



University of Warwick

AHRB Project - Attention and the knowledge bases of expert practice

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This project is funded by the AHRB Innovation Award scheme and comprises a pilot study to test a new conceptual model of expertise.

The Project is funded 1 July 2003 – 30 June 2004.

Innovation Statement

The research is innovative in three respects: (i) Its philosophical model challenges the received view of action explanation; (ii) its research methodology combines empirical research and philosophical theory; (iii) it provides a new model of expert deliberation.

(i).

Intentional action explanation is normally treated as a form of causal explanation in which intentional states are amongst the causal antecedents to behaviour. This supports models of expertise in which expert performance is a causal consequence of knowledge held independently of performance. Expert systems analyses of expertise are examples of this. The research project develops an alternative to this received view.

In the literature on professional expertise, reference to 'tacit', 'craft' and 'intuitive' forms of knowledge is common, but there is no consensus on how to understand these ideas. These are attempts to introduce a concept of knowledge embedded in practice. The research project explores ways of applying ideas from contemporary philosophy of mind to articulate a theory of embedded propositional knowledge. On this theory, many intentional states are attention-dependent states by which the subject is coupled with the environment. Intentional couplings are not causal antecedents to behaviour, but ongoing devices for regulating performance.

(ii)

The development of the philosophical model has taken place in collaboration with practitioners in a number of professional fields - education, medicine, nursing, psychiatry. The aim of the project is to run a pilot empirical study that brings together philosophical theory and empirical study of classroom activity in a way never attempted before. The aim is to undertake a detailed study of instances of teacher deliberation in the classroom to test and enhance the conceptual model. If the results are positive, this will lay the foundations for further large-scale empirical studies and conceptual development of the proposed model of expertise.

(iii)

Most models of expert deliberation assume either a hypothetico-deductive or probabilistic model of deliberation. In either case, performance is derived from initial data plus rules for manipulating data. Patterns of expert performance are explained by patterns in the rules from which behaviour is derived. The concept of intentional coupling provides a radically different account of how and why behaviour is patterned. Patterns in behaviour emerge from choice couplings that produce a direct dynamic feedback between subject and environment. This

idea has been deployed in empirical work in situated robotics in which couplings are causally defined regulators of behaviour. The extension to treat intentional states as couplings that serve a similar purpose is novel.

At this pilot stage of the scheme, work still needs to be done on the conceptual structure of the proposed theory of expertise. Given the potential practical consequences of the work, it would be irresponsible not to develop the model against empirical constraints. If the work bears fruit, a much larger empirical study, possibly jointly funded by the AHRB and ESRC, might be appropriate. The Innovation Award scheme provides the opportunity to develop the project to the point where it could be supported by other schemes offered by the AHRB and ESRC.

Scheme of Research

Research Questions

- (1) Is it possible to detect a role for the concept of intentional coupling in an account of teacher thinking and deliberation in mathematics classes?
- (2) Does the concept of intentional coupling help in identifying the role of judgement in shaping teacher practice, as opposed to practice being shaped by rules?
- (3) Does joint attention (where teacher and pupil(s) share intentional coupling) have a role to play in analysing the management of learning tasks in mathematics classrooms.

Aims and Objectives

Aims:

- A To develop theoretical resources for a general model of embedded expertise.
- B To develop a methodology for detecting the role of intentional coupling in understanding expert teaching practice.
- C To provide guidelines for empirical discrimination between novice and expert teachers in terms of those for whom patterns in teacher behaviour are driven by rules and those for whom patterns emerge from judgement and intentional coupling.

Objectives:

- D To have collected sufficient evidence in response to research questions to frame a full scale research project on embedded expertise in teaching.
- E To have laid the foundations for the development of a generic model of expertise and a general methodology for qualitative empirical research across a number of areas of professional practice.
- F To have provided an initial outline of the character of the expert teacher - 'character' = the assemblage of skills for intentional coupling.

Research Context

The literature on professional expertise has rich descriptions of experiential knowledge, tacit knowledge, craft knowledge, etc. (Schon, Eraut, Benner, Dreyfus & Dreyfus). There is little theoretical underpinning to these descriptions and without this these ideas provide no real alternative to the an expert systems analysis in which expertise is wholly rule-based. The idea that professional expertise requires judgement situated in practice rather than following theoretical rules has been discussed at length (Dunne, Hager, Beckett & Hager) but there is need for much more detail in articulating such ideas. In recent work (Luntley 2001, 2002a, 2002b, 2002c, 2003b) a perceptual dynamic theory of embedded knowledge has been developed. The core to this involves the generalisation of ideas in contemporary philosophy of thought about environmentally-dependent beliefs to provide the concept of intentional

couplings. These are cases of belief/desires the individuation of which depends on the ongoing perceptual attention of the subject on relevant things and properties. This conceptual initiative achieves two things: (a) it gives a clear theoretical model for experiential knowledge; (b) it gives a model that explains how target behavioural patterns can emerge from choice couplings rather than being derived from antecedent rules. The latter idea has been discussed in analysing computational systems in situated robotics, but it has not been applied to intentional systems. The conceptual innovations are central to core philosophical research in action explanation and the study of Wittgenstein (Luntley 2002d, 2003a, 2003c). This research project uses the conceptual structure thus far developed to engage in qualitative social science research to test and develop the new theory.

Research Method

Background

In autumn 2000 Luntley ran a pilot study, funded by the University of Warwick, concerned with developing the theoretical ideas that underpin the notion of embedded expertise. This involved seminars/workshops/presentations for Universities Council for Education of Teachers (UCET), Humanities and Arts Network (HAN); a seminar hosted at Warwick involving delegates from Education, Health Studies, teacher unions (ATL), contact with the GTC, work for the Royal College of Psychiatrists, contacts with leading authorities within the philosophy of education, Shostak, Nixon, Carr, McLaughlin, Centre for Educational Development and Appraisal Research (CEDAR, Warwick), Centre for Academic Practice (Warwick). Further developments have included a plenary paper for a Symposium on medical expertise, organised by *Drug and Therapeutics Bulletin*; plenary speaker at conference on Philosophy of Management, organised by *Reason in Practice & Forum for European Philosophy*.

Research Methodology

The methodology is a mix of philosophical research plus qualitative social science research to test the philosophical model (Aims A, B, Objective D). Dr Ainley is an international authority on maths education and brings the expertise to provide a detailed focus for examining the ideas of the philosophical model in practice. The empirical phase will draw on the qualitative social science research experience of Ainley and Galloway (CEDAR, Warwick as advisor). The idea is to conduct a micro ethnography of teacher practice, to study the detailed cognitive virtues that shape the practice of expert maths teaching (Aim C). These virtues are capacities for intentional coupling, attention-dependent beliefs/desires individuated by the ongoing perceptual attention on the relevant objects and properties (Objective F). The empirical data will be collected in (a) classroom observations + follow up team interview; (b) teacher reflective diaries + follow up team interview; (c) video and audio tapes of classroom activities + individual and group teacher responses. The video data will be supplied from Ainley's ESRC project.

The empirical part of the research will draw upon empirical studies on consultant anaesthetists. Klumela & Norros (1997, 2001) have suggested a differentiation between anaesthetists with a realistic/interpretative orientation and those with an objectivistic/reactive orientation in modelling how anaesthetists cope with complexity and uncertainty in their work. Klumela and Norros's distinction, drawn on the basis of qualitative research based on structured interviews, would seem to support the model under development in the proposed project. The interview structures to be employed will draw on Klumela & Norros's work. Under data collection (c), some tape exposure will be conducted with student maths teachers at Warwick Institute of Education to run an initial test for novice/expert differentiation of response and attitude to managing activities that matches Klumela & Norros's distinction (Aim C).

The use of team interviews, teacher trained research assistant plus one of Luntley or Ainley is used to ensure an interviewer is present who shares the interviewee's understanding of classrooms in addition to a researcher conversant with the philosophical models under examination. This follows the design of Klumela & Norros's study. The focus of interviews will be to elicit the role of attention-dependent beliefs/desires in managing learning targets; steering pupil activity in maths work; co-ordinating group/whole class behaviour. The general

idea is to identify instances where teacher action is targeted on balancing complex configurations of activities, attentions, etc. towards a desired equilibrium in contrast to delivering a curriculum to a pre-conceived plan. The empirical study will locate instances in which the teacher's management of learning activities requires adaptive responses to changing and novel circumstances. The focus is on interactive learning activities in classrooms and the deliberations involved in managing them. Project costing includes a budget for supply teacher cover to enable selected teachers to attend detailed interviews plus video tape viewings + interviews.

Project timetable

1 July 2003 First workshop. Reconvene group that met at workshop held in December 2000 to overview theoretical developments, to appraise proposed empirical research methods including development of Klumela & Norros methodology for use in teacher interviews.

2 Autumn 2003 3 months of school visits and follow up feedback sessions. Participants: Luntley, Ainley + Galloway (CEDAR, Warwick) as advisor. Classroom observations to be done in conjunction with the visits planned under Ainley's ESRC Project (R000239375), 'Purposeful Algebraic Activity'.

3 Project Seminars It is proposed to convene a series of seminars to sustain the interdisciplinary character of the research and the collaboration from 1st workshop. Regular contact between the different disciplines is essential to keep the collaboration in focus. We propose seminars in December 2003, February 2004, March 2004. Each seminar to be based around a pair of papers working on the empirical data from component 2. Seminars to be hosted at Warwick and to involve the group reconvened at the first workshop.

4 Spring/summer 2004 Second workshop/small conference to review results of empirical phase of project, presentation of data and analysis of impact upon theoretical model of embedded expertise. This will also provide an opportunity to present results to user groups including those already involved in earlier phases of this work: GTC, ATL, UCET. The project costing covers attendance for all participants at first workshop (maximum of 12 core contacts from pilot study 2000); teaching replacement during empirical phase, plus researcher and secretaries for transcribing data - autumn 2003; attendance costs for delegates to project seminars; costs for main speakers and respondents at second workshop. On current planning the second workshop will be a small conference and costs will be borne by delegates other than invited speakers. Costing for the second workshop does, however, include funds for bursaries for attendance of three PhD students in order to assist in dissemination of results.

Michael Luntley
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