Developing skilled behaviours

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EDITORIAL

Developing skilled behaviours

My title has a hidden agenda. On the one hand, it refers to the one who wishes to be skilled – the trainee; on the other, it refers to the one who assists others to become skilled – the instructor. The theme that I'm going to discuss is this: the process of acquisition of skill is fairly well understood, but the process by which we develop skills in others, especially movement skills, is not well understood at the level of principles and is certainly not widely understood at the practitioner level. This, surely, has implications for the education and practice of those who must help others to develop skilled movements.

I have worked in industry as a psychologist for 15 years. My specialism is training and skill development. For many psychologists, an interest in skill development means academic research into the way in which skills are acquired and expressed by a healthy nervous system (e.g. Kelso, 1982; Holding, 1989). Studies of disease processes can help with this by showing how normal processes are disrupted by known lesions (Smyth and Wing, 1984). Over the past 20 years or so, the theoretical basis for understanding skill acquisition processes has shifted from the almost irrelevant theories of learning processes to the use of theories and models which use information theory and cybernetics to model human behaviour. These more recent approaches are based on performance rather than learning and use the concept of control systems to show how feedback loops internal and external to the organism control movement and allow actions to occur. Computers and robot systems have provided good illustrations of the processes which may be involved in skilled activity. I'll use this analogy to explain how many psychologists interested in skill acquisition manifest their interest: they study the hardware (human nervous system and its operation with the muscles and skeleton) and the software (the processing of information by the brain, the operation of memory and the

development of concept systems related to action) involved in the skill acquisition process and in skilled performance.

These are clearly important and relevant areas of study. However, as an industrially based psychologist, I was interested to know how to actually get people to learn skills quickly to a high level of performance. If on-the-job performance is not adequate or if the training process takes too long, then the costs rise dramatically. For example, I was able to show that one industrial sector in the UK was losing several hundred million pounds annually as a result of long training periods or low levels of performance (James, 1987, 1989). I tried to use the theories of learning and skill acquisition to help me develop training which was efficient. Unfortunately, they didn't help. I found it very difficult to derive best practice from these models. My next step was to turn to training as a wellspring of ideas – if principles of skill acquisition could not help, then perhaps principles of training could.

Training as a topic was not treated as important until the Second World War, academics preferring to study learning processes. As a topic area training is young. However, although development is still occurring in training theory, there are principles which are well understood and which are regarded as sensible 'good' practice (Holding, 1965; Rae, 1983; Goldstein, 1986; Morrison, 1991; Patrick, 1992). My experience of these techniques applied to training in industry was that they did make a difference but were not as effective as they could be. Not only that, it was almost impossible to reconcile them with theories of skill acquisition and performance. Now, that struck me as strange. Here were two approaches to the same problem. You'd expect that they would have a strong relationship, but any shared ground was very hard to come by. At first, I thought it was my failing, perhaps I was

not bright enough to see the obvious links between training theory and skill theory. Well, that's certainly a possibility. However, the more I talked to others and the more I researched, the more I found an absence of a link between the two. Indeed, I found a large body of opinion worrying about the impossibility of deriving training principles from classical learning theory. Researchers using the more recent basis for understanding skill development almost never discussed training issues at all. I might not be very bright, but there was a strong message here that even I could not miss. Training theory and skill theory do not connect. They barely even acknowledge each other's existence. The jigsaw was not complete. Like most of my daughter's jigsaws, there was a piece missing. What could it be? The answer, when it came, was so obvious and commonplace that many have ignored it. The missing link between training technique and skill development processes is the instructor! With this piece the whole picture falls into place. Without an effective instructor, training techniques will not work properly, but an effective instructor works with the trainee's skill acquisition processes so that skills emerge.

The *Tao te Ching* says: 'We join spokes together into a wheel but it is the centre hole that makes the wagon move. We shape clay into a pot but it is the emptiness inside that holds whatever we want' (Lao tzu). This is an interesting point. We often focus on the obvious and ignore the alternative way of perceiving a wheel's operation or a pot's important components. Thus it seems to be with instruction processes and the instructor. Throughout the world there are millions of people actively instructing at this moment. In industry and in sport there are instructors and coaches trying to help others to develop skilled actions. I'd class physiotherapists as instructors, too, as they guide and assist others to regain movement. You'd think that there would be a vast body of research and advice on how actually to go about the process of instructing to get the most effective skill development. Not so. There is a tiny body of research and it is spread widely through time and space! (Cox, 1933; Davies, 1945; Newsham and Fisher, 1972; Newsham, 1976; Robb, 1972; Allison and Ayllon, 1980;

Flegg, 1983). It is largely unknown in both training circles and in academic circles studying skill processes, or if it is known few discuss it in public. And yet it is the instructor who applies training and who assists the trainee's psychological processes to perform at full efficiency. The instructor or coach is the midwife in attendance at the birth of new skills wherever they occur. The process of instructing or coaching is the link which joins together the spokes of skill acquisition theory and training theory into a workable whole. Let's think about how and then we'll think about why it is that most instructors don't understand their role.

The instructor is the unsung heroine of the skill development process. Mothers instruct their children (Chreitzberg, 1969), sports coaches instruct their charges, instructors in industry develop necessary skills in the workforce and physiotherapists help to develop movements. Exactly what is done when one is effective at instructing is determined and constrained by the trainee's internal processes of skill acquisition. For a particular skill sequence, the instructor must prepare in advance so that she knows what movements must be performed and how quickly. She must break the movements down into a series of achievable steps which build towards the final movement sequence. The training tools of task, skill and functional analysis help to do this. The training principles of practice design help her also. The trainee must then acquire knowledge about the task and must then put it into practice. The training principles of communication help the instructor, but more important here are the principles of coaching, for the development of skill goes through specific stages which demand differing instructor behaviour for each stage. When instructor behaviour is not linked to the stage of skill, then the skill development breaks down. As the trainee practises the skill with increasing facility, then the instructor must apply the training tools of monitoring performance and correction so that the trainee only performs the correct movement sequences. How the instructor provides this feedback can boost trainee confidence or destroy it. Doing this correctly is a subtle skill – most of us grow up in an environment where the examples we see around us or

experience for ourselves often teach us how to undermine and destroy confidence in others when we teach them.

The techniques of training are a tool kit from which the instructor can select those most appropriate for her trainee's needs. They are located in a social world of people doing things and organisational activities. The theories of skill acquisition are concerned with the inside of the trainee's head. The two operate at differing levels. No wonder they cannot be linked directly. But they can be linked by the instructor and her activity with the trainee. An understanding of the skill process will help the instructor to act properly, an understanding of the training process will help the instructor to set up and conduct the skill development effectively. Over and above this are the instructing skills needed by the instructor to select and apply the training techniques and which help her to work within the constraints of the trainee's skill acquisition processes. It's here that the difficulty with instructor activity lies. Here's why.

It's fairly obvious that a series of lectures on swimming will not equip a non-swimmer to swim across Lake Windermere. They might provide the background knowledge but the lectures won't provide the physical resources needed (strength, flexibility and stamina) and they won't provide the actual ability to swim any more than would lectures on music equip one to play the piano. It's this distinction between knowledge and doing that is captured in recent models of skill acquisition based on knowledge structures (Anderson, 1982, 1987). Knowledge about something is useful background, but in order to perform we need procedural knowledge, we need to know how to do it, the rules and procedures which will operate our limbs successfully. Procedural knowledge is built up from actually doing the task and can't necessarily be verbalised. So, telling someone how to do a task is not enough. For successful performance they must be helped to perform and their performance corrected and developed by an instructor/coach actively involved in the performance. That is fairly obvious for sport, less obvious in industry and in many other contexts it is hidden knowledge. Many instructors, for instance, are told about

training techniques but are not helped to coach effectively. As a result, they don't instruct effectively and the trainee doesn't gain adequately or feels incompetent because the instructor seems to be frustrated by less than perfect performance.

How should we train the instructor? By lecture? Is it enough to provide enormous knowledge about physiology or pathology and leave the procedural knowledge of coaching to self-generate by the old and discredited method of 'trial and error'? Is it enough to provide knowledge about coaching techniques but leave application of such techniques to chance? It doesn't make sense to me and yet I have met well-qualified individuals, replete with knowledge and experience, who were totally unfitted to help the trainee in their charge.

Being an expert in a field is not an adequate qualification for instruction tasks. It may be necessary but it isn't sufficient. I have taught instructional technique to groups of physiotherapists who have attended courses on communication and lesson planning but to whom the most basic of introductions to instructional methods was a revelation. They came from an environment where knowledge and lectures ruled, where it was implicitly assumed that a trainee who could not apply her knowledge must be deficient in herself rather than unskilled and in need of coaching, where training was interpreted to mean more lectures and more knowledge. In such a situation, what's needed is careful coaching to build the procedural knowledge of practice, but the clinical supervisors were singularly ill-equipped to carry out what was needed. If on-the-job skill development is hit-and-miss, then where does that leave the patient? The physiotherapist is an instructor developing movements for people who have lost the ability or the resources necessary to move. How would instructional skill help? How should it be developed?

I believe instruction to be a grossly neglected area of study in relation to its importance and prevalence. The theories of training and skill acquisition are available, techniques of interaction analysis are available and recently a *model* of instruction has become available. Anyone out there wanting to study professional training

practices in their entirety is now well equipped to do so, perhaps for the first time. I look forward to seeing the research findings.

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