EXPERTISE, EXPERT TEACHING AND EXPERIENCED TEACHERS' KNOWLEDGE OF LEARNING THEORY

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ABSTRACT

Through the inception of the Chartered Teacher Programme in Scotland there is the intention that continuing professional development can enable teachers to become increasingly effective in promoting learning in the classroom (Scottish Executive, 2002a & b). Whilst this seems a very laudable aim, it is nevertheless a very woolly aim since what is meant by learning (and its promotion) is not contextualised either in a body of literature or within any framework to link the many possible influences on learning in any coherent way. The implications of such a 'non-located' idea suggest that any conception of learning – from the lay person's common sense ideas to the most theoretically rigorous - are equally valid within formal schooling: clearly a conclusion that one hopes would neither be intended by the teaching profession, nor by society at large. However, one of the most important influences on contemporary conceptions of learning comes from research on what experts know and how they think, in contrast to the ways novices approach new tasks and solve problems. This article examines conceptions of 'expertise' and through these and findings from a small-scale research study, discusses understandings of the 'expert teacher', concluding that for the Chartered Teacher Programme to be meaningful, provision must be made for the incorporation of constructivist theories of knowledge.

EXPERTISE

Experts, by definition, are able to think more effectively about problems. Glaser & Chi (1988) define expertise as the possession of an organised body of conceptual and procedural knowledge that can be both readily accessed and used with superior metacognitive skill. Through invoking the concept of expertise it is being posited that teachers who achieve chartered status should be experts in promoting learning. By viewing teachers as experts in the promotion of learning, it would be reasonable to expect them, in line with experts in other areas, to have acquired a large, integrated knowledge base which reflected deep understanding and which allowed the effortless retrieval of pertinent information (Bransford, *et al*., 2000). Such a proposition is perfectly consistent with the claim by the Scottish Executive (2002b) that chartered status can be distinguished from fully registered status by virtue of the chartered teacher's significantly enhanced skill and understanding. One component of this skill and understanding, and the focus of the study reported here, is teachers' knowledge of approaches to, and research on, teaching and learning.

THE KNOWLEDGE OF THE EXPERT TEACHER

According to Shulman (1987) the knowledge needed for teaching is of three types: content knowledge (knowledge of the subject matter to be taught), pedagogical knowledge (knowledge of how to teach in general terms) and, finally, pedagogical content knowledge (knowledge of how to teach that is specific to what is being taught). Pedagogical content knowledge includes: knowledge of how to structure and represent academic content for teaching; knowledge of the common conceptions, misconceptions and difficulties that learners may have when learning particular content; and knowledge of the specific strategies that can be used to address learners' needs in particular classroom circumstances.

Shulman (1987) argues that pedagogical content knowledge is more than content knowledge plus knowledge of general principles of pedagogy. Rather, it is knowledge that guides the teachers' actions and reasoning in highly contextualised classroom settings. In other words pedagogical content knowledge is conditionalised on a set of circumstances: it cannot be reduced to sets of facts or isolated propositions but reflects the contexts of applicability. As such, pedagogical content knowledge is the criterially defining feature of the expert teacher. Without pedagogical content knowledge, teachers are unable to help learners to learn when, where and why to use content knowledge. That teachers' expertise resides in the interaction between disciplinary knowledge and general pedagogical knowledge, is distinct from (and indeed contradicts) fairly well established beliefs that all teaching can be reduced to a set of general methods, that a good teacher can teach any subject or that content alone is a sufficient basis on which to teach.

While Shulman (1987) makes clear that the knowledge base necessary for expert teaching comprises the teacher's knowledge of what constitutes competence in the domain being taught, knowledge of learners' potential confusions/misunderstandings and knowledge of pedagogical strategies to circumvent or overtake learner misconceptions, his account is largely devoid of knowledge of learning. Since teaching is the planned and intentional promotion of learning, it is not unreasonable to suppose that everyone who professes to teach has some sort of theory of learning. Although teachers may vary in the extent to which they make their theory explicit, if their teaching is at all purposeful or rational they must, de facto, base their practice on some notion of learning.

The issue then turns, not on whether teachers have a theory of learning but on the tenability of their theory. Because the knowledge that one possesses affects the type of understanding that one can construct about a domain as well as the types of problems that can be recognised and solved (Haskell, 2001), it is assumed that teachers' knowledge of learning theory will assist them in the complex role of professional teaching. It is the hypothesised significance attributed to teachers' knowledge that drives the study reported here. Its purpose was to describe the extent to which experienced teachers characterised learning and teaching as constructivist, through an analysis of their reported knowledge.

CONSTRUCTIVIST ACCOUNTS OF LEARNING

Behavioural models, with their focus on external evidence of learning, are being replaced with models that assume that evidence of learning may not be available to an observer. Constructivist accounts of learning assume that knowledge is central to all thinking and behaviour; that learning is an active process which is filtered and constructed through extant knowledge and beliefs; and that knowledge is situated in context and culture rather than being detached from the external world (Resnick, 1989). According to Piaget (1977), the learner's construction of knowledge is a self-regulating process. Individuals' cognitive schemes allow them to establish an orderliness and predictability in their experiential worlds. When experience does not fit with the individual's schemes, a cognitive disequilibrium results, which triggers the learning process. This disequilibrium leads to adaptation. Reflection on successful adaptive operations (reflective abstraction) leads to new or modified concepts (accommodation), contributing to re-equilibration. Thus from a constructivist perspective, knowledge is not passively received from the world, from others, or from authoritative sources. Rather, all knowledge is created as individuals (and groups) adapt to and make sense of their experiential worlds. Further, Lave (1988), Vygotsky (1978) and others argue that the construction of knowing is not a matter of individual, solitary construction of understanding, but a dialectical process firmly grounded in a system of social relations. For them all knowledge is socially

constructed, regardless of whether it is an individual's personal understanding, the very intellectual disciplines that we seek to learn, or the social organizations in which we study, work, and play. Within this perspective, the qualitative restructuring of thought is related to the acquisition and use of powerful new tools and signs for mediating thought. These tools and signs are cultural creations and help to shape the structure and organization of individual thought by emphasizing particular, socially valued relationships and processes of reasoning. The means for intellectual change lies in the individual's appropriation and exercise of these socially constructed mediators, as the tools and signs help to organize and shape their experiences and interpretations of the world.

PEDAGOGICAL IMPLICATIONS

Constructivism affords us a fundamentally different way to think about knowledge and its development and offers a framework for understanding the complex processes of learning implying that:

- learners are intellectually generative with the capacity to pose questions, develop solutions to problems and construct knowledge;
- teaching should be based on the development of learners thinking rather than on overtaking schemes of work;
- the locus of intellectual authority resides not in the teacher nor in his/her resources, but in the discourse of the classroom facilitated by both teachers and learners.

Specifically these ideas suggest the need for teaching which:

- enables learners to build from previous constructions, errors and misconceptions;
- attempts to integrate informal and formal knowledge;
- makes use of metacognition and strategic self-regulation by learners;
- focuses on the learner's cognitions and conceptions of knowledge;
- emphasises the role of negotiated and shared meanings;
- monitors the effects of discussion and collaboration on the learners' conceptions.

But how clearly are these ideas articulated by teachers? Indeed, to what extent are they articulated at all? It was answers to these questions that the study reported here was seeking.

METHOD

Design

In seeking to find out how knowledgeable experienced teachers were about learning theory in general and constructivism in particular, the superficially logical means of data collection, the interview, was discounted for two, tightly related reasons. Firstly, it is well known that interviews are susceptible to participant acquiescence and since this study sought the *considered* responses of the participants it was decided that a task requiring a prepared written response would better enable this. A second reason for using a written task to elicit data was an acknowledgement of the evidence (Bereiter & Scardamalia, 1987; Langer & Applebee, 1987; Wells, 2002) that engagement in the writing process can enable the writer to transform extant and earlier understanding(s) into something more sophisticated. Hence the writing task was likely to reflect the most advanced level of understanding the participants were able to express.

Participants

A class of 13 postgraduate, teacher-education students registered for a two-credit module on Learning Theory within a Master's programme participated in the study. The participants, on average, had been teaching for seven years. All were female. Participants engaged in the task at the start of the module since ascertaining extant understanding was a fundamentally important pedagogical principle of the tutors who designed the module. Since the study reported here is not evaluating an intervention, it is limited to describing a very small sample of experienced teachers' knowledge of learning theory. While not concerned with *changes* in participants' conceptions of learning, the results reported here are of considerable interest given that the participants were a self-selected group who voluntarily expressed interest in developing their knowledge in that particular area of theoretical psychology known as learning theory.

Instrumentation

Participants were asked to write a page or so on their knowledge of the relevance of Piaget's and Vygotsky's accounts of learning to their teaching. In the instruction it was suggested (though not mandated) that they might consider such things as:

1. what they thought learning was
2. how learning takes place
3. what they thought teaching was
4. the roles of teacher and learner.

Analysis

Participants' written representations of learning and teaching were analysed using concept propositional analysis (CPA) (Novak & Gowin, 1984). This technique – a developmental extension of concept mapping – is based on the psychological notion that meaning (or understanding or conceptual knowledge) inheres in the relationship that one piece of information has with other pieces of information for any given individual. In other words, a unit of meaning is not a discrete piece of information but a proposition that connects two or more concept labels in a semantic configuration. The propositions constructed by an individual for any phenomenon represent the meaning that the individual has for the phenomenon. CPA is a means of determining what propositions have been generated and does not impose a predetermined structure for participant responses. Through applying CPA to participants' written reflections it is then possible to characterise their representations of learning and teaching expressed at different points in time. Concept propositional analysis can also be used (and was in this study) to determine the propositions in areas of knowledge that are agreed upon as valid by experts in the particular area.

Because concept mapping is derived from Ausubel's cognitive theory of learning, one of its central features has been that concepts vary in their degree of generality/specificity and so knowledge is developed and organised hierarchically. However, an exclusively hierarchical organisation is probably a limited representation of the memory structure (Anderson, 1990). This, together with acknowledged difficulties in recognising hierarchical structures in concept maps (Novak & Musonda, 1991), caused the researchers in this study to list the propositions that had been generated without any attempt to superimpose structure on them. Such a modification would be consistent with the views of Novak & Gowin (1984) who recognise that the scoring of concept maps is arbitrary.

Procedure

All written reflections were read to list the propositions. A proposition was defined as the expression of a meaningful relationship between at least two concept labels (Novak & Gowin, 1984). Sentences containing more than one proposition were disaggregated. Concept labels that were not linked were discounted as invalid propositions.

To provide a baseline against which to make some sense of the findings, a list of (30) propositions was derived from the constructivist concepts, principles and pedagogical recommendations suggested by Applefield, Huber & Moallem (2001). The propositions can be perused in Table 1. Each of the propositions from the 13 participants was then compared for semantic equivalence with the propositions in the baseline list. A research assistant—whose coding was reliable over a two-week period (Cronbach's alpha = 0.85)—listed all the propositions in both the baseline for comparison and in the participants written reflections.

RESULTS

Table 1: Baseline of Comparison: propositions derived from the prototype

1.	Learning is the acquisition of knowledge through reflective abstraction
2.	Reflection can take place through journal writing
3.	Reflection can take place through drawing
4.	Reflection can take place through modelling
5.	Reflection can take place through discussion
6.	Learners should be given time to engage in reflection
7.	Knowledge acquisition emphasises knowledge construction rather than knowledge transmission
8.	Dialogue is the catalyst for knowledge acquisition
9.	Knowledge construction is through engaging in authentic tasks
10.	Knowledge construction is through engaging with ill-defined problems
11.	Knowledge construction is through addressing higher order questions
12.	Teaching is the stimulation of thinking in learners
13.	Thinking should result in deep understanding
14.	Thinking should result in transfer of learning to real-world contexts
15.	Learners are encouraged to raise questions
16.	Learners are encouraged to generate hypotheses
17.	Learners are encouraged to test the validity of their hypotheses
18.	Learners communicate/defend/justify their ideas to others
19.	Learners should be challenged by ideas that generate inner cognitive conflict
20.	Learners should be challenged by experiences that generate inner cognitive conflict
21.	Errors should be viewed positively
22.	Errors should be viewed as opportunities to explore conceptual understanding
23.	Lessons feature clear content goals (the realisation of which are monitored by the teacher)
24.	Lessons feature multiple ways of representing key ideas
25.	The learning environment should provide ample opportunity for dialogue
26.	The learning environment should intentionally confront learners with complex tasks

27.	Complex tasks can be performed with teacher guidance
28.	Complex tasks necessitate the development of relevant skills
29.	Teacher monitors/interacts with learners as they work
30.	Teacher and learner **negotiate** how intended learning will be demonstrated/evidenced

Table 2: Number of Constructivist Propositions Generated

Case	No. of Propositions	No. of Constructivist Propositions	% of Constructivist Propositions
1	30	12	40
2	30	6	20
3	25	8	32
4	28	16	57
5	27	11	41
6	25	8	32
7	37	13	35
8	26	6	23
9	31	17	55
10	26	9	35
11	32	9	28
12	30	15	50
13	27	14	52
Mean	28.77	11.07	38.46

DISCUSSION

Perusal of Table 2 shows that the proportions of constructivist propositions generated ranged from 20% to 57% with the balance of propositions in each case suggesting (variously) knowledge of behaviourism, knowledge of sociological factors which are thought to impact on the learning-teaching process and knowledge of emotional and motivational factors that may impede or promote learning. Given the precise requirement of the stimulus task and the declared emphases in official policy documents, pedagogical texts for teachers and the research literature on the importance of active pupil participation and problem solving approaches to the curriculum, it might be reasonable to assume that the participants would have evidenced a considerable awareness of constructivism. Such an assumption was not, however, well supported by the data.

Almost all of the participants made clear that learning was the acquisition of knowledge and, as such, the proposition is not inconsistent with constructivism. However, only one or two participants went on to communicate that the acquisition of knowledge involved the mental engagement of the learners or that the catalyst for this engagement was grappling with an ill-defined problem or exploring

alternative understandings. True, there were some propositions such as "learning is making connections with prior knowledge" and "learners require to do something with information" but these were few in number. That learning is something we experience, rather than engage with, was stated explicitly in two propositions—"passivity allows learning" and "understanding is the sum of knowing facts"—but implied in the great number of propositions which reflected a transmission model of teaching: "teaching is giving skills for lifelong learning"; " teaching is providing a praise culture"; "teaching is encouraging another to practise skills"; "teaching is making knowledge enjoyable"; " teaching is imparting knowledge". The teacher's role included a myriad of responsibilities: "providing a safe, disciplined environment"; "being interested in every aspect of children' development"; "knowing the child's social background, preferred learning style and desired mode of learning"; "meeting individual needs";" giving confidence"; "creating a sense of achievement"; " motivating pupils and boosting self-esteem". Pupils were understood to be learning when they "asked questions"; "engaged in reading and writing activities"; "observed more knowledgeable models"; "listened to others' views and discussed ideas". The range of propositions can be summarised in three points.

1. For most of the participants, the concept of learning was not considered problematic and so there was neither concern that the understandings developed in instructional situations can be very different from what the teacher intends nor that the practices of the learning context can have a profound effect on the nature of what is learned (Lave & Wenger, 1991).

2. In none of the cases was there any sustained development of the critical importance of discourse. Apart from the global proposition that sharing ideas was a 'good thing', there was no reference to the need for teachers to challenge or for learners to have to justify, reason or defend a position. Without the centrality of discourse which has participants reflecting on their own, and others', beliefs, assumptions and conceptions, it is difficult to see how any conceptual change on the part of learners can occur (Kuhn, 1992; Langer & Applebee; 1987; O'Connor & Michaels, 1996), thereby rendering the notion of sharing as somewhat trivial. For the activity of 'sharing' to have constructivist fidelity, the learning tasks must genuinely acknowledge that meaning is variously constructed by different people.

3. Although invited to provide a constructivist rationale for their practice, most participants revealed an eclectic mix of (sometimes incompatible) approaches, including ideas from behaviourism ("learning has happened when we have an accurate awareness of facts"), from various perspectives in the psychology of motivation ("learning happens in an atmosphere of safety") and from folk psychology ("when learning happens there is a feeling of contentment not confusion"). That the ideas that were neither integrated nor synthesised, suggests that the participants' knowledge base was theoretically scant particularly when contradictory beliefs such as "understanding can be increased through repeated practice of techniques" and "understanding can be increased through conscious reflection" seemed not to be recognised by participants.

Such a theoretical eclecticism is worrying because it suggests a lack of expertise. It means that teachers respond to problems in ways that merely support their preconceived notions and biases rather than using a well integrated knowledge base to guide the selection and generation of internally consistent behaviour (Bransford, *et al*., 2000).

Although the reasons for a lack of appreciation of constructivism on the part of the

participants cannot be directly discerned from the data collected here, two possible and related reasons are implied by the results. The first is to do with understanding the very idea of constructivism and the second is to do with the relationship between teaching and learning.

THE IDEA OF CONSTRUCTIVISM

In his epistemological analysis von Glaserfeld (1995) makes the distinction between trivial and radical constructivism. In trivial constructivism, knowledge construction is understood as involving mental processing, as being dependent on previously acquired knowledge and as being peculiar to the individual. Radical constructivism includes but goes beyond the trivial to argue that there is no objective, absolute reality that is 'out there' waiting to be discovered and that all cognitions are personal and idiosyncratic. The distinction turns on the traditional epistemological assumption that a true reality exists independently of the individual person while constructivism hypothesises that it is the individual who actually invents reality and that knowledge is tied to an internal-subjective perspective where truth is replaced by ways of knowing. For von Glaserfeld (1995) we cannot step outside our internal perspectives and experiences: knowing involves understanding reality as we experience it and knowledge is a human construction made by the individual.

However von Glaserfeld (1993) emphasises that radical constructivism is intended as a model and not as a description of the world, and so while constructivists believe that the world does not exist independently of people, they do not deny that an objective world exists. Radical constructivists would claim, however, that we cannot know that world for sure on the basis of our experiences but that we can make predictions about the known world through the use of scientific theories and concepts. These theories and concepts become viable and functional because they assist us in explaining our world. Therefore scientific laws, theories, methods and hypotheses are appropriate tools for advancing our understanding of the known world because they enable our interpretations of phenomena. They are a conceptual way to understand the world around us. These tools are not separate entities of an objective world but concepts we utilise to construct a reality. In other words, radical constructivism implies that knowledge will be tested against ideas in the community using appropriate cognitive tools/ways of knowing.

The apparent contradiction between absolutist and fallibilist views of our world (which underpins the distinction between trivial and radical constructivism) can, however, be reconciled in the form of social constructivism (Lave & Wenger, 1991; Vygotsky, 1978) which would posit that the world 'out there' appears to be one to which we have shared access but of which we have no certain knowledge. Knowledge is thus understood as being constructed by an individual's interaction with the social milieu in which he/she is situated. This socially interactive component has the potential to result in change in both the individual and the milieu. Whatever the seductive appeal of emancipation and autonomy implied by constructivism, it seems evident from this albeit scant account that constructivism includes a range of perspectives. Furthermore it is now perfectly clear that this study's participants conceptualised constructivism as trivial: that while individuals have to construct their own knowledge base from previously acquired knowledge, the basic building blocks used in the construction process are pre-existing truths. At some point, therefore, the knowledge is received by the cognising person in some pre-constituted form.

Constructivist views of learning suggest that teachers, together with their learners, should create a culture of inquiry aimed at developing deep and flexible understanding. Discussion, in all its various guises, is a significant part of the constructivist classroom since, according to Kuhn (1992), it is only through discussion and in particular through dialogic argument that the quality of thinking and reasoning can be made explicit. In the group discussion the teacher poses some challenging problem or significant question about which the learners externalise their own reasoning, enquire into the reasoning of others and compare relative positions and perspectives (O'Connor & Michaels, 1996). The rationale for this is in Vygotsky's (1978) ideas that discussion promotes the internalisation of ideas, empowers thoughtfulness and acts as a model for private thought. However, the orchestration of group discussion is complex because the teacher has to monitor the ways in which learners interact with each other and with the ideas/content under discussion. Further, the teacher has to consider learners' ideas seriously, focus on how learners use reasons and evidence to substantiate their claims and resist the temptation to provide knowledge when it is possible for learners to work it out for themselves. So complex are the components of this orchestration that productive discussion as a site for intellectual change/socialisation is rare in either primary, secondary or college education (O'Connor & Michaels, 1996). The overall lack of references by participants in this study to the importance of learners' discursive contributions is consistent with this view.

The difficulty of using discussion as a mechanism for substantive learning is already documented (and so is not being pursued here) but what it neatly illustrates is that while constructivism is a theory of learning, it is not a description of teaching and therefore does not offer a set of instructional techniques that are logical derivatives. At best constructivist teaching can be described as a set of pedagogical intentions to bring about significant change in the minds of learners (von Glaserfeld, 1993; Nuthall, 2002) but the kinds of experiences that would help teachers to embrace constructivism are as yet unclear. However, by definition teaching is the promotion of learning (Muijs & Reynolds, 2001; Stones, 1983) and so the rational choice of, or justification for, a particular teaching method is premised on the notion that intended learning will ensue. In other words particular teaching behaviours will influence, if not determine, the learning that is achieved. There is therefore a lack of clarity as to what the relationship between learning and teaching actually means in constructivism, which, again, may go some way to explaining the relatively small number of constructivist propositions evidenced.

In addition to the lack of specificity as to what constructivist teaching is, there may be ambiguity in the relationship between the teacher's teaching behaviours and the teacher's knowledge of learning theory. If understanding must be constructed by each individual (albeit within a social context) then the teacher's understanding of his/her role must also be constructed. But if teachers themselves learned in situations in which behavioural models dominated, they may construe learning as the acquisition of facts, rules and attitudes that are picked up by exposure to the teacher who 'shows and tells'. While there is evidence from the literature on cognitively guided instruction that teachers can, and do, change their teaching practices in very genuine ways, it is probably not as a function of hearing about alternatives but rather through the experiences of disequilibration about learning. Thus, while it was disappointing that most of the participants failed to acknowledge the importance of knowledge construction, it is perfectly understandable if their own models of learning are essentially behavioural.

CONCLUSION

In characterising the teacher as an expert in the promotion of learning, it was argued that the teacher should be knowledgeable about learning theory. The declared knowledge of a small sample of experienced teachers showed that their theories of learning were eclectic mixtures of social, personal and folk psychology, giving scant consideration to the fundamental idea that learners come to school with preconceptions about the world. Further, the participants in this study seemed to place little importance on the need to engage learners' initial understandings and so gave no consideration to how/how well new information is integrated with extant knowledge, thus rendering the outcome of the teaching endeavour as potentially arbitrary.

While the findings of this particular study can be at least partially explained by misconceptions about constructivism per se together with the complexities of translating the idea into teaching behaviours, the issue of teachers' cognitive representations of teaching and learning nevertheless remains. If teachers are to develop constructivist approaches to learning and teaching, they need to confront their existing (and possibly traditional) conceptions of learning and teaching. Without a conscious and focussed examination of what knowledge is and of how people learn, teachers are not going to be predisposed to realise change in their practices. Further**,** without a clearly articulated relationship between teaching behaviour and knowledge of learning which is consistent with constructivism, attempts to develop constructivist pedagogy are at best likely to be limited to trivial constructivism which accounts only for the knowledge representation of individuals and, by implication, concedes that understanding can be built up from received pieces of knowledge. While such a position may be pragmatically useful in the day-to-day minutia of classroom life, it denies the essential implication of radical constructivism which is that teachers base their instructional decisions on their knowledge of the learners' thinking and understanding and thereby allow their expertise its fullest manifestation.

However, whilst it is being argued here that an appreciation of radical constructivism is desirable, it has also to be stressed that the development of teaching expertise requires more than the accumulation of discrete pieces of information. The various elements of constructivism need to be embedded in a coherent structure since it is the ability discern the relations between pieces of information; the ability to explain the interactions between pieces of information and the ability to use these integrated and interactive pieces of information to explain and act on one's professional milieu that distinguishes the expert from the novice as Bransford, *et al*. (2000) make plain in their review of the literature. This means that guidance on constructivist teaching can probably never be available in pre-digestible form. The challenge of developing pedagogical practices that are consistent with constructivist perspectives requires the current (and historical) concern for overt teaching performance to be attenuated and instead requires the cognitive representations, which underpin performance to be privileged. Notwithstanding the political and practical constraints that may attenuate the effects of radical constructivism being implemented, it is important to be clear that if chartered teachers really are to be expert teachers, they must be characterised by that quality which demarcates outstanding performance from competent performance. Insofar as the psychological literature repeatedly points out that this demarcation turns on the sophistication of an acquired knowledge base, it would seem important that chartered teachers become much more conversant with constructivist learning theory. It is perhaps timely for policy makers who have set such store by Chartered Teacher status to begin to understand what might be meant by teachers' significantly enhanced skill and understanding.

This paper has argued that teachers should have a knowledge base that enables them

to make informed judgements. What the findings of this small pilot study suggest is that teachers' knowledge of constructivism is seriously flawed. This is a worrying state of affairs given the impressive evidence for its utility as an explanation of learning (for example, Perkins & Salomon, 1988; Perkins, 1992; 1995; Resnick, 1989; Rogoff, 1990). Unless effective provision is made within the Chartered Teacher programme to address this issue, teachers will be in no position to judge the explanatory power of their own or other theories, or to develop conceptions of learning which have wider scope and plausibility than their own narratives. As noted above, Constructivism encompasses a range of theories that share the powerful message that learning is likely when there is a culture of enquiry aimed at developing a deep and flexible understanding.

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