Professional and Practice-based Learning

Lina Markauskaite
Peter Goodyear

Epistemic Fluency and Professional Education

Innovation, Knowledgeable Action and Actionable Knowledge

Springer

Professional and Practice-based Learning

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Are we made of habits, compressed by time,
like layered rocks?

(Ben Okri, 2014, The Age of Magic*)*

Series Editors' Foreword

An ability to respond to the changing requirements of occupations, work tasks and workplaces has being conceptualised in a range of ways. Sometimes, such capacities are referred to as expertise which has been the subject of decades of enquiry within cognitive science. Along the way, considerations have been given to whether those capacities are of a general kind, specific to a particular domain of activity (e.g. an occupation) or those required for effective performance situationally. Then, there is the call for adaptability and flexibility among workers that governments have long made and is expected of graduates from tertiary education, who should be job-ready. More recently, in some countries this requirement is captured as the capacity to be innovative. This focus on understanding the capacities which can adopt or adapt to changing requirements are central to workplace effectiveness, efficacy of occupational practices and individuals' career trajectories. Hence, these capacities are salient to conceptions of workplace performance, and how individuals might come to learn and develop the capacities, and are highly consistent with the concerns of this book series. Without accounts of these kinds of capacities, the project of professional and practice based learning is stymied.

This volume offers fresh conceptions and accounts about both the qualities and the characteristics of those capacities and how they might be learnt. Peter Goodyear and Lina Markauskaite coin the term epistemic fluency to describe these capacities drawing upon a range of socially-oriented theoretical propositions. Within this conception, they emphasise the importance of actionable knowledge which is used to enact the routine and non-routine professional activities, yet which is more than behaviours which can be observed and measured. Instead, it is a product of learnt processes that are not easily articulated or captured. In essence, it places a strong focus upon the kinds of knowledge which are needed for actions of the kind that are responsive to and secure legacies from engaging in changing professional activities. As such, these conceptions inform how professional education might be considered, organised and ordered. Such is the project of this book.

To make and advance its case, a range of contributions from diverse disciplines are utilised as both bases for the propositions advanced and to indicate why these

concepts have been selected in response to unsatisfactory or incomplete accounts provided elsewhere. Advanced in this elaboration across the initial four chapters are two distinct contributions; firstly personal knowing, actions and being, and, secondly, the demarcations of what constitutes particular occupations. These contributions are seen as being reciprocal and interdependent, which includes the role of the personal in mediating these developments.

Given the extent and scope of its charter, it is not surprising perhaps that the authors offer elaborate and lengthy deliberations about the concepts which support it. These stretch over 20 chapters that initially set out some premises for seeking to understand these conceptions and accounts and the way they differ from what is proposed elsewhere and how they draw upon other ideas and propositions. The reader is provided with specific terminologies and their elaboration within these chapters. These include considerations of the mind and thinking of the kind that is characterised as being epistemic, which is followed by a consideration of artefacts and objects that could draw upon and shape epistemic actions. Then, a clear departure from cognitive accounts is the term 'inscription' which refers to the representation of knowledge that has been secured through the processes of experiencing, as well as of particular roles that socially-derived artefacts play within that securing. Here are rehearsed the roles and contributions of these artefacts, and how they are engaged resourcefully through learners' activity and engagement. Then, considerations for how these ideas fit within educational visions for work and the professions complete its argued case.

In all of this, new ground is trod, and existing ideas re-examined and rehabilitated within the authors' account. In this way, the many chapters of this volume contribute individually and collectively to an understanding about professional practice, its learning and how it fits within the broader education project. As such, it makes a valuable contribution to this book series.

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Some of the most rudimentary ideas about epistemic fluency in higher education got an airing in keynote addresses by Peter Goodyear at conferences in Leuven (1997), Maastricht (1998) and Lancaster (2006). A few sharp-eyed colleagues picked up the essence and, in so doing, provided encouragement to pursue things further. Special thanks here to Paul Kirschner, Chris Jones and Ray Land. Early outings in print can be found in Goodyear and Ellis (2007), Goodyear and Zenios (2007), Goodyear and Markauskaite (2008, 2009) and Markauskaite and Goodyear (2009, 2014b, 2014c). Earlier versions of some material in Chapters 2, 3, 4 and 20 appeared in Markauskaite and Goodyear (2014a).

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About the Authors

Lina Markauskaite is an associate professor in the Centre for Research on Learning and Innovation (CRLI), the University of Sydney. Lina has been carrying out studies in the areas of technology-enhanced teaching and learning, professional knowledge and methodological innovation since the mid-1990s. She has published more than 80 refereed papers and an edited book. Her most recent work spans two related areas. Her primary area is concerned with understanding the nature of capabilities involved in complex inter-professional knowledge work and learning. Her formulated theoretical accounts of professional knowing bring into a single framework insights from psychology, neuroscience, anthropology, design, linguistics, organisational studies and science and technology studies (STS). The second research area is emerging interdisciplinary research methods. Her recent work includes the coedited book *Methodological Choice and Design: Scholarship, Policy and Practice in Social and Educational Research* (2011, Springer, coedited with Peter Freebody and Jude Irwin) and a special issue of the British Journal of Educational Technology *e-Research for Education: Applied, Methodological and Critical Perspectives* (2014, coedited with Peter Reimann).

Peter Goodyear is professor of education and Australian Laureate Fellow at the University of Sydney in Australia. He is the founding codirector of the Centre for Research on Computer Supported Learning and Cognition (CoCo) and now also leads the University's Sciences and Technologies of Learning research network, a multi-faculty network involving over 80 academic staff and PhD students. He has been carrying out research in the field of learning, technology and higher education since the early 1980s. Peter's research focusses on networked learning, the nature of professionals' 'working knowledge' and complexity in educational design. He has published nine books and over 100 journal articles and book chapters. His most recent books are *The Architecture of Productive Learning Networks* (Routledge, coedited with Lucila Carvalho), *Handbook of Design in Educational Technology* (2013, Routledge, coedited with Rose Luckin and colleagues), *Technology-Enhanced Learning: Design Patterns and Pattern Languages* (2010, Sense,

coedited with Simeon Retalis) and *Students' Experiences of e-Learning in Higher Education: The Ecology of Sustainable Innovation* (2010, Routledge, co-authored with Rob Ellis).

Peter and Lina have been jointly working on projects investigating professional learning, design knowledge, knowledgeable action, innovation and epistemic fluency for the last 7 years. Findings from their joint work provide the empirical basis for this book.

Chapter 1
Introduction

What does it take to be a productive member of a multidisciplinary team working on a complex problem? What enables a person to integrate different types and fields of knowledge, indeed different ways of knowing, in order to make some well-founded decisions about actions to be taken in the world? What personal knowledge resources are entailed in analysing a problem and describing an innovative solution, such that the innovation can be shared in an organisation or professional community? How do people get better at these things; and how can teachers in higher education help students develop these valued capacities? The answers to these questions are central to a thorough understanding of what it means to become an effective knowledge worker and of how the preparation of students for a profession can be improved.

Working on real-world problems usually requires the combination of different kinds of specialised and context-dependent knowledge, as well as different ways of knowing. People who are flexible and adept with respect to different ways of knowing about the world can be said to possess *epistemic fluency*.

This book is intended to make a contribution to our shared understanding of epistemic fluency in some of the core activities of professional workers. It uses data from a 4-year project investigating the boundaries between (university-based) professional education and professional practice, with the aim of analysing the epistemic nature of such professional work and identifying some key sources of capability that people need if they are to engage successfully in it. These embrace a range of mental resources, including conceptual, perceptual and experiential resources, and, especially, the epistemic resources that help people to recognise and switch between different ways of knowing and forms of knowledge. Such resources also help people participate in the creation of new knowledge that can be represented and shared in their professional culture(s).

The book is part of a general move to build upon, and integrate, cognitivist, sociocultural and other accounts of learning, knowing and acting (Billett, 2014; Billett, Harteis, & Gruber, 2014; Billett & Henderson, 2011; Collins, 2007; Dall'Alba, 2009; Edwards, 2010; Farrell & Fenwick, 2007; Fenwick & Nerland,

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2014; Kemmis & Smith, 2008; Sawyer, 2014; Schatzki, Knorr Cetina, & von Savigny, 2001; Sternberg & Horvath, 1999). It draws on research into professional learning carried out in continental Europe, Britain, North America and Australia. It connects this with two previously discrete streams of theorisation about learning and thinking which originate in (a) research on science education and 'resource-based' epistemology, originating in America, and (b) research on the materiality of knowledge work, originating in France.

The book's synthesis of recent research into the nature of professional learning, knowledge work and personal mental resources offers a new and powerful conceptualisation of epistemic fluency in professional practice. It links the social and material investigation of purposeful activity with the exploration of key features of mental resourcefulness in knowledge work. Results from our empirical studies are used to illustrate and develop this conceptual framework and to shed light on practical ways in which the development of epistemic fluency can be recognised and supported – in higher education and in the transition to work. We hope that the ideas will be of interest to an international audience of researchers, as well as to curriculum leaders and other practitioners in the areas of professional education and continuing professional development.

1.1 The Social Importance of Professional Education

Our concern for university education and training for the professions may, at first glance, seem esoteric, or even elitist. Why would one choose to focus on the education of a cadre of highly paid people, like lawyers and doctors, when there are glaring cases of social disadvantage in education crying out for better research? One aspect of our answer is that everyone who calls on the services of professional people wants to be able to depend upon their specialist knowledge and skills. Their abilities, in 'normal' times, are important to the rest of us. This is a reasonably straightforward reason for studying professional work and professional education. We want professionals to be effective and efficient.

A more subtle aspect of our answer is that people in professional roles are very influential in helping society adapt in changing times – and also in helping resist some changes (Grace, 2014). The ways in which professionals conceive of, and approach, their work and the ways they engage in the reconfiguration of work and services over time have pervasive effects. They alter people's expectations, for example, of what healthcare can offer to people in old age. They affect national expenditure. They have powerful shaping effects on our day-to-day lives, in domains as diverse as health and medicine, education, legal matters, the economy and taxes, transport and housing. In short, professional people play a significant role in mediating our responses to major changes, such as those associated with globalisation and innovations in technology.

As the world struggles to deal with climate change, war and migration, food scarcity, peak oil, drug-resistant bugs and other 'wicked' problems, many political,

social and economic responses will be influenced by the ways in which professional people do their work – such as in implementing legislation or devising local strategies for ameliorating the effects of environmental change. So a better understanding of how professionals (learn to) do what they do, and what their expertise consists of, can illuminate the unfolding of a number of important societal issues. Dealing with these global changes will also require professionals from different specialisms to work effectively together. The disruptive, pervasive and complex nature of many of these changes also means that professionals will have to examine ever more closely the ethical aspects of their decisions.

Returning to the issue of elitism, we also note that, in many countries, access to the professions has played an important part in social (im)mobility and in the reproduction of economic advantage. Universities face an important equity issue here – not just in opening up entry to professional education programs but also in making changes to their programs to reduce the effects of social and economic background on completion and employment rates. This is good for society, not just for the individuals who find themselves able to access new opportunities. It is good for all of us if universities, and the professions, are able to draw on a bigger pool of talent – hiring people without regard to their origins. And there are social benefits to having a demographic profile in each profession that resembles the profile of the populations being served.

If universities are to become more successful at selecting from a broader range of people and better at supporting their learning once they are enrolled, then the staff managing the admissions; designing courses, curricula and assessments; and doing the teaching will be better able to discharge their responsibilities if they have a good, evidence-based understanding of what to assess and teach.

We do not want to imply that university staff who are engaged in professional education do not know what they are doing. On the contrary, we think that some of the best work on curriculum innovation and assessment can be found in professional education faculties. But the nature of professional work is changing quite rapidly, and there are signs that some of the established ways of distributing professional education between the university and the workplace are in crisis. Employers and their friends in government express deep concerns about the capacity of universities to prepare graduates who are ready for work. For example, in teacher education in a number of countries, there are moves to shift the balance of initial teacher education from universities to schools. Other professions that are relatively new to academia may also find their location becoming a matter of debate and uncertainty once more.

We also want to argue that society needs to be able to rely on *universities* to play their part in the provision of high-quality professional education. This is not something that can be left to employing organisations and/or the market. We do not want to romanticise universities or the education they provide: some are living through tough times and making compromises to survive. However, we take the view that society needs to be able to *place trust* in universities, to do some important things in a disinterested fashion, including professing what is worth knowing and attesting to the capabilities of people for whom they set examinations.

Against this background of uncertainty, change and contestation, we take a firm view that those who manage, and advocate for, university-based professional education programs need a much stronger knowledge base that they can use for making decisions and, especially, for defending the changes they make.

In sum, we are arguing that preparing people to become effective, adaptable, innovative and trustworthy professionals means taking *professional knowledge* much more seriously. *Really* understanding the nature and demands of professional work is a necessity for anyone who needs to assess and support the learning of would-be professionals. Opening up entry to the professions to a wider talent pool depends upon having valid and reliable forms of assessment and a sharp appreciation of how to design and manage a properly supportive learning environment. It also means that staff in universities – and in workplaces – need to understand what can be learnt where and not to harbour unrealistic expectations on that score.

1.2 Patterns in Professional Work: Introducing Epistemic Forms and Games

Research in such diverse fields as sociology, anthropology, cultural studies, psychology and information technology has increasingly acknowledged that human behaviour, at least in part, can be characterised by certain characteristic patterns and structures that appear repeatedly in the physical, social and mental realms and on a range of levels (e.g. Anderson, 1983; Bourdieu, 1977; Giddens, 1984; Schank & Abelson, 1977; Simon, 1979; Sweller, van Merrienboer, & Paas, 1998).

The literature on everyday thinking and workplace practices consistently argues that real-world problems do not come represented for us in one particular shape. As Belth (1977) puts it:

> The problems of the world do not come so well formulated, so consistently structured, that we can learn a tactic of unstructuring the form of that problem, looking into it rapidly, and coming out with the proper conclusions. The dreadful fact about thinking is that it takes time, *and it demands action*. <. . .> Indeed, the world's problems are what we form them to be, and thus are as unique as the individual minds that create them. (Belth, 1977, p. xxi, original emphasis)

These problems can be reformulated in many different ways, and their solutions typically require working with different kinds of knowledge and different ways of knowing. Explaining how people deal with complex questions in different domains, such as psychology or physics, Minsky (2006) argued:

> . . . we find ourselves forced to split those domains into 'specialities' that use different kinds of representations to answer different kinds of questions. (Minsky, 2006, p. 303)

Each such representation is then related to a certain, somewhat different, 'way to think' – that is more likely to help in finding a solution. While Minsky's concern was a broad one – how the mind works – others have argued, in a similar vein, that

such characteristic forms of knowledge and patterns of thinking are necessary generic tools for effective *inquiry*. Perkins (1997) puts it thus:

> When people engage in investigations – legal, scientific, moral, political, or other kinds – characteristic moves occur again and again. An anthropologist, a literary critic, or an astronomer may profile an observation in words or classify it into a category system. A judge, a sociologist, or a philosopher may explain something by analogy or explain it as the lawful outcome of a general rule applied to a particular case (covering rule explanation). A physicist, a historian, or a lawyer may justify a conclusion by appealing to one critical observation or an aggregate of observations with a statistical trend, as in DNA testing. Indeed, a practitioner of any of these professions might proceed at one time or another in almost any of these ways. (Perkins, 1997, pp. 50–51)

Collins and Ferguson (1993) and Perkins (1997) called the characteristic forms of outcome that people use to structure the outcomes of their inquiries 'epistemic forms' and the characteristic patterns of action 'epistemic games':

> In part, the term games is suggested by the conspicuous involvement of goals, moves, and rules; in part by the recognition that these patterns of inquiry are not static templates but action systems; in part by the fact that often epistemic games are played competitively, as in the adversarial system of justice or scientific debates; and in part in allusion to Wittgenstein's notion of language games. (Perkins, 1997, pp. 51–52)

Morrison and Collins (1996) argued that the capability to recognise and practice a culture's epistemic games, with their associated epistemic forms, is one of the essential skills for becoming a member of a community of practice. They called this capability 'epistemic fluency'.

In the empirical studies reported in this book, we saw many such tacit and explicit epistemic games and a variety of professional epistemic forms. For example, we observed pharmacists conducting medication reviews, school counsellors carrying out behavioural assessments and preservice teachers developing lesson plans. In nursing, the phrase 'thinking like a nurse' turned out to involve some component epistemic games. While the goal expressed by this phrase ('thinking like an X') has some explicable components and it has a model behind it, many important aspects of what is desired remain uncertain. Perkins and others give us some language and constructs which we can use to become clearer about what is involved in the epistemic games of professional practice. 'Native speakers' often find themselves unable to speak explicitly about the rules and grammar of their language, but they do notice *mistakes* and can correct them. Experienced nurses and nurse educators – indeed all experienced professionals and professional educators – can do the same. Part of what our research offers is the chance to find and articulate the games, their rules and characteristic moves. However, our book goes far beyond the initial ideas about 'epistemic games' and 'epistemic fluency', which were originally rooted in school education. It delves deeply into the very nature of the capabilities that enable professionals to engage skilfully and knowledgeably in complex, dynamic, and often *inter*-professional, work. It describes how to develop these capabilities in university and other educational settings. By doing this, we also significantly extend and refine the notion of 'epistemic fluency'.

1.3 Seeing Through the Changing Surface of Professional Work and Knowledge

Changes in the way that work gets done – whether these are due to advances in technology, new divisions of labour, disaggregation of the value chain, new ways of relating to clients, new laws or regulatory frameworks or other causes – mean that many of the elements that constitute professional practice, and the tools and resources that enable it, are on the move. They are not just developing into new versions of themselves (e.g. when Office 2007 becomes Office 2010). They are also shifting across categories. For example, what was once part of a professional person's tacit knowledge (at time1) gets articulated as a written procedure (at t2), which later becomes encoded in a computer-based performance support tool (t3), which then means that the task can be delegated to a less skilled worker (t4), whose job is outsourced to a cheaper provider overseas (t5). These kinds of shifts are occurring in shorter and shorter cycles. Working out the implications for initial and continuing professional education is far from straightforward. An awareness of the diminishing half-life of specific professional tools and procedures has coloured initial professional education for a long time. It has placed those staff who design curricula in situations where they have to find workable compromises between teaching more abstract knowledge that stands a chance of being longer lived and knowledge tied to current work practices that helps with a sense of 'workplace readiness' but which can leave the new professional underprepared when the workplace changes.

A firm belief underpinning the approach we are taking in this book is that people who are in charge of professional education programs need ways of conceptualising professional work that can cut through the superficial appearance of things and get to the fundamentals. For example, if, when taking a common-sense approach, one habitually and unreflectively sees X as a physical tool and Y as an idea, then one is less well equipped to see how an idea becomes a tool and to distinguish between what has changed and what has stayed the same when this happens:

> If we truly understand cognitive systems, then we must be able to develop designs that enhance the performance of operational systems; if we are to enhance the performance of operational systems, we need conceptual looking glasses that enable us to see past the unending variety of technology and particular domains. (Woods & Sarter, 1993, p. 156)

We will feel this book has been useful if it helps staff involved in designing and managing professional education programs to find sharper ways of analysing professional work in context. We aim to provide some robust ideas that can be used in such analytic work and some language that may help program teams create a shared understanding of their joint enterprise.

Having deeper ways of viewing these flighty things is important in the design of worthwhile assessment tasks and professional learning experiences more generally.

1.4 Research on Education, Learning and Expertise: From Shifts in Fashion to an Integrated Account

The educational research knowledge base on which staff engaged in professional education might hope to draw is not seen by many people as being accessible, reliable or cumulative (Biesta, 2007; DETYA, 2000; Furlong, 2012). Sceptics might say its evolution over the last 50 years has been characterised by twists and turns of fashion, that educational theories are more a matter of taste than the outcome of rational argument, coherent analysis and reliable evidence. Over this period, research into education, expertise, teaching and learning has borne witness to a succession of 'turns':

- A cognitive turn, away from behaviourism
- A practice turn, away from cognitivism
- A linguistic turn
- A material or socio-material turn
- A neuro- or 'brain science' turn

The opening up of each of these new lines of work can be understood as a reasonable response to the neglect of some key areas of human experience and/or scientific insights. (It can also sometimes relate to the 'drying up' of an existing line of work, as it struggles to make headway with certain problems.)

But because the phenomena being studied are very complex, and researchers doing empirical work understandably tend not to bite off too much, each turn has tended to marginalise, rather than build on, what was dominant before.

Of course, there are some deep issues of theoretical and conceptual incompatibility at work here too, but it is also fair to say – with Lehtinen (2012) and Sfard (1998) – that we really *do* need accounts that bring together research on the brain, the mind, tools, discourse, semiotics, culture, praxis, context, the material and so on. We actually need *all* of these, to understand the complexities of what professionals do, how they do it, how they came to be able to do it, how others might be helped along similar paths and so on.

Our book takes this integrative challenge very seriously, which means you, the reader, will need to follow us in what are sometimes quick passages from familiar to unfamiliar territory and back again.

1.5 Our Empirical Research

Most of the chapters in this book include illustrations that are drawn from empirical work that we conducted in four areas of preparation for the professions: nursing, pharmacy, educational psychology (school counselling) and teacher education. Our focus has been unashamedly on less prestigious professions – what Nathan Glazer might have referred to as 'minor professions' (see Chap. 2). They are strongly