

# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	The Social Importance of Professional Education	2
1.2	Patterns in Professional Work: Introducing Epistemic Forms and Games	4
1.3	Seeing Through the Changing Surface of Professional Work and Knowledge	6
1.4	Research on Education, Learning and Expertise: From Shifts in Fashion to an Integrated Account	7
1.5	Our Empirical Research	7
1.6	Overview of the Book: Key Ideas	8
1.6.1	Part 1	9
1.6.2	Part 2	10
1.6.3	Part 3	12
1.6.4	Part 4	16
1.7	Reading the Book: Online Glossary and Abbreviations	17
	References	17
<b>2</b>	<b>Professional Work in Contemporary Contexts</b>	<b>19</b>
2.1	Professions and Professional Work	20
2.2	Demands of Contemporary Professional Work	26
2.2.1	Workplace Readiness	26
2.2.2	Managerialism, Performativity and Organised Professionalism	28
2.2.3	The Mounting Demands of Epistemic Work	30
2.3	Preparation for the Professions in Higher Education	32
2.4	Approaches within Professional Education	33
2.4.1	Case-Based Learning	35
2.4.2	Problem-Based Learning	36
2.4.3	Inquiry-Based Learning	37
2.4.4	Internships	37

2.4.5	Reflective Practice . . . . .	38
2.4.6	Communities of Practice . . . . .	39
2.4.7	Inter-Professional Education . . . . .	39
2.5	Concluding Points . . . . .	40
	References . . . . .	41
<b>3</b>	<b>Defining the Problem: Four Epistemic Projects in Professional Work and Education . . . . .</b>	<b>47</b>
3.1	Crafting Expert Practitioners . . . . .	47
3.2	The Reflective-Rational Project: From Rational Knowledge to Reflective Practice to Rational Reflection . . . . .	51
3.3	The Reflective-Embodied Project: Skill and the Ontological Turn in Practice . . . . .	54
3.4	Representational and Performative Accounts and the Need to Cross Boundaries . . . . .	56
3.5	The Knowledge-Building Project: From Practice as Knowledge Transfer to Knowing as Epistemic Practice . . . . .	57
3.6	The Relational Project: From Individualistic to Relational Expertise . . . . .	59
3.7	Combining the Four Epistemic Projects: Knowledge for Doing and Knowledge for Innovation and Learning . . . . .	61
	References . . . . .	66
<b>4</b>	<b>The Shapes Taken by Personal Professional Knowledge . . . . .</b>	<b>71</b>
4.1	What Knowledge Is . . . . .	74
4.2	Public, Personal and Organisational Knowledge . . . . .	76
4.2.1	Public Knowledge . . . . .	77
4.2.2	Personal Knowledge . . . . .	78
4.2.3	Organisational or Group Knowledge . . . . .	78
4.2.4	Sociopolitical Knowledge . . . . .	80
4.3	Doing and Understanding . . . . .	81
4.4	Knowledge and Knowing . . . . .	83
4.5	Tacit Knowledge and Explicit Learning . . . . .	86
4.6	Actionable Knowledge . . . . .	89
4.6.1	An Example: Knowledge in Teaching . . . . .	93
4.6.2	Drawing Some Implications for Professional Education . . . . .	96
	References . . . . .	98
<b>5</b>	<b>Professional Knowledge and Knowing in Shared Epistemic Spaces: The Person-Plus Perspective . . . . .</b>	<b>103</b>
5.1	Relational Expertise and Inter-professional Work . . . . .	106
5.2	(Re)presenting Knowledge and Shared Epistemic Labour . . . . .	108
5.3	Continuity of Practice and Innovation: Knowing with and Through Objects . . . . .	110
5.4	Linking Epistemic Practice with Knowledge Culture . . . . .	113

5.5	Knowledge Space and Epistemic Assemblage . . . . .	117
5.6	Creating Assemblages for Local Knowledge Work . . . . .	118
5.7	Knowledge and Knowing in Shared Epistemic Spaces . . . . .	120
	References . . . . .	122
<b>6</b>	<b>Understanding the Mind . . . . .</b>	<b>127</b>
6.1	Understanding the Human Mind and Learning: Experience, Brain, Environment and Culture . . . . .	128
6.2	From Cognition as Structure to Cognition as Coordination and Enaction . . . . .	134
6.3	Learning and Conceptual Change: Formal Concepts and Experiential Knowledge . . . . .	137
6.3.1	Negative Rationalism: Students' Experiential Knowledge Seen as a Problem to Be Overcome . . . . .	138
6.3.2	Positive Empiricism: Students' Experiential Knowledge as a Productive Resource . . . . .	139
6.3.3	Conceptual Change: Coherent Structures and Knowledge-in-Pieces . . . . .	140
6.3.4	Summary: What Changes in Conceptual Change? . . . . .	143
6.4	Troublesome Knowledge and Threshold Concepts . . . . .	145
6.4.1	Issues with Threshold Concepts from a Grounded Perspective . . . . .	147
6.5	Grounding Conceptual Knowledge in Experience: Situated Concepts . . . . .	149
6.6	Conceptual Understanding and Actionable Knowledge . . . . .	151
6.7	Transfer . . . . .	153
6.7.1	The Model Perspective . . . . .	154
6.7.2	The Module Perspective . . . . .	155
6.7.3	The Modality Perspective . . . . .	156
6.8	Dynamic Expertise, Transfer and Innovation . . . . .	158
6.8.1	Dynamic Expertise as Coordination . . . . .	158
6.8.2	Dynamic Transfer and Innovation . . . . .	159
	References . . . . .	160
<b>7</b>	<b>Epistemic Thinking . . . . .</b>	<b>167</b>
7.1	Knowledge and Knowing as an Open System . . . . .	167
7.2	Personal Epistemology, Epistemic Thinking and Epistemic Resources . . . . .	169
7.3	Personal Epistemology: Classical Accounts . . . . .	171
7.3.1	Epistemological Development . . . . .	171
7.3.2	Epistemic Beliefs and Theories: Multiple Dimensions . . . . .	172
7.3.3	Commonalities and Extensions . . . . .	173
7.4	Personal Epistemology Research: Critique and New Directions . . . . .	174

7.5	The Division of Cognitive Labour: Epistemological Implications . . . . .	174
7.6	The Changing Scope of Epistemic Cognition . . . . .	176
7.7	The Epistemic Resources View . . . . .	181
7.8	Epistemic Affordances . . . . .	183
7.8.1	A Distributed View of Affordances . . . . .	184
7.8.2	Pragmatic Affordances and Epistemic Affordances . . . . .	185
7.9	Cognitive and Epistemic Flexibility . . . . .	186
	References . . . . .	191
<b>8</b>	<b>Objects, Things and Artefacts in Professional Learning and Doing . . . . .</b>	<b>195</b>
8.1	Assessment Tasks in Professional Education . . . . .	195
8.2	Knowing Through Objects: Objectual Practices in Learning and Work . . . . .	198
8.3	Motives, Objects and Things . . . . .	201
8.3.1	Predmet and Objekt . . . . .	202
8.3.2	Objects and Things . . . . .	203
8.3.3	Motive, Material Object and Thing . . . . .	204
8.3.4	Knowledge Work, Epistemic Objects and Epistemic Artefacts . . . . .	206
8.4	Finding Objects for Professional Education and Reifying Them in Material Artefacts . . . . .	207
8.5	A Case: Assembling Objects and Things in an Epistemic Artefact . . . . .	212
8.6	Perception, Skill and Artefact . . . . .	215
8.7	Understanding Tasks and Artefacts . . . . .	219
8.8	Knowledge Work and Conceptual Artefacts from the Perspective of Professional Practice . . . . .	222
8.8.1	Materiality, Embodiment and Context . . . . .	224
8.8.2	Hidden Knowledge Work . . . . .	225
8.8.3	Materiality of Inscription . . . . .	226
	References . . . . .	228
<b>9</b>	<b>Epistemic Tools and Artefacts in Epistemic Practices and Systems . . . . .</b>	<b>233</b>
9.1	Epistemic Practice . . . . .	234
9.2	Epistemic Tools . . . . .	237
9.2.1	Tools and Symbolic Signs . . . . .	238
9.2.2	Epistemic Tools as Bridges Between Physical and Mental Worlds . . . . .	241
9.2.3	How Epistemic Qualities of Tools Arise in Practice . . . . .	243
9.3	Action, Meaning and (Epistemic) Practice . . . . .	244

9.4	Understanding Epistemic Qualities of Artefacts: Results from Artefact Analysis . . . . .	248
9.4.1	Epistemic Qualities of Artefacts Produced by Students . . . . .	250
9.4.2	A Case: Constructing the Nursing Guidelines . . . . .	252
9.5	Epistemic Openness: Knowledge Practice Systems . . . . .	255
9.5.1	Science and Research . . . . .	256
9.5.2	Education . . . . .	256
9.5.3	Organisation and Profession . . . . .	258
9.5.4	Commonalities Across Science, Education and Profession . . . . .	259
	References . . . . .	261
<b>10</b>	<b>Inscribing Professional Knowledge and Knowing . . . . .</b>	<b>265</b>
10.1	Inscriptions in Professional Work and Learning . . . . .	268
10.2	Functional Properties of Knowledge Inscriptions . . . . .	270
10.3	Skill for Seeing, Inscribing and Knowing the World . . . . .	273
10.4	A Case: Becoming a School Counsellor Through Inscribing Students' Behaviour . . . . .	275
10.4.1	Some Insights This Case Provides into Learning and Professional Inscriptions . . . . .	277
10.5	Skill for Seeing, Inscribing and Knowing Work . . . . .	282
10.5.1	Inscriptions for Work . . . . .	283
10.5.2	Inscriptions of Work . . . . .	284
10.5.3	Inscriptions within Work . . . . .	286
10.6	Analysis of Students' Inscriptions of Professional Knowledge and Work . . . . .	287
10.6.1	Inscriptions as Inquiry Carriers . . . . .	288
10.6.2	Inscriptions as Discourse Carriers . . . . .	290
10.7	Insights into the Functional (Pedagogical) Properties of Learning Inscriptions . . . . .	291
10.7.1	Learning Habits Through Inscriptional Work . . . . .	292
10.7.2	Linking Professional Inscriptional Work and Innovation . . . . .	294
10.7.3	Inscriptions of Knowledge and Professional Actionable Knowledge . . . . .	296
10.8	From Inscribing to (Re)presenting: Personal, System and Enactive Views of Inscriptions . . . . .	297
	References . . . . .	299
<b>11</b>	<b>Inscriptions Shaping Mind, Meaning and Action . . . . .</b>	<b>303</b>
11.1	How Meanings Get Expressed and Inscribed in Knowledge Production . . . . .	307
11.2	How Meanings Get Expressed and Inscribed in Professional Learning . . . . .	309

11.3	Unpacking the Semiotic Nature of Professional Knowledge Work . . . . .	311
11.3.1	Comparing Students' Epistemic Artefacts to Those Produced in Science . . . . .	312
11.4	What Ways of Knowing and Slices of Knowledge Get Inscribed? . . . . .	315
11.4.1	Example of Clinical Performance Package: Blending Epistemic Spaces . . . . .	315
11.4.2	Limitations of the Traditional Semiotic Account with Respect to Innovation in Professional Work . . . . .	320
11.5	Conceptual Integration and Material Blending . . . . .	321
11.5.1	Blending Conceptual and Material Structures . . . . .	324
11.6	An Example: Blending, Projecting and Enacting Through Inscribing a Lesson . . . . .	328
11.7	Creating Actionable Epistemic Spaces Through Grounding and Blending . . . . .	334
	References . . . . .	338
<b>12</b>	<b>Epistemic Tools, Instruments and Infrastructure in Professional Knowledge Work and Learning . . . . .</b>	<b>341</b>
12.1	Epistemic Tools, Infrastructures and Practices . . . . .	342
12.1.1	Understanding and Encountering Infrastructure . . . . .	343
12.1.2	Tools . . . . .	344
12.2	Instrumental Genesis: Linking Tool and Game . . . . .	346
12.2.1	Tool as Artefact: Intrinsic Features . . . . .	347
12.2.2	Extrinsic Features of Tools: Action Schemes . . . . .	348
12.2.3	Linking Tool and Action Schemes . . . . .	349
12.3	Epistemic Tools and Infrastructures for Professional Work . . . . .	351
12.3.1	Elements of Epistemic Infrastructure in Professions . . . . .	353
12.3.2	Innovation, Tool-Making and Tool Use . . . . .	355
12.4	An Example: Epistemic Infrastructure for Child Behavioural Assessment . . . . .	359
12.4.1	Concluding Points from This Case . . . . .	362
	References . . . . .	363
<b>13</b>	<b>Taxonomies of Epistemic Tools and Infrastructures . . . . .</b>	<b>367</b>
13.1	A Taxonomy of Epistemic Tools . . . . .	369
13.1.1	Epistemic Frames . . . . .	369
13.1.2	Epistemic Devices . . . . .	370
13.1.3	Epistemic Instruments and Equipment . . . . .	374
13.2	A Taxonomy of Epistemic Infrastructure . . . . .	375
13.2.1	Codes . . . . .	376
13.2.2	Conceptual Infrastructure . . . . .	381
13.2.3	Information Infrastructure . . . . .	382
13.2.4	Learning Infrastructure . . . . .	383

13.2.5	Boundary Infrastructure . . . . .	386
13.2.6	Material Infrastructure . . . . .	387
13.2.7	Sociopolitical Infrastructure . . . . .	388
13.3	Learning as Inhabiting an Epistemic Infrastructure . . . . .	389
13.3.1	Socio-cognitive and Socio-material Aspects of Epistemic Infrastructure . . . . .	389
13.3.2	Learning Through Mastering Epistemic Tools . . . . .	391
	References . . . . .	392
<b>14</b>	<b>Professional Epistemic Games . . . . .</b>	<b>395</b>
14.1	Introducing the Idea of Epistemic Games . . . . .	395
14.2	Illustrating the Idea of Epistemic Games in Professional Practice: An Example from Pharmacy . . . . .	397
14.3	Creating a Taxonomy of Epistemic Games: Approach and Rationale . . . . .	400
14.4	The Taxonomy of Epistemic Games . . . . .	403
14.4.1	Propositional Games . . . . .	404
14.4.2	Situated Problem-Solving Games . . . . .	409
14.4.3	Meta-professional Discourse Games . . . . .	419
14.4.4	Trans-professional Discourse Games . . . . .	421
14.4.5	Translational Public Discourse Games . . . . .	425
14.4.6	Weaving Games . . . . .	430
	References . . . . .	433
<b>15</b>	<b>Weaving Ways of Knowing . . . . .</b>	<b>435</b>
15.1	Medication Management Review as ‘Signature Pedagogy’ . . . .	435
15.2	Social Infrastructure . . . . .	437
15.3	Epistemic Infrastructure . . . . .	438
15.4	Assembling and Weaving . . . . .	443
15.5	The Medication Review Form as a Modelling Site . . . . .	451
15.5.1	Structure as a Conjunction of Diverse Epistemic Spaces . . . . .	451
15.5.2	Structure as a Framework for Production of Meanings and Action . . . . .	452
15.6	Linking Conceptual and Material with Social: Weaving Epistemic Games with Social (Bureaucratic) Infrastructure . . . .	454
15.7	Concluding Points . . . . .	456
	References . . . . .	459
<b>16</b>	<b>Rethinking the Material, the Embodied and the Social for Professional Education . . . . .</b>	<b>461</b>
16.1	Epistemic Games in Course Designs: Some Empirical Illustrations . . . . .	462
16.1.1	Epistemic Games and the Material and Social Worlds . . . . .	462
16.1.2	Designing Environments for Learning Epistemic Games . . . . .	464

16.2	Actionable Knowing as Embodied Social Practices in the Material World . . . . .	467
16.2.1	Socio-material Organising of Action . . . . .	468
16.2.2	Socio-material Organising of Cognition . . . . .	468
16.3	How Matter Matters in Professional Knowledge Work . . . . .	469
16.3.1	Knowledge Embodied in Physical Tools . . . . .	470
16.3.2	Knowledge Embodied in Inscriptional Tools . . . . .	472
16.3.3	Knowledge Embodied in Bodily Skills and Senses . . . . .	474
16.3.4	Knowledge Embodied in the World . . . . .	477
16.4	Learning and Thinking with Social Others . . . . .	479
16.4.1	The Socially Extended Mind . . . . .	479
16.4.2	Dialectical, Dialogical and Trialogical Perspectives . . . . .	480
16.4.3	Implications for Professional Work and Learning . . . . .	482
16.5	Four Kinds of Mediation: Tools, Social Others, Artefacts and Self . . . . .	484
16.6	Concluding Points: Learning in 'Thin' and 'Thick' Social and Material Environments . . . . .	488
	References . . . . .	491
<b>17</b>	<b>Conceptual Resourcefulness and Actionable Concepts:</b> <b>Concepts Revisited . . . . .</b>	<b>495</b>
17.1	Concepts Revisited . . . . .	495
17.2	Some Examples: 'Constructivism' and Other Concepts in Abstract Notions, Contexts and Actions . . . . .	496
17.3	Concepts in Mind and in Discourse . . . . .	500
17.4	Abstract, Contextual and Situated Concepts . . . . .	502
17.4.1	Abstract Concepts . . . . .	502
17.4.2	Contextual Concepts . . . . .	503
17.4.3	Situated Concepts . . . . .	505
17.5	Actionable Concepts . . . . .	509
17.6	A Case: Constructing Actionable Concepts . . . . .	511
17.6.1	Creating Actionable Pedagogical Concepts for Teaching by Combining Concepts . . . . .	512
17.6.2	How Actionable Concepts Are Grounded in Experiences and Actions . . . . .	514
17.6.3	How Are Actionable Concepts Linked to Language? . . . . .	514
17.7	Actionable Concepts as Concepts That Mean and Matter . . . . .	517
	References . . . . .	520
<b>18</b>	<b>Epistemic Resourcefulness for Actionable Knowing . . . . .</b>	<b>523</b>
18.1	Understanding Epistemic Resources . . . . .	523
18.2	Epistemic Resources in Discourse and the Mind . . . . .	526
18.2.1	Epistemic Knowledge as Discourse . . . . .	526
18.2.2	Epistemic Knowledge as Cognition . . . . .	528



18.2.3	Epistemic Knowledge: Bridging Discourse and Mind . . . . .	531
18.3	Actionable Epistemic Resources . . . . .	534
18.4	Linking Epistemic and Conceptual: Dynamic View of Conceptual Learning . . . . .	540
18.5	Framing, Stability and Coherence . . . . .	541
18.5.1	Stability vs. Coordination . . . . .	541
18.5.2	'Following Instructions' vs. 'Sense-making' . . . . .	542
18.6	Learning to Coordinate Diverse Ways of Knowing . . . . .	544
18.6.1	Three Kinds of Stability in Situated Knowing . . . . .	544
18.6.2	Seeing Opportune Points for Productive Pedagogical Framing and Reframing . . . . .	545
18.6.3	Situating Instructions Between the Conceptual Regularities and Material Arrangements . . . . .	546
18.6.4	Resourcefulness as Active Coordination of Concepts, Actions and Situated Experiences . . . . .	548
	References . . . . .	549
<b>19</b>	<b>Teaching and Learning for Epistemic Fluency . . . . .</b>	<b>553</b>
19.1	Introduction . . . . .	553
19.1.1	Four Educational Approaches to Teaching and Learning for Epistemic Fluency . . . . .	554
19.1.2	Professional Problems: Structure and Stability . . . . .	555
19.2	Approach One: Learning by Integrating Knowledge . . . . .	557
19.2.1	Purpose . . . . .	557
19.2.2	Structure and Principles . . . . .	558
19.2.3	Model Cases . . . . .	560
19.2.4	Rationale and Evaluation . . . . .	562
19.3	Approach Two: Learning by Playing Epistemic Games . . . . .	563
19.3.1	Purpose . . . . .	563
19.3.2	Structure and Principles . . . . .	566
19.3.3	Model Cases . . . . .	569
19.3.4	Rationale and Evaluation . . . . .	571
19.4	Approach Three: Learning by Designing Knowledge . . . . .	573
19.4.1	Purpose . . . . .	573
19.4.2	Structure and Principles . . . . .	575
19.4.3	Model Cases . . . . .	576
19.4.4	Rationale and Evaluation . . . . .	578
19.5	Approach Four: Learning by Designing Inquiry . . . . .	580
19.5.1	Purpose . . . . .	580
19.5.2	Structure and Principles . . . . .	582
19.5.3	Model Cases . . . . .	585
19.5.4	Rationale and Evaluation . . . . .	586
19.6	Concluding Comments . . . . .	589
	References . . . . .	590

<b>20</b>	<b>Creating Epistemic Environments: Learning, Teaching and Design</b> . . . . .	595
20.1	From Rational Thought to Embodied Skill to Grounded Actionable Knowledge . . . . .	595
20.2	What Is Knowledge, Revisited: Dynamic Knowledge, Grounded Concepts and Embodied Epistemic Environments . . . . .	599
20.2.1	How Knowledge Emerges . . . . .	600
20.2.2	Grounded Concepts: Situated Knowing and Non-situated Knowledge . . . . .	601
20.2.3	How Environments Support Knowing: Embodied Epistemic Environments and Professional Knowledge Work . . . . .	601
20.3	Learning by Creating an Epistemic Environment and Constructing a Conscientious Self . . . . .	603
20.4	Designing for Epistemic Fluency . . . . .	607
	References . . . . .	612
	<b>Related Publications and Presentations</b> . . . . .	615
	<b>Index</b> . . . . .	617

Epistemic Fluency and Professional Education  
Innovation, Knowledgeable Action and Actionable  
Knowledge

Markauskaite, L.; Goodyear, P.

2017, XXII, 636 p. 71 illus., 4 illus. in color., Hardcover

ISBN: 978-94-007-4368-7