Agricultural economics teaching and our domestic problems. **Journal of Farm Economics.** 44.
8. Thatch, Daymon W. 1978. Changing Undergraduate Degree Requirements for Agricultural Economics in the Northeastern Land Grant Universities. **Journal of the Northeastern Agricultural Economics Council.** Vol. VII, No. 2, October.

Classroom Network Planning For Nursery Management

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Abstract

The incorporation of a network planning system into a nursery management classroom could greatly aid teaching and learning of nursery business and technology. A network is an extension of a flow chart. It not only is a graphic representation of interrelated activities but includes time estimates necessary for the completion of each activity. The logic demanded by such a system results in comprehension of the important interrelationships inherent in the nursery business.

Introduction

Teaching a class in nursery management can be difficult in that practical technical skill necessary to grow plants must be incorporated with essential business and managerial skills. This problem is compounded by the fact that the nursery industry has grown rapidly in the last 10 years and in many cases has outgrown management capabilities. Nursery management graduates must be prepared to deal with the industry in this critical growth period.

Management techniques currently used by many nursery operators for control and scheduling include use of flow charts, graphs, record books, work calendars, or some combination thereof (4). PERT (Program Evaluation and Review Technique) is an alternative to these methods. It is a management tool which extends the concept of flow charting by assigning time estimates to each activity on the network diagram. The combination of a network diagram and time assignments provides management with a tool which does the following:

1. Shows at a glance the overall plan and progress achieved.
2. Makes evident those activities which could be in difficulty and require close observation.
3. Enables managers to visualize operations in more detail and with more accuracy.

The process necessary in dealing with network planning is one which demands logic and a thorough understanding of the components of an operation. The PERT concept, therefore, can be beneficial to managers, students, and instructors.

Network Planning

Network planning refers to a graphic representation of the logical sequence of events and activities necessary to complete an operation (Fig. 1). An activity is represent-

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ed by an arrow and indicates work effort. An event, represented by a circle, is a specific definable task.

Prior to constructing a network a user (student or manager) must first list all activities necessary for a particular operation. To construct the actual network the user must assimilate the activities in a logical sequence by asking the following questions.

1. What activities must be completed before this one starts?
2. What activities cannot start until this one has been completed?
3. What activities may be carried on simultaneously?

This procedure makes the student realize activity interrelationships.

Once the graphic model is complete, time estimations are made for each activity. Two approaches can be used: the statistical average of three time estimates, or one single time estimate. When using three estimates, a user must determine an optimistic time (to) in which an activity can be accomplished, a pessimistic time (tp), and a most likely time (tm). The expected time (te), or statistical average, is determined by the following formula:

$$t_e = \frac{t_o + 4(t_m) + t_p}{6}$$

The advantage in using three time estimates is that a user can make allowances for weather sensitive activities. The advantage in using a single time estimate, however, is that it is less time consuming and, therefore, less costly.

Following the determination of estimated time for each activity, simple calculations can be made to determine:

1. The earliest time an event can be expected to take place (TE).
2. The latest time an event can be accomplished and not cause a delay (TL).
3. The amount of free time between the time each event is scheduled to be completed and the time allowed for the termination of the operation (Slack).

A worksheet, such as that designed by Evarts (3) can be used to facilitate calculations (Table 1). The method for making these determinations is detailed in network literature (1,2,3,5,6).

With the addition of the time durations to the graphic model, a user can also determine the critical path. The critical path is that path through the network which requires the longest time for completion. If any activity on this path is delayed the final outcome of the operation will be delayed.

Once the critical path is determined the user can see the interrelationships between activities and determine what effect one activity has upon the other. A network is superior to the more traditional bar chart in that these relationships can be determined. A bar chart may indicate that activities overlap, but it does not show if a slowdown in one activity will affect another. Once the interrelationships are visible to a user he can analyze the network and make more knowledgeable decisions relevant to the allocation of workers and equipment and completion of the entire operation.

The calculations necessary in networking may be accomplished manually or by computer (networking computer packages are available). The calculations are simple and may be accomplished with relative ease up to 150 activities. Beyond this point, calculations can become cumbersome and use of a computer is advisable. Budgetary considerations will likely determine whether a computer is used in the classroom. Use of a computer would expose students to a management tool which has become prevalent in today's business. However, the benefits of network planning can be derived without the use of a computer. The principles of networking are basic to good management in that they demand the important concepts of logic and interrelationships. When a computer approach is used, care must be taken that learning to use a computer package does not dominate the more critical understanding of nursery operations and the principles of networking.

Networking in a Classroom

Since a combination of CPM and PERT has not been tried in a nursery management class, it is not the intent of this article to dictate how such a class should be taught. It is intended, however, to present some ideas which could be adapted to an individual instructor's program.

One possible approach when using a network in a class would be to spend 1.5 quarters on nursery technology and nursery business. The remaining one half quarter could be used to teach the principles of networking and its integration into the nursery operation. Gaming situations could be included where certain conditions and changes occur in a nursery operation requiring analysis and subsequent managerial decisions. An additional higher level course might also be offered to students requesting more detailed knowledge and application of the concept.

Literature Cited

1. Battersley, A. 1970. **Network analysis for planning and scheduling.** 3rd ed. St. Martin's Press. New York.
2. Control Data Corporation. 1975. **PERT/Time reference manual.** Models 72, 73, 74 Version 1.2, 6000 Version 1.2. Control Data Corp. St. Paul, Minn.
3. Evarts, Harry F. 1964. **Introduction to PERT.** Allyn *and Bacon*, Inc., Boston.
4. Furuta, T. 1974. **Environmental plant production and marketing.** Cox Publishing Co., Arcadia, California.
5. Moder, Joseph J. and Cecil R. Phillips. 1970. **Project management with CPM and PERT.** Van Nostrand Reinhold Co. New York.
6. Radcliffe, Byron M., Donald E. Kawal, and Ralph J. Stephenson. 1967. **Critical path method.** Cahners Publishing Co., Inc., Chicago.