
ON THE NATURE OF EXPERT TEACHER KNOWLEDGE¹

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Abstract: *The paper addresses the role of knowledge as one of the sources of teaching expertise. More specifically, it focuses on the phenomenon of theory-practice gap, on the role of theoretical or academic research-based knowledge and teacher-based practical experiential knowledge. Tensions between theoretical and practical knowledge (epistémé and phronésis), the need for linking them and implications for teachers' journeys towards expertise are highlighted.*

Key words: *teacher professionalisation, expertise in teaching, nature of expert teacher knowledge, tensions between theoretical and practical knowledge – epistémé and phronésis, knowledge integration and flexibility*

"... teachers, for many social and political reasons, have been afforded second-class status while being given first class responsibilities." (Welker, 1991, p. 20)

Introduction

The above quotation reflects an ongoing discussion on the social prestige and recognition of teachers and teaching which is marked by never-ending lay attempts to diminish its status, at least in the Czech Republic. Calls to raise the quality of education are included in political manifestos. At the same time, however, the same representatives of educational policy talk about the lowering of teacher qualifications to a bachelor's degree, about opening up the profession to

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laymen with practical experience in other fields of human endeavour through the provision of short courses in pedagogy, etc. In the last twenty years this attitude to the teaching profession has become something of a pattern in the Czech Republic. In this sense, rather ironically, along the road to a “knowledge society” teachers have become an endangered species. Therefore, our text aims to support the struggle for the professionalisation of teachers and towards its recognition as a fully-fledged profession whose role is crucial for further social development.

Professionalisation is closely linked to the image of a profession’s practitioners as experts, which has become prominent since the end of the twentieth century in professions that include the teaching profession. Teaching in general and expertise in teaching are complex multidimensional issues. Moral and ethical aspects of teaching are acknowledged as being at its core, whether we call these a mission (Korthagen, 2004; Korthagen & Vasalos, 2005) or refer along with Day (2005; Day et al., 2007) to a “passion for teaching”. A passion for teaching, however, is a broader concept. It also encompasses professional identity, commitment, emotional (e.g., Hargreaves, 1998; Day & Leitch, 2001) and volative (Van Eekelen et al., 2006) dimensions of teacher professionalism, and, last but not least, its social dimension (Boshuizen, Bromme, & Gruber, 2004, p. 6). Though the focus of our further discussion is on the cognitive dimension of teaching, it should be emphasised that we perceive this as closely linked or rather intertwined with all the above aspects of teacher professionalism.

The study of expertise has a very long tradition – an interest in excellence and superior performance goes back to the very beginnings of Western civilisation (Ericsson, 2006). Serious academic attempts to capture the essence of expert performances and the nature of expertise, however, date back only to the 19th century. The “golden era” of research in expertise started in the 1960s with the translation into English of the pioneering study of expertise in chess players by de Groot (for more details see Feltovich, Prietula, & Ericsson 2006). Cognitive psychology highlighted complex relationships between what people do and what they know and believe.

In teaching, the key point in the emergence of teacher cognition research came in the mid 1970s. Almost simultaneously, two high-profile research reports, one from the National Institutes of Education in the U.S.A. (NIE, 1975) and the other from the Social Sciences Research Council in England (Sutcliffe, 1977) argued for an understanding of teaching through the lens of teacher knowledge and cognitive processes (Freeman, 2002). As research moved from investigations of teacher behaviour and its influence on learners’ achievement (process – product paradigm) to considerations of teacher cognition, in the first generation predominantly of the decision-making processes, questions concerning teacher knowledge and its role in these processes gained importance. From our perspective of teacher educators and researchers, we find issues related to what teachers know, the nature of their knowledge, how the knowledge originates and is acquired, and how it is stored and retrieved in classroom practice, central to the work of all who are concerned with initial and further/continuing teacher education (cf. Grossman, 1995).

It should be noted that there is an obvious parallel between interest in teachers' knowledge and the teacher professionalisation movement: evidence of an established knowledge base necessary for the work of professionals is considered a hallmark of a profession. Thus, a focus on the knowledge dimension of teaching is motivated by political as well as academic and practical concerns (Shulman, 1987; Bromme & Tillema, 1995; Grossman, 1995; Norris, 2000, etc.).

In our paper we address the role of knowledge as one of the sources of teaching expertise. More specifically, the paper focuses on the phenomenon of theory-practice gap, on the role of theoretical or academic research-based knowledge and teacher-based practical experiential knowledge. The relationship of theory and practice in teacher education is reflected in most European countries by increasing academisation (university-based teacher education) and, at the same time, by professionalisation (accent on domain specific experience; Bromme & Tillema, 1995; Kansanen, in this issue). Tensions between theoretical and practical knowledge (epistémé and phronésis), the need for linking them and consequences for teacher education and career support of teachers on their journey towards expertise are highlighted.

Expert

A discussion of the nature of expert teacher knowledge in the context of theory and practice takes us back to the questions: Who is an expert? and What is expertise? Wittgenstein once commented that for the major ideas of any age, precise definitions are difficult, if not impossible, to arrive at (Welker, 1991, p. 22). Understanding and discourse in the field are hampered by the fact that over time they receive attention from a range of disciplines in their paradigmatic plurality. The expert approach – perhaps the most influential current in cognitive psychology, which culminated in the publication of a first handbook, edited by Ericsson et al. (2006) – provides the following definitions (Ericsson et al., 2006, p. 3):

- *expertise* is perceived as “the characteristics, skills and knowledge that distinguish experts from novices and less experienced people”
- these characteristics, skills and knowledge underpin “superior reproducible performances of representative tasks”, i.e. *expert performances*
- an *expert*, then, is “someone widely recognized as a reliable source of knowledge, technique, or skill whose judgment is accorded authority and status by the public or his or her peers. Experts have prolonged or intense experience through practice and education in a particular field” (Wikipedia, 2005, cited in Ericsson, 2006, p. 3)

The two major orientations in cognitive psychology, called by Chi (2006, p. 22) the absolute approach (and which studies exceptional individuals) and the relative approach (i.e. a comparison of experts and novices) have yielded a knowledge of well-known characteristics of experts which are considered generalisable across

domains: superior memory for information in their domain, better awareness of what they do and do not know, greater pattern recognition, faster and more accurate solutions, and deeper, more highly structured knowledge (Lajoie, 2003; cf. Glaser & Chi, 1988; Eraut, 1994; Chi, 2006, etc.).²

Regarding studies in expertise by cognitive psychology, however, a reservation may be expressed in that these expert studies based on top-performance research have used very diverse groups of subjects, from chess players to waiters, from doctors to taxi drivers, etc. In other words, the domain and type of performance were considered irrelevant, or, more precisely, the assumption was that “any coherent set of tasks and problems that is amenable to objective performance measurement ... can constitute a domain of expertise” (Lewandovski et al., 2007, p. 84, quoting Ericsson, 1996). Such a perception of expertise has been criticised on the basis of the argument that expertise is exclusively linked to professionals, i.e. in our understanding to people who are a) trained, b) work for the benefit of society, and c) who are admitted to the profession by a body that regulates membership. Bromme and Tillema (1995, p. 264), for instance, argue that expert research “overlooks the fact that expert activity is mainly professional activity, and that the information processed in this course belongs mainly to the culture of the respective profession”. A similar position is assumed by Tynjälä et al. (1997), Hatano and Oura (2003) and Welker (1991, p. 22), who note that expertise as a social phenomenon also “refers to the emergence of the public perception that such knowledge is the exclusive domain of specially trained and licensed practitioners”.

Approaches of social theory to expertise stress the importance of context in the processes of becoming an expert: professional development towards expertise includes enculturation into professional culture. Enculturation is understood here both as an internal process, i.e. the acquisition of knowledge, skills, attitudes and values of the professional community, and as an external process of acceptance and legitimisation of the individual by the community (Boshuizen, Bromme, & Gruber, 2004, p. 6). It follows that the processes for gaining expertise are also of a socioemotional and sociocultural nature (Hatano & Oura, 2003, p. 26). In terms of thought processes, researches have referred to the ‘positionality of knowing’, to the reflection of social identity by thought processes (Freeman, 2002, p. 9). To summarize, emphasis is placed on the concept of *expert* as an outstanding educated professional, on expertise as the highest quality of professional performance.

2 Much more has been written about ways in which experts excel. Chi (2006, pp. 24–27), however, warns that an equally important list might be drawn for issues in which experts fall short. In addition to domain and context limitations of their expertise they include the dangers of experts being overly confident and thus miscalibrating their capabilities, of glossing over the apparent surface structures and overlooking details, and of inaccurate judgment of novice performance which may lead to faulty prediction and inaccurate advice. Last but not least, experts sometimes have more trouble adapting to changes in problems or environment than even novices; in other words, they may be considered inflexible. Hatano and Inagaki (1986) address the issue of experts’ flexibility in their theory of adaptive vs. routine expertise, claiming that adaptive experts have developed strategies to balance their innovativeness and effectiveness of their performance. Similarly, a list of fallacies in thinking is formulated by Sternberg (2003, p. 7): the fallacies of unrealistic optimism, egocentrism, omniscience, omnipotence, and invulnerability.

Professional expertise then builds not only on the individual knowledge of the professional, but also on the collective knowledge of the given profession.

Expert Teacher

Amongst the domains of professional expertise common patterns as well as differences can be observed. There are substantial variations in professional cultures and their languages which are rooted in their vocations and the underlying theoretical assumptions. This may lead to different links between theory and practice. In what way, then, do the findings of general research on expertise in professions inform us about expertise in teaching and about the role of knowledge as a constitutive element of teacher expertise?

The underlying and crucial question in research on expert teachers is, of course, how we define and identify an expert teacher. Identification of experts in professions in general and in teaching specifically poses a true challenge. In a discussion on common criteria for identifying expert teachers, Tsui (2005, pp. 170–171) notes “cultural differences in perceptions of what constitutes expertise in teaching” and expresses doubts about “whether it is at all possible or even meaningful to establish criteria which could be applied across cultures”.

As no set of objective criteria has yet been set, it may be useful to refer to a study conducted by Palmer et al. (2005) in which the authors examined 27 studies from the perspective of the marker variables used to identify expert teachers and found out that these included:

- A. *Years of experience in the profession*: the most frequent requirement was between 5 and 10 years of practice (further in the discussion the authors strongly recommend that context, too, is taken into consideration and they require at least 3 years in the same instructional context).
- B. *Professional or social group membership* (e.g., status as a cooperating or mentor teacher etc.). Some other sources (e.g., Tsui, 2005, p. 169) tend to talk in this sense about nominations or recommendations from school administrators, social recognition, etc.
- C. *Performance criteria*: either normative (5 studies), criterion-based (9 studies) or a mixture of the two (2 studies).
- D. *Other general criteria* (usually based on literature on expertise, e.g., Berliner’s studies, 1995, 2001, 2004)

Sternberg and Horvath attempt to solve the problem through a prototype view of teacher expertise, “a featural model of similarity based categorisation” (1995, p. 9). They propose three critical prototypical features – *knowledge*, *efficiency* and *insight* – which distinguish expert teachers from novices and represent a core of clusters of similar features. This prototype model is considered particularly useful as it allows for variation and diversity among expert teachers. It was adopted by Bond et al. (2000) in their sophisticated study aimed at establishing and validating

professional standards for the National Board of Professional Teaching Standards. They worked with thirteen prototypical features of expertise³ and created measures for each of them. Prototypical features were deployed in a comparative study of a group of Board certified teachers (experts) and a comparison group of experienced and well-prepared teachers. In our opinion the outcomes, no matter how remarkable Berliner (2004, p. 24) and others consider them, provide a validation of the assessment procedure used by the Board rather than a generalizable and objective tool for identification of expertise (cf. also Tsui, 2005, p. 170).

Research on expert teachers and the role of knowledge in expertise is represented in two competing paradigms; the tension between these reflects the theory – practice dilemma:

1) Studies since the cognitive shift, in particular those building on the rationalist information processing and decision-making approaches of cognitive psychology, have established the following characteristics of expert teachers:

- Expertise is based on a highly organised and elaborate knowledge base, which enables a deeper and more precise perception of issues and provides immediate access to optimal solutions of pedagogical situations.
- Experts constantly monitor their professional behaviour and actions.
- (Self-)reflection is a necessary prerequisite for achieving and maintaining expertise (Eraut, 1994; Tsui, 2003 and others).

2) Research aiming to give ‘voice’ to teachers themselves and to acknowledge wisdom of practice, i.e. studies of the “mental lives” or thought processes of teachers, conceptualised teacher expertise in a different way:

- Expert teacher knowledge is embedded in the expert’s action (know-how).
- Expert know-how is tacit.
- Expertise in action is automatic and unreflected.
- Expertise is intuitive or even arational (Berliner, 2004, p. 22); experts do not monitor their actions consistently (Olson, 1992; Kagan, 1992; Berliner, 1995, 2004; Johnson, 2005, etc.).

³ These features or characteristics of expert teachers include: *better use of knowledge; extensive pedagogical content knowledge, including deep representations of subject matter knowledge; better problem solving strategies; better adaptation and modification of goals for diverse learners including better skills of improvisation; better decision making; more challenging objectives; better classroom climate; better perception of classroom events including a better ability to read cues from learners; greater sensitivity to context; better monitoring of learning and providing of feedback to students; more frequent testing of hypotheses; greater respect for learners; the display of greater passion for teaching.*

Expert Teacher Performance

In a study of expertise the specifics of context in which professional actions are performed must be acknowledged. Representatives of all professions, be they doctors, architects or teachers, deploy their knowledge in professional actions in accord with the conditions set for these actions. Pedagogical situations seem to be specific or at least very different from those in most other professions. In his description of classroom situations, Doyle (1986) pinpoints their multidimensionality, simultaneity, immediacy, unpredictability, publicness, and also their history. Similarly, Eraut notes that unlike with other professions such as lawyer or architect, the actions of a teacher are guided by a practical imperative: "The pressure for action is immediate, and to hesitate is to lose" (1994, p. 53–54). For classroom actions he adapts the metaphor hot action (as opposed to cool action, when there is sufficient time for consideration). In addition to this, pedagogical situations often belong among so-called ill-defined problems (vs. well-defined problems; originally used in medicine), i.e. problems for which there is no right solution or more than one possible solution (Eraut, 1994, p. 45).

The nature of pedagogical situations determines teachers' actions and thus also the utilisation of knowledge in these actions. Since the 1980s research on teacher effectiveness has focused, amongst other issues, on the analysis of teacher knowledge-in-action. According to a detailed survey provided by Clark and Peterson (1986, pp. 255–296) experts differ from novices in the breadth and depth as well as the structure of their knowledge base, in both the pre-active and inter-active phases of teaching. An integrated knowledge base organised around 'big ideas' (Bransford et al., 1999, pp. 31–33) and the ability to perform fluent retrieval of knowledge lead to greater effectiveness and efficiency in experts' lesson-planning as well as in the development of long-term curricular projects. As regards the inter-active phase of teaching, it was found by Kagan (1992) in her meta-analysis of forty mainly qualitative studies of professional teacher development that, in addition to the above-mentioned features, a salient feature is the development of metacognition, i.e. teachers gradually become more aware of what they know and believe in and how their knowledge and beliefs change over time.

It is, then, generally accepted that a teacher's actions are guided by their knowledge and that simultaneously this knowledge is deepened or modified through these actions (Dann, 2000, p. 82). Empirical evidence of differences in the novice and expert-teacher knowledge base and its availability in action proves that pedagogical actions, or in other words experience, are a necessary precondition for the development of expertise and expert knowledge. Closer attention will be paid to the processes of expertise development and maintenance in part 6.

Expert Teacher Knowledge

Expert teachers are said to be more knowledgeable than novices. A useful summary of the previous discussion on expert teachers' superior cognition and

knowledge structures can be based on Ethell and McMeniman's (2000) conclusions. They claim that an expert teacher has:

- large, highly organised knowledge bases with complex interconnected schemas which are easily accessed
- sets of basic automated skills, or routines, which are executed smoothly and apparently effortlessly
- well-developed but flexible and adaptive sets of strategic knowledge which are used for planning

As regards the first point, knowledge accumulated by experts over extensive periods of practice is not only broader than that of novices, but it is also of a different quality. It seems to be structured and organised around the main concepts of the domain (Bransford et al., 1999, pp. 31–33).

Approaches of cognitive science and the knowledge-based approach to expertise research have been widely discussed since the 1990s in connection with rapid changes of broader as well as immediate contexts (Eteläpelto & Collin, 2004, p. 234). Contextual determinants ranging from the actual context of a school classroom to a professional community and its functioning in a broader social context as reflected by social theory have had impact on new, "desirable" constructs of expertise, e.g., adaptive expertise (Hatano & Inagaki, 1986), creative expertise (Winograd, 1995), innovative expertise (Achtenhagen, 1995). As a consequence of these changes, the perception of expertise has developed new dimensions, such as a need for cognitive flexibility and a continuous need for innovation, i.e. also a restructuring of knowledge structures (Bereiter & Scardamalia, 1993).

The above factors have been accounted for in the development of models of the knowledge base for teaching. Since 1987 – when Shulman articulated his highly influential framework for a teacher knowledge base that included knowledge of content, context, general pedagogy, curriculum, learners, educational ends and pedagogical content knowledge as the central domain – a considerable amount of research has been conducted in this area (Valli & Tom, 1988; Turner-Bisset, 1999, 2001; Verloop, Van Driel, & Meijer, 2001; Kansanen 2009; van Dijk, 2009; in the Czech context Janík et al., 2009; Janík, 2009, and many others). In the course of reflection on these developments, Shulman himself redefined his model (Shulman & Shulman, 2004), choosing a holistic approach and combining the shared knowledge of the community of professionals and individual knowledge. Shulman and Shulman (2004) stress that there is an ongoing interaction between an individual professional and the community; therefore, the knowledge base consists of shared knowledge (knowledge a team or community should have) and distributed knowledge (knowledge each member should have). Furthermore, the knowledge base is not viewed as static, but as dynamic and growing.

The most burning issue in the discussion of expert teacher knowledge, however, is not the composition of the knowledge base, but rather the type or form of knowledge and its relation to classroom practice (Grossman, 1995, pp. 22–23). The

above-mentioned distinction made by the Shulmans (2004) of shared (sometimes labelled collective) and distributed (individual) knowledge is by no means the only one; in literature we may come across a plethora of classifications that explain different conceptions of knowledge. Behind these efforts to distinguish types of teachers' knowledge we can find different criteria. In our discussion we are going to build on the theory-practice criterion, partly because of its well-established tradition with its roots in the very beginnings of Western philosophy, partly because this distinction has provoked passionate and sometimes even heated debate among theoreticians/educationalists as well as among the teaching and lay publics. Attempts to bridge the theory-practice gap by its extrapolation to the relationship of theoretical and practical knowledge date back to Plato and Aristotle and their conceptions of *epistémé* vs. *phronésis* (Korthagen, 2001, p. 22), knowledge by description vs. knowledge by acquaintance (Russell, 1911), knowing that vs. knowing how (Ryle, 1949), declarative knowledge vs. procedural knowledge (Anderson, 1983), formal knowledge vs. practical knowledge (Fenstermacher, 1994), and others (see Figure 1).

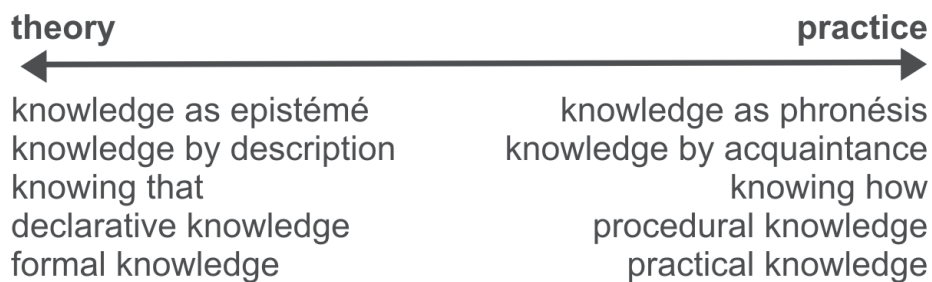


Figure 1. Knowledge classification based on the theory-practice criterion

Epistémé and phronésis: on the nature of expert teacher knowledge

Expertise in general as well as expertise in teaching has for centuries been linked to general, universal knowledge, to scientific understanding of a problem, to *epistémé* in the Platonian sense. Korthagen (2001, pp. 25–26) summarises the characteristics of *epistémé*: it is propositional, i.e. it consists of assertions of a general nature that can be explained, transmitted, and proved. The proofs are based upon empirical or theoretical research, in other words, their truthfulness or objectivity are always linked to a theory they are consistent with. It is a representative, fixed, and in that sense timeless knowledge that provides conceptualisation of real world phenomena and, last but not least, articulates concepts in the form of principles, rules and theorems, and provides us with language for conceptualisation.

The relevance of research-based knowledge and scientific theory to teaching were not questioned until the mid 1970s. In his famous *Life in Classrooms*, Jackson (1968, p. 7) described schools and classrooms as relatively stable physical and social environments where theory-based concepts were transmitted to learners. The 1970s marked a period of change in the perception of teachers and teaching. Increased criticism of the image of the teacher as a doer and 'delivery man' of

knowledge gave birth to reconceptualisation of the field with teachers' mental lives at the centre, with the key concepts of personal, practical knowledge organised in narrative images (initially Elbaz, 1983, and Clandinin, 1985; in the Czech context Štech, 1994, and others). According to Korthagen (2001, p. 25), *phronésis* requires a grasp of generalities as well as a knowledge of particular context-related facts; the latter is far more important. Dealing with the ultimate particular is an object of perception; therefore, the author claims, *phronésis* is perceptual while *epistémé* is conceptual. It is often difficult to verbalise as it is embedded in professional action – it is usually referred to as tacit (or implicit) knowledge. Emphasis on teacher-based practical knowledge, on *phronésis* perceived as practical wisdom of an individual nature, was frequently expressed as criticism or rejection of *epistémé* and its role in the teaching profession – a typical either/or approach was adopted.

An overview of the critique of university research-based knowledge was offered by Norris (2000, pp. 169–170), who noticed that the arguments either attempted to undercut the university research-based knowledge and empirical theory as irrelevant to teaching, or, on the other hand, to elevate teacher-based knowledge and experience as particularly suitable sources of teaching expertise.

The line of argumentation on which the proponents of *phronésis* build their cases starts from the claim that academic knowledge is too abstract and general while teaching is concrete and specific, e.g., “the generalisations of a Piaget or Brunner are of little help in sorting out the particular practical problems (teachers) are immediately faced with” (Carr, 1992, p. 246). Furthermore, academic knowledge has no direct links to practice, as the same author states: “discourse of a theoretical nature ... can have no real relevance to educational practice if it lacks a direct practical application” (Carr, 1992, p. 251). Norris (2000, p. 172) also refers to claims that research-based knowledge is unable to capture the inherent complexity of school situations; in addition, it incorrectly construes teaching as a causal process. Application of research-based knowledge is seen as technicalism in the sense used by Schön: “... teaching is a prime example of the sort of activity in which almost all the important decisions which need to be made at a practical level are of a moral rather than a technical nature” (Schön, 1987 in Carr, 1995, p. 323). Last but not least, there are arguments of a socio-political nature such as claims that university research-based knowledge tends to alienate teachers (Schön, 1992) because it endangers their ownership of practice and makes them “subservient to the producers of that knowledge” (Norris, 2000, p. 170), to academicians; yet teachers “are more than simply passive consumers of knowledge” (Fenstermacher, 1994, p. 18).

The elevation of teacher-based knowledge as a source of expertise, the second line of argumentation, views professional practice in education as the pursuit of goodness rather than the pursuit of truth (Norris, 2000, p. 173). In this view, knowledge useful for teaching can only be generated by a new type of research that is conducted by teachers themselves, as they have privileged access to it: “... the questions teachers ask about theory and practice ought to be the starting point for classroom inquiry (Cochran-Smith & Lytle, 1990, pp. 4–5). Perhaps the strongest or most widely accepted argument states that the type of knowledge needed for

successful teaching practice can only be acquired through experience of a special type: "The authority of experience simply does not transfer because it resides in having the experience" (Munby & Russell, 1994, p. 93).

To sum up, the *phronésis* paradigm claims that science produces knowledge that is propositional, general in nature, formulated in abstract terms, and often situated in a theoretical structure (Kessels & Korthagen, 1996, p. 18). What is needed for teaching is something like practical wisdom or knowing how rather than knowing that, as Eraut (1994, p. 15) points out.

Tension between episteme and *phronésis*: theory-practice dilemma

There is no doubt that professionals including teachers act in a complex and complicated field of tension between *epistémé* and *phronésis* representing the theory-practice dilemma. In seeking the sources of teaching expertise Norris (2000, p. 167) describes the relationship of practical vs. theoretical knowledge as follows: "The crux of the distinction ... is that the first list is seen to represent from the inside the specific and concrete situations in which teachers work whilst the second represents the general and abstract perspectives of outsiders".

The theory-practice problem has persisted historically; viewed along a timeline, various approaches to the equilibrium between theory and practice are seen to have gained weight (Bromme & Tillema, 1995, pp. 261–262). Thus the major arguments underpinning the current extreme *phronésis*-orientation may be weighted and disputed.

Firstly, the discreditation of scientific theories in terms of their lack of ecological validity, i.e. direct applicability, seems to be untenable: immediate guidance for action is not the purpose of scientific theories, nor is their structure suited to this. In order to provide a basis for practical activity, theory requires transformation (Bromme & Tillema, 2000, p. 262) – practical knowledge differs in structure as well as content. No theory can – nor does it attempt to – capture the reality in its full complexity; therefore it does not aspire to offer an overall description or even prescriptions for action – yet, as Norris (2000, p. 179) notes, it can still generate insight and furnish understanding. Various aspects of teaching as a multidimensional endeavour are dealt with by different scientific disciplines; the integration of theoretical knowledge for the above purpose, or as Bromme and Tillema (1995, p. 266) note perhaps more precisely, the transgression of boundaries between disciplines for the gaining of insight, is a complicated and lengthy process. In teaching as a socially determined profession, this transgression includes boundaries set by local contexts within which professionals act.

Secondly, context is closely linked to a consideration of *phronésis* as individually developed and owned and to its tacit character. This characteristic is in contradiction with the social dimension of teaching expertise (Boshuizen, Bromme, & Gruber, 2004, p. 6), i.e. the view of professional teacher development as a process of enculturation into a professional community. Furthermore, contextual determination raises doubts about the tacit character of professional practical

knowledge, as shared language is a pre-requisite of a shared discourse necessary for collective understanding. It is claimed that *phronésis* is perceptual rather than conceptual (Korthagen, 2001, p. 25). In order to develop collective understanding, however, individual experience has to be reflected upon and articulated; teachers need to name notions, to conceptualize experience. The question remains of whether to adopt for this purpose the conceptual language of theory – and if not, for what reasons. Here we would rather hypothesise that both teachers and researchers function in explicit discourses, but that these discourses may be inherently different (Pířová, Kostková, & Janík et al., 2011). Though we do not wish to claim that they are mutually unintelligible, difference may significantly hamper understanding – or at least willingness to become involved in discussion.

Last but not least, content domains of the knowledge base for teaching should be brought up in the *epistémé*–*phronésis* discussion. Back in 1986 Shulman (p. 25–26) talked about “a missing program” in relation to the absence of attention to subject-matter content in teacher cognition research. More precisely, he did not question a sort of general agreement among the lay public and decision-makers concerning the importance of “teachers’ competence in the subjects they teach” (Shulman, 1986, p. 25) as a crucial factor in teacher quality. Nonetheless, he pointed out that it was not clear what sort of subject-matter knowledge this was: “basic skills, broad factual knowledge, scholarly depth”? (Shulman, 1986, p. 25). In designing his model of a knowledge base for teaching (1986) he proposed three kinds of content knowledge, i.e. subject-matter knowledge or content knowledge, pedagogical content knowledge and knowledge of curriculum. There can be little doubt that the first of these, i.e. subject-matter knowledge, represents *epistémé* in the sense of both substantive and syntactic structures of the relevant scientific discipline (Schwab, 1964 in Shulman, 1987, pp. 8–9), though we acknowledge the beliefs, assumptions and values that influence a teacher’s representations of these structures (Bromme, 2005; Gudmundsdottir, 1990). The type of knowledge which Shulman (1987) labelled pedagogical content knowledge refers to the cognitive aspects of the transformation processes for educational purposes. Komorek and Kattman (2008) presented a Model of Educational Reconstruction that attempts to capture the nature of these processes (cf. in the Czech context the Model of Didactic Transformation, Janík et al., 2009). The model is based on a constructivist epistemological position, i.e. “concerns the understanding of students’ perspectives as well as the interpretation of the scientific content” (Komorek & Kattman, 2008, p. 172). As explained in Janík et al. (2009, pp. 49–50), in teaching/learning processes the teacher moves in a semantic channel between the learner’s subjective preconcept and a disciplinary content, thus developing the intersubjective concept. Intersubjective concepts are not isolated units: they grow from the semantic network of the relevant disciplinary content, and have to be expressed in language (notions). The accepting of such a theory implies that a prerequisite for teacher’s know-how is *epistémé* in the area of the ‘parent’ scientific discipline/s, in brief a ‘know what’.

Linking Practice and Theory: Towards Knowledge Integration and Flexibility

The preceding debate suggests that though there is an inevitable tension between *epistémé* and *phronésis*, both seem to play an important role in the development of teacher expertise. The transfer of *epistémé* and its utilisation in teacher's actions are often described in agreement with Eraut's view (1994, p. 17):

- "The public knowledge⁴ of which a professional worker has cognizance will be an individual selection from a much larger public knowledge base, influenced by public knowledge encountered during professional education and independent reading, by personal interest and experience, and by social interchange with fellow professionals.
- Only a portion of the public knowledge which is potentially available to a professional has a significant chance of being used in practice. This portion, sometimes referred to as 'action knowledge', comprises knowledge which has been sufficiently integrated into or connected with personal practice to be either automatically or very readily called into use. Only when problems are difficult and time is available to work on them will searching beyond the domain of action knowledge be likely."
- "Public knowledge which gets incorporated into action knowledge undergoes a process of personalisation in which some interpretations and uses become prominent while others get neglected."

Eraut's explanation provides us with a useful starting point, as he acknowledges at least partial transfer of *epistémé* to – in his term – action knowledge, emphasises the need for knowledge integration processes, and pinpoints a knowledge personalisation process during which the beliefs, assumptions and value systems of a teacher come into play. In order to understand the role of *epistémé* and *phronésis* in the development of expert knowledge it is necessary to adopt a dynamic or developmental perspective. A number of studies conducted in another professional field (medicine) by Boshuizen and her colleagues (Boshuizen & Schmidt, 1992, 2000; Boshuizen, 2004) offer a perspective which seems to be applicable across professions.

Her theory includes three phases of the development or restructuring of knowledge (Boshuizen, 2004, pp. 74–76). The first phase, which typically takes place during professional undergraduate studies and professional induction, comprises three steps: knowledge accretion, validation and integration. The three steps should result in a well-integrated knowledge network validated by practice. Here we are obviously talking predominantly about theoretical knowledge (*epistémé*) in a number of disciplines which is "learned" and organised with a certain aim – in

4 Eraut (1994, p. 17) talks about public knowledge base as represented by publications and training courses. He also refers to the collective nature of this kind of knowledge, i.e. knowledge of the profession.

the case of teachers with the aim of creating opportunities for learners to acquire certain content and facilitating their learning processes. In the teaching profession, however, the long “apprenticeship of observation” (Lortie, 1975, p. 61) has to be taken into consideration. Compared to other professionals, future teachers possess rich and deeply rooted precepts as a result of years spent at school, though in a different social role. The processes of knowledge accretion may then be hindered by the filtering effect of precepts. Therefore a strong accent on knowledge reconstruction is necessary and processes may be quite demanding in terms of cognitive load as well as temporal requirements.

As regards knowledge integration, Bromme (1995, pp. 211–212) points out that the psychological question of cognitive integration still remains partly unanswered. In his opinion, it is rather “a transformation of the meaning of previously available ‘academic’ concepts of the disciplines involved”. In other words, in teaching subject matter, knowledge shapes the interpretation of pedagogical concepts – e.g., motivation may have a different significance for a teacher of mathematics than for a teacher of foreign languages. In addition to this, professional knowledge gets adapted to the specific environment and circumstances – in the case of teachers, to their learners and their previous knowledge or precepts as well as to the school culture. Bromme (1995, p. 212) labels this process contextualisation of knowledge. The resulting networks thus comprise knowledge of a different quality, the so-called ‘amalgamating’ knowledge of different types (cf. Shulman, 1987).

When an integrated network gets used in practice, gradually it becomes possible to create direct lines in reasoning between different concepts, and over time to strengthen these direct lines, thus omitting intermediate concepts. Boshuizen (2004, p. 75) calls this second learning process or phase of professional knowledge development towards expertise “knowledge encapsulation” as it “includes the clustering aspects of the process and accounts for the automation involved”. The clusters, as Bromme (1995, p. 212) notes, contain large amounts of original separated disciplinary knowledge “subsumed under a few general concepts”.

The third phase of the learning process is described as script formation; scripts are perceived as “knowledge structures that describe stereotyped sequences of action” (Boshuizen, 2004, p. 75). Scripts then become activated according to the level of match with the situation. Actions conducted on the basis of scripts would differ significantly from actions underpinned by isolated concepts – the author actually links script formation to the development of professional competence.

In our discussion of the nature of expert teacher knowledge, the above-mentioned developmental perspective provided by Boshuizen (2004), Bromme (1995) and their colleagues seems to tally with some of the characteristics discussed in the text. For instance, the description of expert actions based on encapsulated or scripted knowledge here corresponds fully with the characteristics of expert teachers and their performance, as provided for by Eraut (see above). The perspective of a scripted knowledge structure would also account for the characteristics of *phronésis* as an individual, context-based, tacit construct rooted in perception, as discussed above.

In addition to this, it might provide clues for the phenomenon of so-called inert knowledge, a concept coined by Whitehead as early as 1929 to refer to knowledge that can be recalled when people are explicitly asked to do so but that is not used spontaneously in problem-solving even though it is relevant. In other words, "it does not guide one's thinking and actions in new settings" (Hammerness et al., 2005, p. 372). A possible explanation for the phenomenon of inert knowledge linked to the three-phase model proposed by Boshuizen (2004) might be that inert knowledge represents concepts which have not been incorporated in the granular structure of encapsulated knowledge, and consequently in the scripts. In professional development towards expertise, it is vital, as Whitehead (1967, p. 5) says, "to keep knowledge alive", to prevent it from becoming inert. In order to overcome problems of inert knowledge, it is necessary to promote knowledge mobility, to provide opportunities for meaningful contextualisation and the utilising of knowledge in different settings, which requires a movement in the conceptual network through decontextualisation and re-contextualisation (cf. Štech, 2003); in general, to create rich spaces for knowledge dialogue.

In a sense, as far as the issue of inert knowledge is concerned, or more generally as far as the relevance of Boshuizen's (2004) model for the development (and maintenance) of expertise in teaching is considered, it seems to offer an explanation for the cognitive dimension of what has been labelled routine expertise (Hatano & Inagaki, 1986; in the text above different terminology has been attached to similar concepts). Routine experts, according to them, function in a stable environment in a highly efficient way, but they are unable to respond to external change at the same level of efficiency. Routine experts are distinguished from so-called adaptive experts, who are capable of responding to external change in an innovative way (Bransford et al., 2005, pp. 49–52; Hammerness et al., 2005, pp. 358–389). It follows that cognitive flexibility or mobility, as opposed to permanent scripts, seems to be inherent in the concept of adaptive expertise. As teachers function in the context of constant evolvement of a broader educational context (Fullan, 2001) and with regard to the characteristics of pedagogical situations (Doyle, 1986), balance and a careful weighting of an accent on efficiency and innovativeness are important in professional teacher development.

The requirement of cognitive flexibility is consistent with the dynamic view of expertise acquisition formulated by Bereiter and Scardamalia (1993). In their study of experts and experienced non-experts they come to the conclusion that experts continuously reinvest mental resources freed by the acquisition of relevant knowledge through experience (cf. Boshuizen's scripted knowledge) by problematising what is taken as routine, by reformulating problems and solving them. Thus, the acquisition and maintenance of expertise seems to be determined by the constant meeting of *epistémé* and *phronésis*, transformation and restructuring of knowledge in reflection of the evolving environment.

Post Scriptum

As there are no definite responses to the questions posed in the text (nor, we might add, could any have been expected), we have opted for a post scriptum rather than a traditional conclusion.

The text aims to contribute to teacher professionalisation, which is viewed as closely linked to the image of what it is to be an expert. We address the role of knowledge as a source of teaching expertise, specifically focusing on the phenomenon of the epistémé-phronésis dilemma.

The discussion brings us to the view that the cognitive dimension of expertise and the processes of expertise development encompass both epistémé and phronésis. Though expert knowledge may be action-based in the sense that it is demonstrated and further developed in professional actions, it can hardly – at least not in professions – be acquired solely through experience and/or training, but it develops from epistémé in rather complex and non-linear learning processes which include integration, transformation and restructuring of theoretical knowledge. We realise that in putting a strong emphasis on this claim the text may seem slightly biased against practical knowledge. To some extent this has been the intention of the authors, partly stemming from the political reasons mentioned in the introductory part of our discussion and from the constant attempts to undermine the status of teachers and teaching as a full-fledged profession. In the context of university education (in general as well as teacher education) the generally accepted perception is of a hierarchy which favours theoretical knowledge over practical knowledge, the “head more than the hands” view (Goodson, Anstead, & Mangan, 1998, p. 141). At the same time, it is generally acknowledged that expertise in teaching cannot be achieved without experience, i.e. without practical knowledge, which is obviously valued less highly by the “head more than the hands” position.

In the text as a whole we have attempted to thematise the theory-practice dilemma (the episteme–phronésis tension) as a variation of the more general “head” vs. “hand” problem. By drawing attention to the need to connect theory and practice we want to argue that the “head”-“hand” hierarchy might not apply because it is equally true that “a hand can be raised above the head”.

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