ACTIVE LEARNING AND OPEN LEARNING
(CASE STUDY)

Professor Judith Greene
Professor of Psychology
Open University
United Kingdom
email: J.Greene@open.ac.uk

The Acquisition of Knowledge

One way of considering the acquisition of knowledge is to think of turning novice learners into expert learners. This is a particularly useful approach because there has been a great deal of research into the differences between experts and novices.

Typical of novices is declarative knowledge which consists of verbal statements normally obtained from books, instructions or being told what to do. An example might be: as you increase speed put the clutch down and change gear. However "in order to achieve skilled performance you need to be able to translate declarative knowledge into actions. A new form of representation known as procedural knowledge must be established" (Kahney, 1993:92).

Education has to turn out people who can do more than parrot declarative statements. Similarly actions on their own are not sufficient. An expert will have internalized knowledge in a form which allows them to act with understanding. This applies to all experts, whether they are expert at chess, physics, nursing or drivers. There is a world of difference between knowing that you need to change gears and being able to do so. It is only after a lot of driving experience that practice makes perfect.

So how can novices acquire the internalized knowledge which appears to come so easily to experts?

The traditional approach to teaching is found in schools, technical colleges and universities in most countries. This assumes that the teacher is the 'expert' who can transfer their knowledge by imparting it to the learner. This is often characterized as 'filling' the student from the teacher's 'vessel' of knowledge. I have heard it said that lectures consist of information being passed from the teacher's notes to the students' notes without going through the minds of either.

Obviously this is a caricature but with a lot of truth in it. Good teachers ask questions and try to get discussion going. But the students know perfectly well that the teacher already knows all the answers to the questions. So they are not genuine questions because the teacher is not genuinely seeking information.

Lessons and lectures concentrate on content and students try to imbibe sufficient content to pass exams. In subjects like mathematics pupils are taught the necessary skills but these are often displayed only in homework. One of the differences found between novices and experts in attempting to solve physics problems is that novices attend to superficial aspects while the experts relate problems according to deep underlying principles, as was demonstrated by Chi, Feltovich and Glaser (1981).

Another way of expressing the difference between rote learning and understanding is to contrast the 'memorizer' and the 'deriver'. The memorizer can mimic knowledge by remembering all the necessary facts and rules. The deriver can recreate the necessary output from a "rich web of interlinked operations that allows creative 'workarounds' in the event of a problem-solving impasse" Eisenstadt (1995: vi). As Eisenstadt points out, one of the great challenges of education is to capture expert knowledge in order to store it and pass it on to others.

However, one essential feature of expert knowledge is that it is never instant. There is no magic formula for acquiring knowledge. Knowledge gradually emerges from the opportunity to test ideas, question assumptions, share ideas with other people and to go beyond given information to make it one's own.

The tragedy is that traditional teaching methods actually preclude the acquisition of knowledge. It is made obvious right from the beginning that teacher knows best and that all that is required is for the student to absorb the teacher's knowledge correctly. Discussions are not between equals. It is a rare teacher who genuinely believes they can learn novel ideas from their students and that they may be engaged in a joint acquisition of shared knowledge.

Empowerment through knowledge and technology

It will not have escaped your attention that this is the subtitle for this conference. At this point I want to emphasize the concept of empowerment in learning. This implies that people should take responsibility for their own learning. This is the only way that they will take opportunities to find out things for themselves.

This may sound like the perfect recipe for open learning. Surely this provides students with the means for learning for themselves. They can pace their own studies, deciding when and where to study, they can call on tutors to help them when required. They can continue in their current occupations, whatever these are, while picking up useful knowledge and skills.

But, despite the myriad advantages of open and distance learning, one warning needs to be heeded. Even in the context of open learning, the providers of materials for distance learning can easily be construed as experts. The teams of academics and teachers who prepare texts, perhaps also television and audio programmes, naturally try to make these materials as good as possible.

This is a worthy aim which all of us who are in the open learning game would support. But there is a danger that our students will treat our texts with the same reverence as traditional students regard their teachers. The drive to produce 'ideal' materials can compound this effect. In the absence of the wear and tear of face-to-face teaching, students could come to regard our texts as the truth. I have had students who, I think quite genuinely, claim that they are not guilty of plagiarism. It is simply that the ideas in my text were so much better expressed than anything they could produce for themselves.

I know this may seem like a contradiction in terms. Surely open learning texts encourage students to think about ideas and to become reflective learners. This may be our aim but what do students actually do? They follow a study calendar and produce essays and exams which reproduce our texts. They have become memorizers rather than derivers of their own ideas.

The paradox may be that there are not enough rough edges to allow individual learning in a perfect teacher-produced text. Sometimes the graphic design is so beautiful that students hardly dare to write in the margins of their texts. So excellence in written texts and spoken audio-visual cassettes may not succeed in encouraging real understanding. The fact that the distance learner is often solitary is another reason for their lack of confidence to learn for themselves.

Empowerment through technology

One of the strong motivations for using electronic and other information technology methods is that they free the student from the teacher treadmill. The emphasis is on self-exploration. CD Roms are designed to present information in a way that enables the user to assess knowledge when it is required and to reassess it at will.

Of course, CD Roms are limited by the organization of the material. I have seen bad examples in which boring spoken loops are built in and, of course, there are many shining examples. But CD Roms can be almost too information-rich so that students are locked into them and can become almost taken over by them. They allow exploration but the links have been input by the designer.

The other extraordinarily 'free' source of information is access to the World Wide Web. Search engines allow students to explore relevant sties. The convergence of computing and telecommunications are speeding up the process of integrating graphics, text, moving images and communication on a single screen. This technology allows students to go far beyond any prescribed text.

I shall not attempt to describe the advantages of on-line communication because there will be many more expert contributions. Here I am discussing the implications for the acquisition of knowledge. Does

Internet access count as learning by doing? Does this freedom from the teacher lead to individual learning or to chaos in knowledge? What role is there for guidance about appropriate output targets ? And at what cost?

The Virtual School or Virtual University are extreme versions of on-line facilities. I will briefly describe a Virtual Summer School which was developed by Marc Eisenstadt and his colleagues at the Knowledge Media Institute at the UK Open University. A full account is given in Eisenstadt *et al* (1996).

The context is that the Open University course Cognitive Psychology runs a week-long Summer School at which students plan their own research projects and work in small groups to carry them out using each other as participants.

Certain students for very good reasons cannot attend Summer School. It was decided that twelve of these students would be given the opportunity of participating in a Virtual Summer School. This was an ambitious project. Students were sent an Apple Macintosh TM LC-II computer with all sorts of software on the hard disk, a modem and a mobile phone to use when their telephone was in use for the modem. In addition, for this pilot experiment students' telephone bills were paid.

There was a long practice period while students learnt how to use the on-line communication with tutors and other students, to understand the configuration for 'rooms' like lecture hall, public on-line chat, and software for handling the projects and statistics. Through the Internet facility, students could listen to worldwide lectures and question the speakers.

Despite all the complications, and a few technical problems, the twelve students, who had very little previous computer experience, succeeded in carrying out projects by communicating within small groups. They found it an exciting experience and reported that they had learnt a lot and increased their confidence about computing.

The one theme that ran through the evaluation was that the experience was much more time consuming than expected for the volunteer students who had to undertake an extended learning period. So it was too for the volunteer tutors who were all computer experts. A week-long face-to-face Summer School had been replaced by a four to five week virtual on-line experience. Students also found it quite difficult to keep other students up-to-date with group work. Quite often the electronic chat was on a one-to-one basis with one of the tutors.

The other obvious reason why this pilot has not been repeated or extended is the costs of sending equipment and software to students and paying their telephone bills. It will need great increases in integration of on-line facilities combined with a great decrease in costs before such an exciting venture can become truly portable.

Empowerment through knowledge

So what would constitute a low-tech version of the Virtual Summer School? How can students be encouraged to undertake active projects from which they can learn for themselves?

One possibility is to include projects in the course materials offering guidance about how students can carry out their own projects. Examples could include surveys interviewing people they know, working with very simple equipment which can be sent out to them, or to analyze some data provided for them.

There is a limit to what students can undertake on their own even if they are given the opportunity to contact tutors for advice. If it is possible to organize get-together occasions where students meet each other, more extended projects can be undertaken.

The key is group work. It may be economical to hire simple equipment for groups rather than individuals. It may be economical to arrange for group visits to factories, hospitals or other workplaces.

But the advantages of groups working together go far beyond any economics of providing group travel and resources. Students can worth together on their own projects and decide to allocate roles for each individual. Students learn from each other and they appreciate the problems and delights of group cooperation.

The presence of the tutor is crucial. Students require quite a lot of guidance if their projects are to progress their knowledge. The notion of the 'guided project' has proved to be a very important factor in successful learning of methodologies at the UK Open University. However the tutor must act as a facilitator not as director. Most important in empowering students is to let them make their own mistakes. Internalized knowledge depends on students learning from their own reactions to suggestions by the tutor. It is only thus that true empowerment occurs.

On-line tutorials in which students can send e-mails to tutors have obvious advantages. But it has been demonstrated that they are most successful after face-to-face and telephone contacts have already been established, see Laurillard (1993). The type of interaction changes in each situation and there is something to gain from the benefits of social contacts before proceeding to telephonic and on-line forms of communication in which so much more has to be taken for granted.

The aim of the Virtual Summer School was to foster group interactions and solidarity. Reading texts, watching television, crowded round a radio transmitter, accessing CD Roms or the internet, it is essential that students interact in their own processes of learning, whether face-to-face or virtually. The secret of open learning is to encourage students to learn actively; to achieve the empowerment to acquire knowledge by doing.

References

Chi, M.T.H., Feltovich, P.J. and Glaser, R. (1981) 'Categorization and representation of physics problems by experts and novices', *Cognitive Science*, 5, pp.121-152.

Eisenstadt, M. (1995) 'The knowledge media generation', *The Times Higher Education Supplement*, April 7, pp.vi-vii.

Eisenstadt, M., Brayshaw, M., Hasemer, T., and Issroff, K. (1996) 'Teaching, Learning, and Collaborating at a Virtual Summer School'. In A. Dix and R. Beale (Eds.) *Remote Cooperation: CSCW Issues for Mobile and Tele-Workers.* London: Springer-Verlag.

Kahney, H. (1993) *Problem Solving: Current Issues*, Buckingham: Open University Press.

Laurillard, D. (1993) *Rethinking University Teaching: A framework for the effective use of educational technology*. London, New York: Routledge.