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The Tutoring Role of Mentors Working with Adults and Elderly People with Learning Disabilities Using Virtual Environments

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ABSTRACT

This article outlines the potential of virtual training environments in the rehabilitation of adults and elderly people with learning disabilities. Before such virtual training environments are developed, tutoring roles for mentors working with adults and elderly people must be investigated. This is because this group of people has far less expectation of and experience with computers than younger people with learning disabilities, for whom virtual training environments have already proved effective. Effective tutoring strategies employed, together with appropriate and well-designed virtual training environments, will be the outcomes of two methods suggested in this article.

INTRODUCTION

MIRRORING THE TREND in the general population, people with learning disabilities are living longer. The proportion of those with learning disabilities in older age groups is expected to increase in the next 30 years owing to increased survival: The difference in mortality at all ages compared with the general population is now relatively small. This is due to a number of factors including the general improvement in treating infectious diseases, an improvement in anticonvulsant therapy, neonatal care, and nutrition.[1] The closure of long-stay institutions means that the needs not just of the young but also of elderly people with learning disabilities in the community must be addressed. The increased life expectancy of older adults with learning disabilities has already resulted in a growing population of individuals who face, among other challenges, a transition from a work-based lifestyle to a leisure-based lifestyle in retirement, loss of older parents and a diminished social network, adjustment to relocation to a long-term care facility, as well as experiencing many other role changes common in the general older population.[2]

An examination of the lives of the current elderly population shows that these challenges are not always being met successfully. An Australian study[3] examined the social and community involvement of a group of people with learning disabilities who were aged over 55 years. They made infrequent use of public amenities and social and recreational facilities and, with the exception of those living with relatives, most had limited contact with family and friends. An earlier study[4] using the same cohort found that the majority of older people were autonomous in basic functional skills such as eating, toiletting, and grooming but few

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had competence in reading, writing, handling money, operating a bank account, using laundry or cooking equipment, or shopping independently.

This situation could be partly by the predictable effects of aging. More recently, British researchers carried out a 5-year follow-up study of older clients (aged between 50 and 92 years at the beginning of the study) with intellectual disabilities in a long-stay facility in the United Kingdom.[5] Over that period, they found a significant deterioration in both their vision and hearing as well as in communication, social interaction, and symbolic activities. However, their Australian colleagues[3] cite the work of Hogg and Moss[6] to suggest that this lack of engagement in social and recreational activities is not solely attributable to age but also to caregiving practices that exist within the settings in which they reside. They go on to conclude that there is a need for independence training that enables the current generation of middle-aged people with an intellectual disability to make decisions and choices about social and community activities. "As for their younger peers, writers have emphasised the need for developing the independent living skills of older people such as the use of the telephone, shopping and other public amenities, public transport and maintaining freindships and contact with family members" (p. 120).

Earlier, the authors[7] argued that the need for independence training could be partly met by using virtual environments. They went on to show that not only are virtual environments effective in facilitating the acquisition of living skills (shopping, navigating new environments.[8–10] and Makaton sign language[11]) by children with severe learning disabilities but that these skills will transfer to the real world.[9]

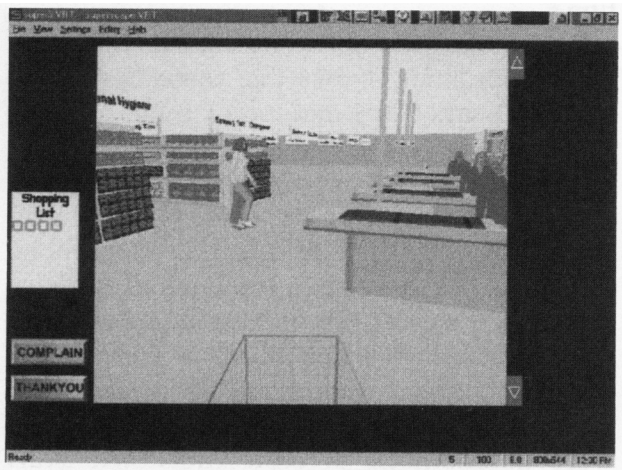

FIG. 1. Virtual supermarket.

In addition to facilitating the acquisition of new skills, such interactive software might have the following advantages. First, it might allow the continued practice and therefore the maintenance of skills that might otherwise fade with lack of practice. Second, it would encourage active involvement in a group of people characterised as having a tendency to passivity.[12] Third it might have beneficial effects on their level of cognitive functioning.[13–15] Lastly, it might act purely as entertainment by providing experiences to the individual that he or she would not otherwise undergo.[7] Several environments have already been developed[16] that might play such roles. These are based on real environments in which this client group could practice a range of household skills, social activities, the use of public services, vocational skills, health skills, and the use of telecommunications. They are structured so that they provide guidance to support the decisions that must be made within them.

- ***The Virtual Supermarket:*** in which to practice and redevelop skills including personal planning, handling money, personal safety, seeking assistance and making decisions (Fig. 1).
- ***The Virtual Café:*** in which to practice and redevelop social skills, handling money, and making on-the-spot decisions about purchasing and sequencing activities (Fig. 2).
- ***The Virtual House:*** in which elderly people could practice and develop skills necessary for their daily activities, health and safety in the home, healthy eating plans, personal safety, and develop a directory of contacts. Within the Virtual House the training could assist in personal planning: presenting options and relating activities to time and resources. Scenarios could be developed to practice the monitoring of the home environment to ensure essential actions were undertaken (for example, turning off the cooker; Fig. 3).

FIG. 2. Virtual cafe.

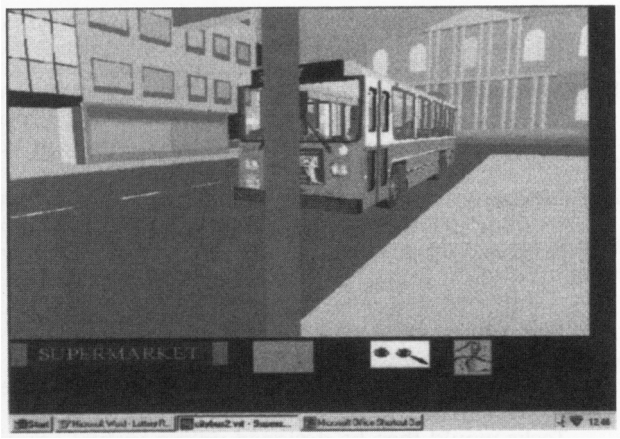

FIG. 4. Virtual transport.

- ***The Virtual City:*** in which to practice and redevelop skills (including road and personal safety). It would also support the execution of everyday tasks within the city by prompting, timing, and sequencing activities.
- ***The Virtual Transport System:*** in which to practice and redevelop skills concerning the independent use of public transport. Tasks would include handling money, planning routes, timing and sequencing events, and road safety (Fig. 4).
- ***The Virtual Community Centre:*** in which to learn about the services available to elderly people, including health services, home help, and social contact with other people.

Other tasks and environments would be suggested by user groups formed from adults and elderly people with learning disabilities, their metnors, and caregivers. It has been shown that user involvement in the design, development, and subsequent evaluation of Virtual Training Environments is a vital component of these programmes if they are to be successful.[16]

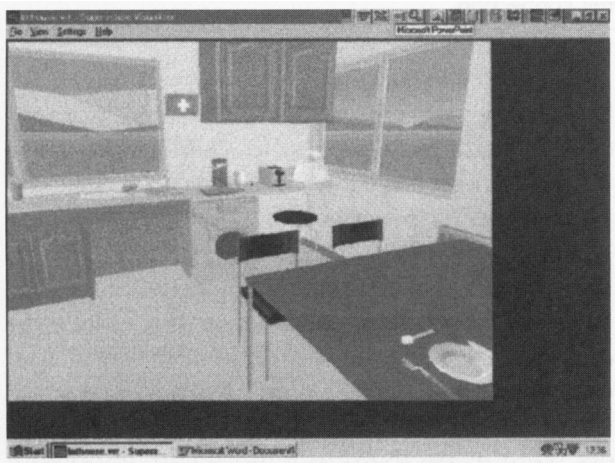

FIG. 3. Virtual house.

METHODS FOR TRAINING ADULTS AND ELDERLY PEOPLE WITH A LEARNING DISABILITY USING VIRTUAL TRAINING ENVIRONMENTS

The development and evaluation methodology for extending this work to the older population of people with learning disabilities would follow a user-centred approach already developed by the authors and successfully applied when working with young adults with learning disabilities to develop independent living skills within virtual environments.[16] (See Table 1.)

The need for effective tutoring strategies

For primary and secondary schools, the introduction of new technologies has frequently led to predictions that they will revolutionise education. All too often these claims are not realised. According to Light[17] many new technologies have been offered to educators as panaceas in the past, but the reaction of many was that "the only successful piece of educational technology is the school bus." Talking about computer use in general, Hope and Odor[18] report a growing suspicion that teach-

TABLE 1. DEVELOPMENT AND EVALUATION METHODOLOGY FOR VIRTUAL TRAINING ENVIRONMENTS FOR USE BY ELDERLY PEOPLE WITH SEVERE LEARNING DISABILITIES

1. **Formation of Project User Groups:** These User Groups would be formed from representatives of the adult and elderly learning disabled community. This ensures that whilst maintaining and developing cognitive skills the computer software will develop real and important independent living skills relevant to this User Group.

2. **Selection of common functional difficulties and computer based tasks to counter these:** Experts in research concerning the effects of learning disabilities and ageing will select a range of common functional difficulties experienced by this client group. These may include problems arising with tasks that involve cognition such as:

   - Not remembering simple recurrent activities.
   - Not being able to plan independently.
   - Not being able to use common technological devices.

   Tasks would then be designed within Virtual Training Environments so that clients could practice important independent living skills whilst developing and maintaining cognitive skills.
   These may include the Virtual City, Virtual House, Virtual Supermarket, etc.

3. **Development of Storyboards describing the Virtual Training Environments:** storyboards will be drawn-up by programmers working with the project User Groups. These will provide a detailed description of the proposed Virtual Training Environments. Their use would provide a building specification for the programmers as well as an easily understandable means of ensuring that the Virtual Training Environments stay within the original vision of the project User Group.

4. **Development of the Virtual Training Environments:** The Virtual Training Environments will be developing using a suitable Virtual Reality based authoring tool. This mayu be VRML or Superscape.

5. **Expert review of these Virtual Training Environments:** Whilst the Virtual Training Environments are being built they will be reviewed by the project User Groups to highlight any usability difficulties at the earliest possible stage. These may include problems concerning the use of input devices, interface design and content design.

6. **Evaluation of Virtual Training Environments by the User Group:** A combination of methods will be employed to formally assess usability problems with the Virtual Training Environments and to assess their effectiveness in combating the functional difficulties encountered as a result of ageing and learning disabilities. The methods will include the use of questionnaires, observation and interviews with the project User Groups.

7. **Refinement of the Virtual Training Environments:** An analysis of the evaluation process will allow the identification and correction of common usability problems. It will also allow us to assess the effectiveness of the Virtual Training Environments at combating functional difficulties and to identify ways in which this method can be extended and improved.

8. **Dissemination of the Virtual Training Environments:** The most appropriate method of distributing the Virtual Training Environments will be investigated. This may include methods via a project web-site, where the learning software can be downloaded and used by anyone wishing to tackle functional difficulties arising from ageing and learning disabilities at any site with an internet connection.

ers will be merely transferring old instructional techniques onto the new medium and not fully exploiting its potential. To avoid this happening with the introduction of virtual environments, Salem-Darrow[19] exhorts educators to take a proactive planning stance in the growth of this important technology rather than the reactive stance many have taken with other educational technology developments in the past. "If educators want virtual environments to meet learning needs especially of those students who have unusual learning needs, they must play an active role in the development of applications offering to developers their unique understanding of learning styles and good teaching practices."[20]

A study by Standen and Low[11] shed some light on the teaching practices associated with the use of virtual environments in special education. Specifically, it looked at whether virtual environments did enable learners to take charge of their own learning or whether teachers were using them in a more conventionally didactic manner. Eighteen school-aged stu-

dents with severe learning difficulties and their teachers were videotaped while using an educational virtual environment. Teachers' activity was coded into eight categories (e.g., instruction, suggestion, pointing) and the students' activities were coded into three (e.g., moves in three-dimensional space). Intra-rater reliability was established. Teachers contributed significantly less ($p < 0.0001$) as sessions progressed. This was shown by the composite score formed from all the teacher behaviour categories. However, this drop was not as great as the increase in rates of student behaviour. This is because some behaviours (teacher's moves, physical guidance, and non-3D instruction) dropped at a faster rate whereas others (both categories of suggestion) hardly changed. The interpretation of this could be that teachers are not just becoming fatigued but selectively dropping the more didactic and controlling behaviours.

This can be explained with reference to the term "scaffolding" that was identified by Wood[21] as one of the functions of tutoring. When a beginner starts to learn a task, help (a scaffold) is provided to enable the beginner to make progress by controlling those elements of the task that are initially beyond the beginner's capability. As the beginner becomes more familiar with elements of the task and develops the ability to carry it out independently, the tutor intervenes less. This means that the scaffolding or training support is removed little by little. Another function of the tutor according to Wood is to maintain the learner's interest and motivation, marking relevant features of the task and interpreting discrepancies between the child's productions and correct solutions and controlling the level of frustration experienced by the learner. This is represented in the present study by the categories of pointing and suggestion which decreased at a slower rate. These findings support the hopes expressed by some[17,22] that teacher–student interaction around computer based learning has the potential to reduce the traditionally didactic form of teaching often employed in special education.

The recent pilot study carried out at an adult training centre for adults with learning disabilities with little prior experience of computers found that the staff at the day centre, unlike the special school teachers, were more apprehensive of their own ability to use computers. According to Hawkridge and Vincent,[23] teachers need help and encouragement to build their confidence and skills in using computers and deserve proper training opportunities. During the 1980s the number of computers in education increased significantly, but many teachers trained before their use became widespread. The situation in centres providing care for the adult population is even more acute as centres are only now starting to buy computers. These trainers have even more need of support.

Before we can use the adapted methodology presented earlier and based on work with younger people with learning disabilities, we need to provide some assistance for mentors using virtual environments with adults and elderly people with learning disabilities. It is particularly important that we start at this stage because it is likely that adults and elderly people with learning disabilities have far less experience using computers. It is also likely that adults and elderly people with learning disabilities attended school during a period when the use of computers was not widespread. We are currently engaged in a study that aims to produce a repertoire of tutor strategies that are effective in terms of their association with an increase in client attention/engagement and self-initiated activity in the virtual environment. The next step would be to carry out an intervention study in which mentors would be encouraged to use the "successful" strategies with a range of clients to determine how strategy success varied with client characteristics.

METHODS TO PRODUCE EFFECTIVE TUTOR STRATEGIES FOR MENTORS WORKING WITH ADULTS AND ELDERLY PEOPLE WITH LEARNING DISABILITIES USING VIRTUAL ENVIRONMENTS

The design of this study closely follows that found to be successful in the study by Standen and Low.

1. Initial briefing session with mentors explaining the project, demonstrating software

after which they are asked to nominate a client with whom they will work.
2. Individual training sessions where mentors (a) learn how to use the computer and virtual city, which includes several settings where users can learn how to find their way about the streets, catch a bus, negotiate a pedestrian crossing, order food in a café, and shop in a supermarket; (b) discuss the different ways that the virtual city can be used (e.g., only attempting simple tasks in each setting or moving through the hierarchy of tasks in one setting, using the facility to have a task demonstrated first, or talking the client through the task as they attempt it; (c) discuss the aims they have set for their nominated client and how the virtual city might help achieve these; (d) set goals for sessions on the virtual environments for the clients they have nominated.
3. A copy of the community version of the Adaptive Behaviour Scales[24] is completed by the mentor for the client that allows the client group to be described in terms of their abilities.
4. Mentor/client pairs are then recorded on videotape using the virtual city over repeated sessions for 10 sessions over 5 weeks.
5. Ask mentors to rate their own success and the degree to which the sessions met their goals. If appropriate, why do they think individuals dropped out?

Video tape analysis

Videotapes are analysed using computer software and a video capture card. Coding of tutor strategies and client actions will be based on that used in the Standen and Low study. With an older group of learners, however, this will have to be adapted and new figures for inter-rater and repeat reliability calculated and reasons for low reliability examined. Frequency of reliably coded behaviour patterns will be converted to rates per session or, if necessary, first and second half of each session. Analysis is intended to answer the following questions:

1. Which tutor strategies, if any, show a change in rate of occurrence over repeated sessions, and do client-initiated actions increase?
2. Can pairs or clients be identified as more successful (in terms of change from baseline in attention span and activity) than others, or are there only successful sessions?
3. If pairs or clients can be identified as more successful, does this relate to tutor strategies, client ability as measured by Adaptive Behaviour scores, client age or initial level of performance?
4. If there are dropouts, did their initial sessions differ from those who went on to complete 10 sessions?

Results will be treated with caution as this is inevitably a complex area. Mentors differ in their style of teaching with several styles being as effective as one another. We do not wish to suggest a uniform style is appropriate. Pairs may have built a relationship based on past interactions and possess a style of learning that works for them but not for others. One outcome of the work may be that we can offer a repertoire of strategies from which new mentors can select those that they are happy to work with and if they do not appear to be effective then they can try others.

CONCLUSIONS

Existing user-centred methods for the development and evaluation of Virtual Training Environments are currently being adapted for use with adults and elderly people with learning disabilities. It is likely, however, that an extra stage should be added to this methodology that concerns the lack of experience and expectation of adults and elderly people with learning disabilities in using computers. Providing that we can develop effective tutoring strategies that can be employed by mentors working with adults and elderly people in Virtual Training Environments, this skills gap should not prevent this client group from using them as effectively as their younger peers already have.

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