Discussion

Integrated training for the blind programmer

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At the present time it is necessary to find a means of training blind people for programming in groups of only one or two. This paper investigates the feasibility of integrating blind people into normal courses for the sighted.

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Fewer blind people are coming forward for training as computer programmers. There are two possible reasons for this. The first is that the original reservoir of those who fulfilled the criteria for programming and who wanted to carry on this occupation is drying up. The second is that there are fewer blind young people (fewer children born are or become blind), and many of those who are blind have other handicaps which disqualify them from programming.

It is therefore necessary to find a means of training one or two blind people at a time, rather than a dozen or so together; otherwise, by waiting until we have sufficient numbers for a traditional programming course, we may lose valuable employment opportunities.

The choice would seem to be between integrating suitable blind people into normal courses for the sighted, or finding some way of training them on their own (maybe in their new employment situation) as they come forward.

The following paper seeks to establish the feasibility of integrating blind programmers into normal training courses for the sighted, contrasting it with programmed instruction; and the procedures which should be adopted to meet this end. It also explores programmed instruction as an alternative possibility. It contains the following sections: (*a*) Problem definition; (*b*) Possible solution.

Two types of integrated training will be distinguished: that where a person already qualified is further trained 'on the job'; and that where an unqualified person receives initial training on a course for the sighted. So far, the first of these has been, by and large, successful; but the second is notable by its failure.

It must be stressed that this document is a very tentative summary, its object being to open the whole subject to brisk debate so that hopefully, in being thoroughly aired by all parties, the problem of blind programmer training may be solved, or at least more nearly find a solution.

Part of the problem is that no one has worked out which is the best way to train the blind: although several good, conscientious reports have come out of the Hursley project (see below, and Love, 1968a; 1970; 1968b; 1968c), with the work still continuing, there is nothing at all on the others that is either comprehensive or objective.

I must emphasis that any views expressed in this paper are very much my own, although I believe that many would be shared by other blind programmers.

Problem definition

The problem resolves itself into a two-fold one: the choice between courses on the one hand and individual learning on the other; and, if courses are taken, which type of course, and, in particular, whether the course is one for the normally sighted, with the blind person being integrated *in the best way possible.*

Any course demands a certain minimum number of people equipped to take it, whereas private programmed instruction tuition or integrated training can be started just as soon as someone needs it, as sighted counterparts might do.

Lecture-based training (*White, 1970*)

There are broadly two types of course at the moment: the commonest is lecture-based training; and the other programmed instruction.

Lecture-based training consists broadly of lectures interspersed with exercises, being on some aspect of the operating system, or programming; the exercises use programming languages, students referring to manuals already brailled—no course being arranged unless such a braille manual is available.

Disadvantages with lectures are possible boredom, and, on some recent courses, indiscipline by lecturers' absence. Some of the lectures are said to have been below standard.

Programmed instruction (*pi*)

Of the second type there has only been one example—this involved programmed instruction (Love, 1968a; 1970; 1968b; 1968c). The pi text was on talking book cassette, with the answers in braille. It was backed up as usual with braille manuals of the programming language used (COBOL), and a tutor was continuously on hand to give assistance with problems both from the method of instruction and the material, and later on to help with the exercises where necessary. The first part (on operating systems) contained no exercises; the second part on COBOL contained exercises (programs written around problem specifications presented on talking book cassette). Both parts contained lectures on some aspect of programming or the programmer's career, and served to break up the monotony of either pi or exercises. The 'Computer Game', in which computer components are realistically simulated by course participants, was both enjoyable, and, I feel, beneficial.

There is a lot of opposition to pi by those who have not used it, on the grounds of being more difficult for the blind to follow than lectures, and, of course, random access is more difficult with tape than braille.

I am personally in favour of pi when properly supervised, but many of the Hursley course felt that they did not learn as efficiently as those on other Civil Service courses.

An advantage is that participants can go at their own pace: however, this causes strife from the inevitable faster progress of some people than others (this would not be a problem with pi being used by one or two people working alone). Another factor in favour is exactly predetermined course quality, and a second the tutor's presence and closer relationship with the students.

Integrated training

As already indicated, integrated training is quite simply where a blind person participates in any course not specifically created for him or geared to his requirements (although he may reasonably expect that the lecturer will make some effort to recognise his special needs). But, as also indicated, we have to make a distinction between a course organised for the computer professional, and one organised for the computer initiate.

A disadvantage of integrated training is that the material in braille is likely to be of a restricted nature, due to the small annual quota of material that can be brailled. It would be very difficult to guarantee that all the material required by different lecturers, in different areas, working maybe for different companies, would be in braille, or even readily accessible to the student. Quite clearly, it cannot be left to him to transcribe it in any way, due to his inexperience.

On top of this, a blind person has the additional task of properly integrating himself with the sighted course: using a typewriter for communicating with his tutor and fellow participants; using a (noisy) brailler for making his own notes, and in exercises; using a tape recorder to record what the lecturer is saying—the latter may or may not remember to read out what he is writing on the blackboard or other visuals not in braille!

These problems are experienced by any blind person on an integrated training course, but at least the qualified person does know the subject to some extent already, being familiar with the terminology, and experience has already shown that it is therefore easier for him to adapt. It is also easier to make arrangements with the lecturers if the course is internal to one's own company. Initial integrated training to date has been characterised by: material not being ready; the student having to braille his own manuals from tape dictation, without knowing the subject matter; and inaccurate material provided.

Other problems associated with integrated training include the

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fact that the supply of the BCAB Datatape (to civil servants), and of needed manuals, is no longer automatic, nor is the student automatically informed of what is available to him *because he is blind*—in particular, he does not necessarily hear about the British Computer Association of the Blind.

Problem solution

Programmed instruction presents a standardised material, which could be used by someone used to dealing with the blind (but not necessarily familiar with programming), who is therefore more likely to enforce course discipline, and who can turn for expert advice when needed (if no expert is actually present in addition).

If, however, we plump for integrated training, then adequate student accommodation must be provided, including: table or desk; power point (for recorder if needed); special equipment (brailler, typewriter, recorder, etc) (Coleman, 1973; Coleman; Love, 1968b; Love, 1968c). Extra time during or after sessions must be allowed for the student to assimilate material and do exercises, as the initial learning process for the blind is slower.

Whichever system is used there will be a need for some means of rapid transcription into braille of small documents—e.g. course handouts, additional exercises and examination papers, and student notes provided by the tutors. The system outlined by Gill (1973) is a good example. This service is needed now by programmers in their jobs, for the brailling of job specifications, memoranda, and similar documents.

There would also be a need for a resource tutor (he would be useful even now), who would understand and solve the problems of blind programmer students (whether on initial or later training). His duties could be to: aid the programmer in organising his part in the course; see that all the necessary brailling is done well in advance; be on hand to help with problems on the course (and in homework); and, in addition, acquaint the beginner with items such as suitable manuals available, the British Computer Association of the Blind, and the BCAB Datatape (tape recorded journal).

The braille problem

It cannot be right to train blind people for programming, and then to fail to provide them, *in braille*, with the literature required to do their job. But this is precisely what has happened in Britain, with much less than one percent of *required* manuals in braille (not to mention books!). I am not interested in the reasons (excuses?) for this, but in trying to solve the problem.

The solution, I believe, is to set up a separate unit for the rapid production of braille for blind professionals of all kinds, one that could handle *quickly* large amounts of material, for as many as a dozen or more, and as few as one, without undue difficulty. We might proceed along the lines suggested by Vinding (1972).

This unit should be funded by the Government, as a necessary aid to the employment of the blind, and completely separate from the normal braille publishing units which obviously are not equipped to deal with this very special problem.

After eight years of programming for the blind, this is now a matter of extreme urgency, as people's jobs and promotion prospects have been put at risk for some time now. Credit for achieving as much as they have without adequate braille redounds solely to the programmers themselves, their tenacity and ingenuity. But the time is over ripe for giving them the support they need.

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