THE COST CONSTRAINT IN AUTOMATED CARTOGRAPHIC EDUCATION AND TRAINING FOR TECHNICIANS

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ABSTRACT

Much emphasis in training to date has been placed upon developing the skills of postgraduate research workers or those of digitising operatives. The College recognises the need to develop the skills of technicians and higher technicians in automated cartography. However, high capital costs and recurrent expenditure to up-date and replace equipment coupled with substantial operating costs are likely to limit what can be achieved. The authors hope to encourage discussion of the industry's requirements and how these may be achieved.

INTRODUCTION

Luton College of Higher Education has developed a unique and highly successful course leading now to the Business and Technician Education Council Higher National Diploma in Geographical Techniques. Students from the course find employment in many fields where applications of automated cartography are increasing rapidly, particularly in petroleum exploration and development, the public services and planning, and in field survey. With the exception of the last, the majority of our students tend to be cartographic illustrators rather than cartographers in the strict sense. Although from the outset computing has formed part of the course the emphasis initially was placed on data processing applications and has shifted only gradually towards computer assisted cartography. The course teaching staff believe the time is now right for a substantial investment in technician training.

BACKGROUND

The course is a sandwich structure, the students spend the first and third years in College and the second out gaining industrial experience. Through a programme of regular visits
to students' employers, from information coming via students visiting College, through contacts with former students after completing the course the staff maintain close liaison with developments in the industry. It was deliberate policy not to become involved in automated cartography early in the history of the course but to establish a reputation for a broadly trained, adaptable student well grounded in cartographic skills and possessing sound knowledge of basic survey and data processing techniques. This has been achieved, but we are becoming increasingly aware that students completing the course will require practical experience in automated cartography at a high level.

The structure of our course as currently approved by the Business and Technician Education Council (BTEC) enables us to provide this training developmentally and to differing levels through the preliminary stage, the core of the course and options taken at the highest level. Students are introduced to computer cartography early in the course but at present do most of their developmental work at the beginning of the third year on their return to College from industrial experience. More students are encountering automated cartographic systems during their work experience year and our first year curriculum is under almost constant review.

By abnegating computer cartography in its early development we tried to avoid committing the College to heavy expenditure on expensive and rapidly obsolescent equipment whose capabilities were frequently limited. As the equipment enters the third generation we feel that expenditure can now be justified.

THE OBJECTIVES

The requirements for technician training are different from those for operatives or for research workers but provide linkages between these groups. The technician requires a wider range of skills than a machine-minding operative; a higher technician requires managerial skills to organise work and ability to solve problems which may arise both from the machine and in its products. The higher technician may require the ability to carry out all tasks performed on the job and to switch between jobs, changing for example from one contract to another whilst supervising a shift.

Our objective of a Diplomate who can successfully switch tasks may well involve a high level of understanding of computer operation and the use of user-friendly and less friendly
systems and possibly machine languages as well as more common languages. We do not consider a knowledge of programming essential when the student completes his or her course. Programming is a specialised task beyond the course and carried out in employment to meet specific requirements. It is knowledge of the applications and limitations of programmes we regard as important.

We hope to provide worthwhile experience of an interactive computer system or systems, using both the student's own data as well as other data. To be able to produce maps using existing frameworks and to design within the limitations of existing programmes. There is a need to be aware of the different types and outputs and the different methods of plotting. Most of this will go on in the third year because we remain committed to a firm understanding of the basic graphic cartographic principles taught in the first year.

ATTAINING THE OBJECTIVES

The teaching staff have submitted to the College a number of options costing between £5,000 and £300,000. The lowest price is for a simple system to demonstrate the principles to students. The highest price is for the ideal of 10 interactive workstations capable of working on a single problem simultaneously through a central 'teaching console' yet also being capable of independent work for student and other projects. This is our primary objective, how can we attain it?

In terms of cost, £300,000 is a greater investment for a single course than the College has ever made. Our estimated running and replacement costs equal our present Departmental income covering 35 staff in Science.

Obviously it will require special funding, we believe that this can be obtained from the Department of Education and Science; the Natural Environment Research Council; Industry, as well as local sources. In return we would expect to share the facility with other Colleges and with Industry. We already share other facilities with a Polytechnic and are extending this agreement. We have expressions of interest from local cartographic firms to use equipment if we get it. However, in education buying capital equipment is treated like purchasing a house - how many of you would buy your auto-carto equipment with a mortgage over twenty years? Would any manufacturer or factory lease us equipment on an annual payment we could afford? Used equipment is superficially attractive but spares and maintenance costs become prohibitive.
THE TRAINING PROCESS

Having obtained equipment and found how to use it we need to apply it. Our validating body, the Business and Technician Education Council (BTEC) will need convincing that CAC or Auto Carto is more than button pushing and screen or printer watching and requires high level skills. Our present course is in four stages, three of which would require modification for Auto Carto. In the Preliminary Stage - the first term in College - there would be an introduction to computer graphics as part of a general computer course. We cannot yet rely on all students entering with a sound knowledge of computers and computing. This should provide the basic motor skills of keyboard, loading and running and some understanding of capability of CAC.

In Stage One - the rest of the first year, students would work as groups on assignments and exercises set by staff but in-putting some of their own data and observations. This would be regarded as Level III by our validators.

Stage Two is the industrial experience year where exposure to CAC is likely to remain variable for years to come. Hardly any of our 25 or so employers have no computer assistance be it only a self-rectifying KROY machine or a typesetter; only the largest can afford full-scale interactive automation.

At Stage Three - the third year of the course emphasis would shift towards student directed project work - examining applications and developing them further, exploring designs and styles of mapping and graphing, making innovations. To provide time for this other things in the course may have to have less time. To begin some of this work may be done by small option groups but given the rate of expansion of the applications we could not hope for it to remain so for long.

CUSTOMER NEEDS

We serve two groups of customers. You, whom we serve directly by training technicians and secondly your customers whom we serve indirectly. You are interested in the quality of training we give our students we know that they are accepted throughout the cartographic industry and want to keep it that way. It is these technicians and higher technicians who will produce the products that keep your customers happy. We know that they may not necessarily be using 'hard copy' maps in the future but whatever they have it will require good design and sensible production. This is a very important development in cartographic illustration and we intend to go with it.