

## SUPPORTING THE COMPETENT PRACTITIONER: TRANSDISCIPLINARY COACHING WITH KNOWLEDGE-BASED EXPERT SYSTEM

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### Abstract:

By today disciplines, both hard sciences and softer areas that often fight for the 'scientific' status, grew so large that they became impossible to master. This statement perhaps re-quires some explanation. By hard sciences we mean disciplines, such as physics or biology, that are around for a long time, focus on discovering universally and infinitely (both in time and space) valid laws of nature and are in a position where the 'truth' of their statements can be demonstrated, enabling prediction and control. In turn, soft disciplines, including not only arts but also any knowledge domains that aim at understanding human and social phenomena, are in comparison limited. This means, that the laws of nature in these areas do not seem to be universally and infinitely valid (there are variations both in time and space), 'truth' allows for multiple interpretations, and prediction and control, if attempted, usually fail. These soft knowledge domains thus cannot meet the requirements of hard scientific disciplines. There are three ways to battle this situation: (1) giving up the claim of the scientific status, (2) redefine what science means in such knowledge domains, and (3) trying to squeeze the discipline into the traditional 'science' box. Most researchers in the human-social arena are unhappy with (1), cannot make (2) happen and thus attempt (3). We believe that this is not only dangerous but outright harmful. When squeezing the human-social disciplines into the 'science' box, the discipline is truncated. Instead of becoming scientific they become 'scientistic' (Dörfler & Eden, 2014). We do not attempt to resolve this problem in this paper but we wanted to clarify our departure point in order to outline the playing field.

What is common for both hard and soft disciplines is that there is such amount of knowledge accumulated in each of them that it is impossible to master any of them completely. This means that nobody today knows physics or biology – and, equally, nobody knows psychology or economics. However, it is possible to get a taster from the various disciplines at every level of education. Education starts with a liberal arts phase. Elementary school pupils learn reading, calculating, somersaulting, painting and singing. In higher school years they may learn solving integrals, burning sulphur, the directions and timing of Napoleon's quests or that the antagonist is a necessary component of a story. Here pupils start to specialise, shifting more towards hard or soft. At university level students of engineering become familiar with the deep secrets of the Carnot-cycle and the Nash equilibrium but are not longer able to understand anything a sociology professors says, and vice versa. The outcome of the university is then a semi-specialised cultivated mind. By semi-specialised we mean that it is not a balanced knowledge any more, such as it was in the liberal arts phase, but engineers can still read, know some history, and some of them will appreciate paintings, others music. Some are more narrowly focused than others, but all of them will have knowledge limited to the part of their respective disciplines that can be taught and learned. This part is easy to accept. However we also want to make an assertion that is somewhat more difficult to accept: the knowledge acquired in formal education is both necessary and useless.

The semi-specialised cultivated mind is familiar with the main concepts of the discipline(s) they specialised in. In the formal education these concepts are developed from scratch, which is a time-

consuming process, and they are validated in an intellectual context, through thinking. This means that the cultivated mind sees the world through the lens of their respective disciplines and can think about it using the disciplinary context. Then, however, the cultivated mind leaves the school and finds itself in the context of praxis. To their horror the school-leavers find themselves in a place that seems familiar, i.e. they recognise the concepts – but these concepts seem to make a completely different sense than what they ‘sup-pose’ to mean. The knowledge of the textbooks is useless. At this point it does not help if further and further disciplinary concepts are added to the cultivated mind. Instead, in the context of praxis the same disciplinary concepts are re-developed, they gradually acquire a new meaning validated through application. However, it would not be possible to re-develop the concepts, if the school-leaver did not have them in the first place. Therefore the formal education is also indispensable. From time to time the practitioner may go back to the formal education for knowledge refreshment, acquire new concepts of the discipline, and then bring these back to praxis. Thus going back and forth between the formal education and the praxis competence emerges.

We expect the competent practitioner to be able to solve the problems of praxis. However, as they are becoming competent, the practitioners quickly discover that the real world of praxis does not fit within the boundaries of any discipline. In order to solve any real-life problem in praxis, we need to borrow tools, models, insights sometimes from one other times from another discipline. This will partly lead to the competent practitioners expanding their horizons, and partly to working together with other competent practitioners (semi )specialised in different disciplines. These processes of problem solving we call trans-disciplinary. Without attempting detailed delineation from inter-, cross- and multidisciplinary, we conceptualise the transdisciplinary problem solving process as one in which we borrow what and when needed from various disciplines in order to solve the problem at hand. In a sense it can be regarded as a superior stage of interdisciplinarity, “which will not be limited to recognize the interactions and/or reciprocities between the specialized researches, but which will locate these links inside a total system without stable boundaries between the disciplines” (Piaget, 1972). Together with Nicolescu (2010) we argue that such transdisciplinarity must not be reduced to the ‘hard sciences’. In our presentation we will address the possibility of supporting transdisciplinary problem solving process through a particular form of coaching called knowledge engineering and knowledge based expert systems.

*Keywords: knowledge engineering, knowledge based expert systems, transdisciplinarity, problem solving*

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