

## Some Thoughts on Learning and Understanding

David Hooper

Learning is a continual process that occurs throughout life. Whether intentional or otherwise, it seems clear that individuals constantly change or modify their behaviour as a result of prior experiences. They learn to act in certain ways in order to achieve, or perhaps avoid, particular outcomes. This learning may not necessarily be a conscious process, nor indeed may it be possible to rationalise or identify exactly what has been learnt or understood. Nevertheless, the knowledge we have expands as our range of experience grows.

The whole industry of education is centred on this concept of enhancing and facilitating the learning process. Both teachers and learners generally have a coherent set of beliefs about knowledge and how this process of learning does and should occur. Whilst such views may not be verbally articulated or explicitly expressed, they will, nevertheless, become apparent from the attitudes and practices that are adopted. Argyris (1976) made the distinction between what he described as “espoused theory” and “theory-in-use:” the former being the “official” view regarding education; the latter being the implicitly held theory that determines the strategies adopted. Although the theory-in-use may not be recognised as a theory as such, Biggs (1994) is undoubtedly correct in his assertion that:

“Any deliberate act is founded on some sort of theory, a coherent set of assumptions. You do this rather than that because you think it will work, and it will work because...of this, or the other.”

Indeed, constant manipulation of the learning environment by teachers in order to create a more optimal setting in which learning will occur is a requirement of every conscientious teacher. Just how well students respond, however, will be largely determined by the beliefs

and expectations that are held. Kember (2001), from a study with university-aged students in Hong Kong, came to the conclusion that:

“...this set of beliefs about knowledge learning and teaching is a fundamental factor in determining how well students cope with higher education and what they get from it. There is enough evidence to suggest that these beliefs should be addressed in helping students to cope with higher education.” (p. 220)

This set of beliefs is clearly going to be influenced to some degree by the culture within which individuals function and operate. Individual differences notwithstanding, there are approaches to learning and teaching that seem to have common traits identifiable within a specific cultural group.

A primary impetus for this paper stemmed from personal experience and observations over a number of years of learning and teaching a traditional Japanese martial art, *Shotokan* Karate. There seems to be a widely-held, yet misplaced, belief amongst some students that the Japanese have an in-built predisposition for learning karate that gives them something of an edge. Whilst it may be true that karate—at least, karate in its current form—originated in Japan, why should the Japanese have any greater propensity towards karate than say the English have towards football, or those of Greek nationality have to engage in philosophical speculation? The answer, of course, is “they don’t.” However, teaching and training in a number of diverse cultural settings with teachers and students of quite different backgrounds led to the formulation of a number of questions about learning and understanding in general, and how we evaluate and measure these notions.

Students clearly arrive at the learning situation (in this case, a *dojo*) with a set of preconceived notions and beliefs about how this learning process is going to take place. It soon becomes apparent that there exist a number of conventions regarding how classes are conducted, the ways in which things are explained (or not explained) and the “system” of imparting knowledge and assessing how successfully students have learned and understood. Japanese students with a Japa-

nese teacher readily accept the format. Even those with no experience of traditional Japanese arts appear to have little difficulty in accepting a style of instruction that to someone unfamiliar with the Japanese tradition would be quite alien. Indeed, when Japanese instructors have to teach abroad, or are suddenly faced with foreign students with very different beliefs and expectations about how this learning process should evolve, it quickly becomes apparent that without some adaptation on the part of both teacher and learners, difficulties are going to arise.

Invariably it is left to the assessment procedure to decide whether “learning” has taken place. Has this interaction between the teacher and students brought about the desired result—a result that, presumably, can be observed and confirmed by the assessment procedure adopted? Are the students better, more skillful, more knowledgeable than before? Have they, in fact, “understood?”

The question seems quite straightforward; after all, surely there is a generally accepted agreement on what it means to “understand” something? An examination of the cognitive and educational psychology literature however, reveals few successful attempts to accurately define this abstract concept, despite its prodigious use within education. Indeed, learning and understanding are often used interchangeably.

It does not automatically follow, of course, that when we talk about learning and understanding in relation to a physical skill like karate that we are necessarily talking about the same kinds of activity or mental processes that occur in a more typically academic setting. Certainly, some theories about how learning and understanding takes place are more applicable to education, and Biggs (1994) warns against the danger of assuming the existence of an all-encompassing theory that is just waiting there for psychologists to finally define and articulate:

“... the strategy of top down application of the One Correct Theory is simply misguided, essentially because psychologically-based theories are derived to explain the data emerging from laboratory contexts, and they are stretched to snapping point when applied to classroom and institutional contexts.”

However, regardless of the context or the setting, there are clearly

a number of variables that interact in some complex way and result in what we refer to as learning and understanding.

In a recent study in Hong Kong (Marton et al, 1997), school children (aged between 12 and 18) were asked to articulate their understanding of learning. They used the two terms quite interchangeably. When discussing about whether they had “learned” or “understood” something, the students described their views about what had occurred by completing their sentences in the following ways:

...then you can do it again, then you can say it again, then you can tell it back...

or

...then you can do (say, tell) it again, somewhere else, at another time...

or

...then you can do (say, tell) it somewhat differently (e.g., you can tell it in your own words)...

or

...then you can do (say, tell) something different... (Marton et al, 1997)

In the same paper, Marton et al reported that Uruguayan students describe their understanding of the process of learning as a sequence:

understanding (1)—learning—understanding (2)

The initial understand (understanding 1) is a very superficial understanding in which the explanation of what is to be learnt is recognized. This is then worked on in some way until it is grasped (learning) and then finally it is understood to the extent that it has become appropriated for the learner to use (understanding 2).

Fazey and Marton (2002) point to an alternate study by Mugler and Landbeck (1994) where a very similar distinction was found be-

tween learning and understanding amongst students from the University of the South Pacific, but where the similar three-phase process was actually transposed:

Learning (1)—understanding—learning (2).

They observe that:

“...whilst there seem to be categorical differences within the pattern when pooling results from different cultures the two phenomena (learning and understanding) become indistinguishable across the pattern of variation or in the way in which they are differently assembled...

The point we are trying to make is that even if individual students had differentiated learning and understanding as different phenomena, on the group level the same pattern of variation appears in relation to both. In that sense, the two are indistinguishable. It also seems reasonable to assume that what the high-school students in Hong Kong referred to as ‘that which you have understood’ or ‘that which you have really learned’ is what, in other studies at university level, is represented by an outcome or product category in a three phase sequence of knowledge acquisition.” (p. 236)

Clearly, people have different ideas regarding how learning and understanding should be distinguished, and the most cursory glance at the literature reveals the struggle psychologists have had in formulating a satisfactorily precise description of what we mean by the term *learning*.

Ammons, back in 1988, was no doubt representative of many researchers when he expressed a sense of frustration at the futility of trying to define this seemingly elusive notion, and suggested, somewhat tongue-in-cheek, that:

“Perhaps we should ban the concept of learning and confine ourselves to finding what variables at what levels lead to how much resistance to change after what prior experiences.” (Ammons, 1988. p. 288)

Nickerson (1985) suggested that:

“Understanding is an active process. It requires the connecting of facts, the relating of newly acquired information to what is already known, the weaving of bits of knowledge into an integral and cohesive whole. In short, it requires not only having knowledge but also doing something with it.” (p. 217)

More recently, educational research has recognized the importance of understanding as an integral part of learning. Certainly all constructivist conceptions of learning and development see learning as a process that involves understanding (Duffy & Jonasson, 1992; Phillips, 1995). The key point, however, is the ability to demonstrate this notion of understanding by applying the knowledge in some novel way. Perkins (1994, 1998) describes it thus:

“Understanding is being able to carry out a variety of actions or ‘performances’ that show one’s grasp of a topic and at the same time advance it... It is being able to take knowledge and use it in new ways.” (p. 6; p.13)

In my own area of interest, karate, the process of understanding has nothing to do with a cognitive analysis. The study of karate is not an academic educational pursuit of knowledge. Students do not intellectualise new knowledge or engage in meta-cognitive processes in the same way that they may do in other areas of study. Although some students may be able to explain the course of a new movement, have some image of how it should be performed, or even be able to articulate to a degree how the new movement ‘feels,’ the only evidence that any understanding has occurred will be largely determined by changes in subsequent movements or actions. The idea of a performance view of understanding, then, seems intuitively applicable to the acquisition of a physical skill where an introspective knowledge or understanding of the new ‘knowledge’ is not present, although the new skill is demonstrably evident. Perkins’ (1995) call for critical scrutiny of the perceived and often assumed connection between mental representations (mental models or schemas) and understanding is highly relevant here, and his cautionary example related to ordinary language comprehension and development appears most apt:

“In some sense, people understand the syntax of their mother tongue. They decode it and produce speech flexibly with it. Yet, apart from tenuous memories of grammar instruction, people generally lack introspectable mental representations that mediate these acts of understanding. People act effectively without knowing the rules in any ordinary sense.” (p. 2-3)

The same is certainly true for those engaged in learning and producing a movement skill or martial art.

When we talk of a person having learned karate to a certain level, we generally end up measuring “performance” against a certain level of criteria or threshold level of competence. Can he or she perform this particular action or series of movements without displaying identified errors that would mark him or her as a novice or beginner? Has he or she learned how to move and evade a pre-designated attack in the prescribed way, and respond with a technique that will be judged sufficiently well executed—with balance, appropriate timing, strength and power? Such an assessment of learning fits in very well with the ideas we have about “intended outcomes.” The models of learning that emerged in the wake of the cognitive revolution typically follow such approaches to learning and training that identify legitimate “functional” goals (e.g., Pew, 1974; Schmidt, 1975, 1976). The assessment procedures are set up to determine whether these goals have been met, and whether or not the learner’s performance meets the prescribed criteria.

It is very common to hear individual learners described as “naturally talented” or “skillful,” and whilst certainly in the karate world individuals begin with differences in levels of coordination, flexibility or strength, the process by which they learn and understand how to move and respond involves a complex interaction of numerous factors, not least of which includes their previous experiences (not necessarily related directly to karate at all), their expectations and the context in which they are taught.

In psychology, notions such as intelligence, talent, ability, skill, giftedness and cognition have traditionally been used in association with individual learners, as if this whole process of learning and under-

standing was something that was going on in the minds of individuals (Fodor, 1975; Newell & Simon, 1972). Barab and Plucker (2002) warn that:

“This line of thinking, rooted in Cartesian dualism (Descartes, 1637/1978), is founded on the separation of the learner from the learning context, effectively isolating the body from its mind, the self from its world, the content from its context, and ability from those situations in which one is competent (Barab et al., 1999; Turvey & Shaw, 1995). Especially in discussions of talent, intelligence, giftedness, and related topics, researchers have traditionally located constructs in the minds of those considered talented or intelligent, or gifted, or not.” (p. 165)

Barab and Plucker (2002) go on to warn that educators too are also guilty of having fallen victim to the same circular logic where:

“Traditional, entity-based theories, placed knowledge in the head of the learner, which led to the creation of educational systems that focused on transmitting content into individual minds” (p. 165)

Much of the “theory-in-use” in current education clearly stems from this assumption that knowledge needs to be absorbed by the learner in some way. The context—the classroom, the dojo, the “educational setting” or “learning environment”—is regarded as a fixed reality in the sense that perception of that reality is the property of the individual mind. It is the individual that acts upon that environment and has an impact upon that reality. There is a complete separation of mind and matter which:

“... [results] in a set of post-Cartesian dualisms: stimulus versus response, behaviorist versus cognitive, reactive versus motivated, innate versus learned, talented versus incompetent—all of which stem from the surrounding dualism separating individual and environment.” (Barab & Plucker, 2002, p. 167)

With the learner and the context polarised in this way, notions such as ability and talent are thus seen as possessions of the individual. Snow (1992), in discussing the problems of traditional theories of aptitude, thus concludes that:

“The conceptual limitation derives from our tendency to think of



persons and situations as independent variables, rather than [thinking of] person-in-situations as integrated systems. To build the aptitude theories of tomorrow, we need a language for describing the processes that connect persons and situations—the processes that operate in their interface.” (p. 19)

The roots of this thinking are evident in the traditional theory of abstraction which Bolton (1977) has pointed out can be traced all the way back through the works of Lock (1690) and Hume (1739) to Aristotle. The theory holds that through the process of *abstracting* certain resemblances from amongst otherwise dissimilar stimuli, knowledge is acquired and concepts are formed. Central to this view, and indeed common to all views and theories that deserve to be called cognitive, is the belief that behaviour is never merely a reflex action to presented stimuli, but rather something intentional, no matter how faintly defined that intent might be for the subject or the observer.

Underlying this theory, then, is the assumption that knowledge and the formation of concepts (what we might think of as “understanding”) relies in some way on the individual recognising similarities between stimuli. These similarities are thus seen as a property of the subject’s environment and all he or she is required to do is to attend to them; what Bolton (1977) refers to as:

“... a one-way causality—the world impresses itself upon a subject who has no point of view of his own—and it becomes quite impossible to do justice to the diversity of points of view which inform our concepts.” (p. 11)

It is interesting that criticism of the traditional theory of abstraction has come primarily from philosophers more than psychologists. Many educationalists’ theorising—espoused or otherwise—reveals this underlying acceptance that learning and understanding (whether it be described as knowledge acquisition, skill acquisition or concept formation) is in some way related to classification; consequently, they ignore the many other ways in which people organise their experience:

“...although we may talk of the general features of conceptualisation, those forces which constrain and channel the development of con-

cepts into particular forms must not be ignored. The subject develops in a particular environment...; he is a member of a certain society...; he uses a particular language and is guided by certain values. These facts raise the question of the extent to which concept formation is influenced by social and linguistic variations.” (Bolton, 1977, p. 19)

The issue that Bolton addresses here almost thirty years ago is essentially the same that Barab & Plucker (2002) refer to when they point out that the socially agreed upon labels and terms that are commonly used in education and psychology (such as *ability*, *talent*, *expertise* and *intelligence*), mitigate against the notion of a relationship between individuals and their environment that is dynamic, continually evolving, and highly contextual in nature. They argue that:

“...instead of advocating for the systematic and didactic separation of individual from environment, an ecological or relational model points to the importance of fully contextualized experience through which individuals, environments, and the sociocultural structures and relations transact. In this line of thinking, the place to look for talent is not in the head or in the environment, but in the variables of the “flow itself.” Talent, or evidence of being knowledgeably skilful, is thus considered present when individuals, frequently using multiple resources and always interacting as part of the sociocultural world, demonstrate their propensity for forming particular relations.” (p. 178)

And conclude that:

“...we hope that our discussion can prompt educators, researchers, and policy makers to more equitably apply the labels of gifted or talented, realizing the value of the perspective that nobody has talent, yet everybody can engage talented transactions.”

This paper was prompted initially by questions that emerged from being involved with the practice and study of karate. Whilst recognising that in the area of movement and motor behaviour the term “understanding” may well be employed differently to that used in a more academic setting, it is, nevertheless, just as important in this field to analyse how people recognise understanding within themselves and others if we wish to make predictions about how future learning

may proceed, and identify implications for constructive pedagogy. Perkins' (1995) flexible performance criterion for understanding seems particularly useful, and he himself acknowledges its applicability to situations that are much less academic:

“For instance when would one say that a person understands how to use a hammer? Not if the person can only use a hammer in a single awkward and limited way. But yes, if the person can use a hammer in a variety of manners in response to routine and nonroutine situational demands—holding the handle close to the head or far from it, using a shorter or longer stroke, using the claw not just to remove nails but straighten them when they drive crooked, and so on. Again, flexible performance is key.” (p. 4)

Whilst admitting that the flexible performance criterion for understanding is somewhat vague, and there are still outstanding questions related to the kind of performances that are required in order to understand a specific topic and how flexible they should be, Perkins points out that:

“...this vagueness simply reflects the context-relative character of understanding. Anything can be understood more or less deeply and from different perspectives. The appropriate performances vary accordingly.” (p. 4)

Whilst learning and understanding are frequently differentiated in people's thinking and experience, they are clearly related to each other. If learning is looked at from the perspective of a change in the person-world relationship, and understanding is reflected in a greater flexibility of performance, it follows that there is not necessarily a “correct” understanding; rather, the understanding is defined as the understanding arrived at by the learner which may well differ from that of other learners. The learner cannot be treated in isolation or separated from the environment and context within which learning is taking place. Improving education is not a simple matter of looking at what is wrong and fixing it. The move away from what Biggs (1995) has described as the “deficit models” of learning theory (where poor learning is attributed to a lack of something in the student, the teacher, or the

learning task) is surely a move in the right direction.

There are many ways in which learning and understanding have been conceptualized. If progress is to be made in terms of providing clearer direction and guidance to those involved in pedagogy, it seems clear that theory needs to be derived from the context within which it is to be applied.

## References

- Ammons, R.B. (1988) Distribution of Practice in Motor Skills Acquisition: A Few Questions and Comments. *Research Quarterly for Exercise and Sport*, 59, 4, 288-290
- Argyris, C. (1976) Theories of action that inhibit individual learning. *American Psychologist*, 31, 638-654
- Barab, S.A., Cherkes-Julkowski, M., Swenson, R., Garret, S., Shaw, R.E., & Young, M. (1999). Principles of self-organisation: Ecologizing the learner-facilitator system. *The journal of the Learning Sciences*, 8(3&4), 349-390
- Barab, S.A., & Pucker (2002). Smart People or Smart Contexts? Cognition, Ability, and Talent Development in an Age of Situated Approaches to Knowing and Learning. *Educational Psychologist*, 37(3), 165-182
- Biggs, J. (1994) *Student learning Research and Theory – where do we currently stand?* In G. Gibbs (Ed.) *Improving Student learning – Through Assessment and Evaluation*. Oxford: Oxford Centre for Staff Development.
- Bolton, N. (1977) *Concept Formation*. Pergamon Press
- Descartes, R. (1978). Meditations and passions of the soul. In E. Haldane & O. Ross (Eds.), *The philosophical works of Descartes*. Cambridge, England: Cambridge University Press. (Original work published 1637)
- Duffy, T.M., & Jonassen, D.H. (1992) (Eds.). *Constructivism and the technology of instruction: A conversation*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.
- Fazey, J. and Marton, F. (2002) Understanding the space of experiential variation. *Active learning in higher education*, The Institute for Learning and Teaching in Higher Education and SAGE Publications (London, Thousand Oaks, CA and New Delhi. Vol 3 (3),

p.234-250

Fodor, J. (1975) *Language of Thought*. Cambridge, MA: Harvard University Press.

Hume, D. (1739) *A Treatise of Human Nature*. Oxford: The Clarendon Press (1896)

Kember, D. (2001) Beliefs about Knowledge and the Process of Teaching and Learning as a Factor in Adjusting to Study in Higher Education. *Studies in Higher Education*, 26, 2 pp 205 – 221

Locke, J. (1690) *Essay on the Human Understanding*. Oxford: The Clarendon Press (1924), Abridged Edition.

Marton, F., Hounsell, D. & Entwistle, K. (1997) *The Experience of Learning*. Edinburgh: Scottish Academic Press.

Mugler, F & Landbeck, R. (1994) 'Student Learning at the University of the South Pacific: A Pilot Study,' in R. Ballantyne & C. Bruce (eds) *Proceedings: Phenomenography, Philosophy & Practice Conference*, November, Brisbane.

Newell, A., & Simon, H.A. (1972) *Human problem solving*. Englewood Cliffs, NJ: Prentice Hall

Nickerson, R.S. (1985) Understanding understanding. *American Journal of Education*, 43, 2, 201-234

Perkins, D.N. (1995) *Understanding and mental representations*. Paper presented at 'Understanding Understanding' Conference, University of Edinburgh, Edinburgh, Scotland, May 25 – 27.

Perkins, D., & Blythe, T. (1994, February). Putting understanding up front. *Educational Leadership*, 51 (5), 4-7.

Pew, R.W., (1974) Human Perceptual-Motor Performance. In B.H. Kantowitz (Ed.) *Human Information Processing: Tutorials in Performance and Cognition*. New York: Erlbaum.

Phillips, D.C. (1995) The good, the bad and the ugly: The many faces of constructivism. *Educational Researcher*, 24 7, 5–12.

Schmidt, R.A., (1975) A Schema Theory of Discrete Motor Skill Learning. *Psychological Review*, **82**, 225-260

Schmidt, R.A. (1976) Control Processes in Motor Skills. *Exercise and Sport Science reviews*, **4**, 229-261

Snow, R.E. (1992) Aptitude theory: Yesterday, today, and tomorrow. *Educational Psychologist*, **27**(1), 5-32