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Developing the concept of metalearning

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Developing the concept of metalearning

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The idea of metalearning was originally used by John Biggs (1985) to describe the state of 'being aware of and taking control of one's own learning'. This paper explores the concept through collaborative enquiry involving researchers and higher education teachers. An evolved conception is proposed in which metalearning is a sub-concept within metacognition and self-regulation. It is perceived as a sort of creativity that is best displayed by proactive self-regulators for whom deliberate self-regulated learning is a way of life. This conception is consistent with the 'awareness' and 'taking control of' elements of Biggs' original definition. The utility of the concept is in helping people to connect thinking about their own learning (metacognition and their wider imagination) to actions and behaviours that engage them in learning strategically.

Introduction

According to Flavell (1979) metacognition is higher order thinking to actively control the cognitive processes engaged in thinking and acquiring knowing. It is central to learning. This paper examines that part of metacognition that is concerned with how we control or regulate ourselves in order to learn and learn better. I will use the term metalearning, first used by John Biggs (1985) to describe the state of 'being aware of and taking control of one's own learning'. Implicit within this conception of metalearning are the ideas that people:

- Need to have knowledge and understanding of how they learn.
- Are motivated to regulate themselves in this way.
- Have the capacity to regulate their actions and behaviours in this way.

The conception implies that metalearning is a complex mixture of:

- Products—knowledge about learning particularly one's own learning and how we learn in different contexts.
- Attitudes—founded on beliefs that regulating self in this way is the right thing to do.
- Capacities and skills—to think and act on thinking in ways that make use of one's knowledge about self.

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This special issue on metalearning brings together a number of research studies that use the Reflections on Learning Inventory (RoLI) developed by Professor Jan Meyer (Meyer, 2000) to engage students in evaluating and judging their own approaches to learning in the context of higher education. The process of engagement is designed to enhance their awareness of their own learning and identify aspects that might be improved. This self-knowledge, perhaps combined with the support, encouragement and guidance of teachers, can then be used by students to engage in activities that are more likely to be effective in promoting learning.

This contribution tries to develop a deeper understanding of what metalearning might be and whether the concept might be useful to teachers. The ideas were developed through a collaborative process of enquiry and an account of this process can be found in an extended version of the paper that was developed for the symposium on metalearning at the European Association for Research on Learning and Instruction, 10th Biennial Conference, Padova, Italy, August 2003 (Jackson, 2003a).

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Perceptions of metalearning

We all infuse words with our own meanings. Figure 1 includes a list of concepts and propositions that were either volunteered through discussion, or are explicit or implicit in the papers contributing to this special issue.

The list reveals a number of things about the way metalearning is perceived. For example:

- The strong connection of metalearning to metacognition, self-awareness, self-identity as a learner and reflection as a process for achieving this self-awareness as a learner.
- Metalearning as a product (knowledge), a thought process (a way of thinking to create routes to new learning), an attitude or habit (a way of engaging in learning and life more generally perhaps), a behavioural process (active regulation of behaviours in ways that will enhance learning).
- A way of growing knowledge about learning by imagining and thinking about the future, the present and the past.

But the list also reveals an important problem that lies at the heart of my enquiry. In the words of one of my collaborators: 'Your list of terms illustrates a major problem in the psychological literature, which is a plethora of constructs that conceptually overlap' (Professor Barry Zimmerman, personal communication, 2003). There is clearly a tension between the need (from a psychological perspective) to define the idea as a researchable construct in order to demonstrate scientific validity, while valuing a range of personal views and insights that are unlikely to be accepted by many other people (personal utility). We have to explore both of these dimensions. As an initial step in my sense making I tried to organize the ideas contained in Figure 1 in terms of increasing complexity and implication (Figure 2).

What is learning?

The question 'what is metalearning?' begs the question 'what is learning?' For the purpose of this discussion I am using the conception provided by Davenport and Prusak

- A collection of learning methods that people utilize to help them learn
- Higher levels of learning
- Learning about learning
- Personal knowledge of learning
- Being aware of and taking control of one's own learning
- Changing perceptions of learning
- Knowledge about how other people learn in order to help me learn (selfish or selfless knowledge depending on purpose)
- Metacognition
- Metacognitive skills
- Applied metacognition
- Metacognition in action
- Metalearning embraces more than cognition, it embraces the affective, cognitive, connative and also embodiment … mind, body, emotions/feelings
- Consciousness/awareness of own learning practices and study strategies
- Awareness of own approaches to learning
- Awareness of what works or doesn't work
- The advisory function to self about how to learn in a particular situation
- Learning through reflection, reflective skills, different forms of reflection
- Taking the learning context into account
- Recognizing own motivations for learning
- Knowledge of self as a learner in a context
- A sense of identity in the learning process
- A sense of engagement with learning processes
- Regulating own behaviours in order to learn better/more deeply
- Helping people to be more effective learners
- A route to further metacognition
- The ability to stand back and see the bigger picture for learning
- The ability to adapt and change approaches to learning as conditions change and new knowledge emerges
- Capacity to think about processes for learning
- Imagining possible ways of learning
- Imagining the future
- Ability to connect and use different sorts of knowledge creatively

Figure 1. Some perceptions of metalearning (compiled from the perceptions of participants in email discussions, insights gained from symposium papers and reflections on my own learning)

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(2000) of a fluid mixture of experience, values, contextualised information that provides a framework for evaluating and incorporating new experiences and information and for imagining new things. I added the reference to imagination (causing to come into existence) as it seems particularly relevant to the idea of metalearning as a means of viewing and anticipating the future—a necessity if one is to take control of one's own learning and create plans and strategies in order to achieve desired goals. This conception of learning means that although we may encounter the same experience or may be confronted by the same new knowledge, the sense we make of it, the value we place on it and our capacity to make use of it, will be unique to each of us. Using this reasoning, metalearning—high-level thinking about learning and how we acquire new learning, must also be unique to each of us.

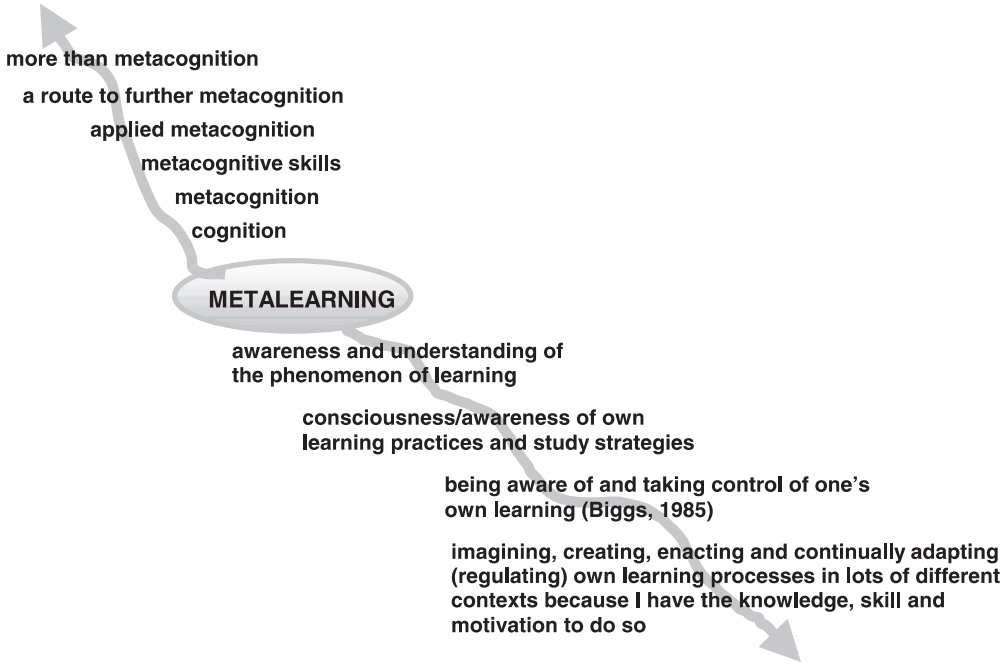

Figure 2. Some of the ways in which the ideas associated with metalearning might be connected

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Metalearning as metacognition

Flavell (1979) defines metacognition in terms of 'higher order thinking to actively control the cognitive processes engaged in thinking and acquiring knowing' (learning). It involves thinking about thinking and it must therefore include thinking about learning.

> Is the whole concept of *meta* not that of 'thinking about'? So metacognition is thinking, to good purpose, about how the processes of cognition work, and in particular, about how they can work for us. Metalearning is thinking about how we ourselves learn, and can learn and develop more effectively. (Professor John Cowan, personal communication, 2003.)

Activities such as planning how to approach a given task, monitoring understanding and learning needs, and evaluating progress towards completion of the task or modifying the task as additional factors emerge, are metacognitive in nature (Livingstone, 1997). Wenden (1998, p. 34) described 'metacognitive knowledge' as the 'facts learners acquire about their own cognitive processes as they are applied and used to gain knowledge and acquire skills in varied situations: People consciously or unconsciously use this knowledge to create metacognitive strategies, strategies about learning rather than learning strategies themselves (Cook, 1993, p. 114). These strategies include, for example:

- Planning—deciding what to do and how to do it (pre-planning) and modifying plans while you are doing it (planning in action).
- Directed attention—deciding in advance to work on the general aspects of a task.

- Selective attention—deciding in advance to concentrate on certain things.
- Self-monitoring—checking one's performance when engaging in a task.
- Self-evaluation—appraising one's own performance in relation to self or external criteria or standards.
- Self-reinforcement—rewarding oneself for success.

According to Flavell (1979), metacognition consists of both metacognitive knowledge and metacognitive experiences of regulation. Metacognitive knowledge refers to acquired knowledge about cognitive processes; knowledge that can then be used to control cognitive processes. Knowledge is considered to be metacognitive (rather than cognitive) if it is actively used in a strategic manner to ensure a goal is met. Flavell distinguishes between knowledge of (1) person variables, (2) task variables and (3) strategy variables:

1. *Knowledge of person variables*—refers to knowledge about how human beings learn and process information, as well as individual knowledge of one's own learning processes.
2. *Knowledge of task variables*—includes knowledge about the nature of particular tasks or more generalized knowledge about types of task as well as the processing demands that will be placed upon the individual.
3. *Knowledge about strategy*—variables include knowledge about both cognitive and metacognitive strategies, as well as conditional (contextual knowledge) about when and where it is appropriate to use such strategies.

The basic metacognitive strategies are:

- Connecting new information to existing (personal) knowledge.
- Selecting thinking strategies intentionally.
- Planning, monitoring and evaluating thinking processes. (Dirkes, 1985, quoted by Blakey & Spence, 1990)

The idea of metalearning sits fairly and squarely within metacognition: that part of metacognition that is devoted to the act of learning. But the following comments provided by Professor Barry Zimmerman warn us of the dangers of conceptual proliferation.

> One of my main concerns is that the behavioural side of human functioning often gets lost in models with multiple levels of cognition. Metacognition despite its attractiveness as an idea has been difficult to measure. For example, I am not aware of a firm body of evidence showing that metacognitive measures can be separated reliably from cognitive measures. Thus, theories are constructed wherein one level of mental functioning is linked to other levels with no clear way to determine if the multiple levels exist physically in a way that teachers can exploit. (B. Zimmerman, personal communication, 2003)

Accepting the problematic nature of metalearning as a scientifically testable construct, there is still merit in examining the idea from the perspective of its value to teachers. To do this we have to connect the process of thinking about learning to the behaviours and actions that engage with and result in learning.

Self-regulation and metalearning

John Biggs' (1985) definition of metalearning included the idea of 'taking control of one's own learning'. This requires learners to consciously regulate their thinking and behaviours in ways

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that will achieve desirable outcomes and results for a particular context. It is therefore important to consider the idea of self-regulation. Schunk and Zimmerman (1994, 1997, 1998), Zimmerman (2000) and Zimmerman and Schunk (2004) provide us with a well-developed scientific construction to explain the links between thinking, actions and the environment (problem situations and learning contexts) within which thinking and action occurs.

Some social cognitive researchers describe self-regulated learning in terms of self-determined processes and associated self-beliefs that initiate, change and sustain learning in specific contexts. These processes and beliefs are linked to three fundamental questions about students' self-regulated approach to learning.

> **How** questions refer to students' use of metacognitive processes such as planning, organising, self-instruction, self-monitoring and self-evaluating. **Where** questions pertain to behavioural processes such as selecting, structuring and creating learning environments that optimize growth. **Why** questions refer to processes and beliefs that motivate self-regulated students to learn, such as beliefs about their capabilities to learn, intrinsic interest in the task and satisfaction with their own efforts … High levels of motivation are necessary to self-regulate when short term goals must be subordinated to long term goals and ultimate gratification must be delayed. In summary, self-regulation refers to metacognitive, behavioural and motivational processes and beliefs used to attain personal learning goals in specific contexts. (Zimmerman, 2000, p. 221)

The processes and beliefs that underlie self-regulation are constantly adjusted in response to changes in three sources of control: personal, behavioural and environmental. Each of these sources is also changing during learning and each source must be self-monitored and adjusted using feedback mechanisms constructed by the learner (see Zimmerman, 2000, p. 222). Highly self-regulated people are strategically flexible, environmentally resourceful and perceptive of personal agency. A self-regulated system for learning can be represented as a continuous process (Figure 3) involving *forethought*, *performance* and *self-reflection* operating within a context-specific environment that is structured by the learner to provide resources for learning.

Forethought involves thinking about the tasks, problems and contexts for learning. The model identifies two subordinate categories—task analysis and self-motivational beliefs. People do not engage in tasks or set learning goals and plan and work strategically if they are not motivated by strong personal agency (Zimmerman, 2000, p. 226). In particular, self-efficacy—personal beliefs about having the means to learn or perform effectively—and outcome expectations—personal beliefs that the outcomes will be worthwhile—are key features of personal agency.

Performance is the doing part of the process. It includes the capacities and attitudes to instruct self and seek help to learn, the self-management of tasks, the creation of processes for learning and the structuring of the environment in order to learn. These processes enable learners to optimize their effort. A second set of subordinate processes used during the performance phase is self-observation. It involves the cognitive monitoring of performance and the conditions that surround and influence it. This process (also called reflection in action) enables people to adjust their actions and performance in response to their observations on the impact they are making.

The *self-reflection* phase involves both self-judgements and self-reactions to those judgements. The two key self-judgement processes are self-evaluation and attributing causal significance to the results. Self-evaluation involves comparing one's own performance with a standard, criteria or goal. It might also involve comparing one's own perceptions of performance with the feedback given from students or peers. Attributional judgements are pivotal to self-reflection

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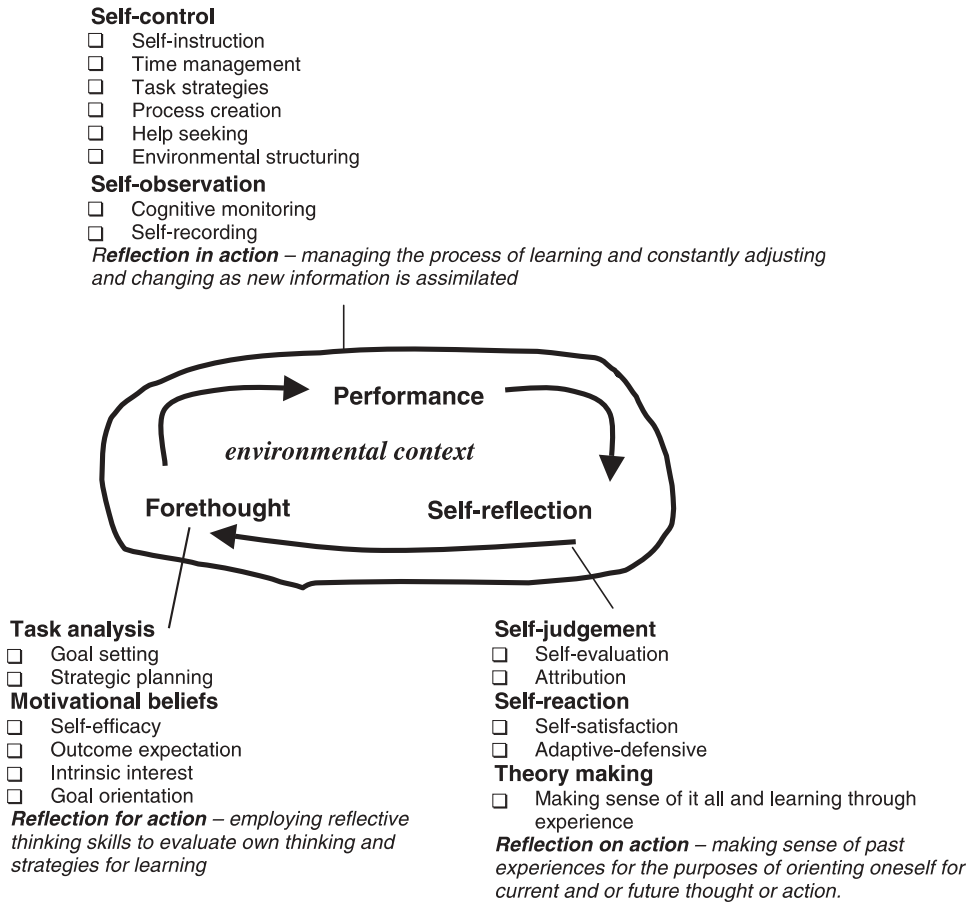

Figure 3. Model of self-regulated learning Zimmerman (2000, p. 226) coupled to notions of reflection Ertmer and Newby (1996)

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because attributions to a fixed ability prompt learners to react negatively and discourage efforts to improve. By contrast, attributions of poor performance to inappropriate learning strategies sustain perceptions of efficacy.

Self-reactions include self-satisfaction and adaptive inferences. Self-satisfaction involves perceptions and associated effects regarding one's own performance. Courses of action that result in satisfaction and positive effect are pursued; whereas actions that produce dissatisfaction and have negative effects are avoided. Self-regulated learners condition their satisfaction on reaching their goals, and these self-incentives motivate and direct their actions.

We might also anticipate that through this deliberative process people generate their own theories of why things worked and happened in the way they did, thus feeding into new perceptions of the way the world works for them and new beliefs that influence future forethought and actions.

Zimmerman and Schunk (2004) draw the distinction between proactive and reactive self-regulators in terms of self-regulatory processes and beliefs. Reactive learners avoid forethought

and attempt to regulate functioning during and after performance whereas proactive learners engage in forethought in order to improve the quality of subsequent phase functioning. We might also distinguish between learners with high levels of self-awareness and intentionality, and those in which these states are less well developed. The development of capacity for self-regulated learning might be seen as a process in which the educator can play an active and facilitative role. This is the basis on which the RoLI interventions described in this volume are founded.

Evolved conception of metalearning

From the foregoing discussion we might generate the proposition that metacognition and self-regulation are inextricably linked. Figure 4 provides a concept map in which metalearning is a subconcept within metacognition and self-regulation. It is a sort of creativity that is best displayed by proactive self-regulators for whom deliberate self-regulated learning is a way of life. This conception is consistent with the '*awareness*' and '*taking control of*' elements of Biggs' original definition.

But there is a need to explain the relationship between the self-awareness that derives from one's own metalearning and the acts of self-regulation that this inspires in the continually evolving contexts in which we engage in learning. Barab *et al.* offer a perspective on cognition, knowledge and learning which might help us think about this relationship.

> In our thinking, cognition and knowledge are interchangeable terms that characterize the dynamic relations among the changing world and changing individuals. Knowledge is *not* some ontological substance that lies in people' heads (or in the pages of textbooks) waiting to be actualised through cognitive processes. Instead, and consistent with our relational or situated perspective, it is a term that delineates a person's potential to act in a certain fashion. Such an active and contextualised redefinition of knowledge eliminates the distinction between knowledge conceived as a thing and knowing about or cognition described as a process. (Barab *et al.*, 2000, p. 3)

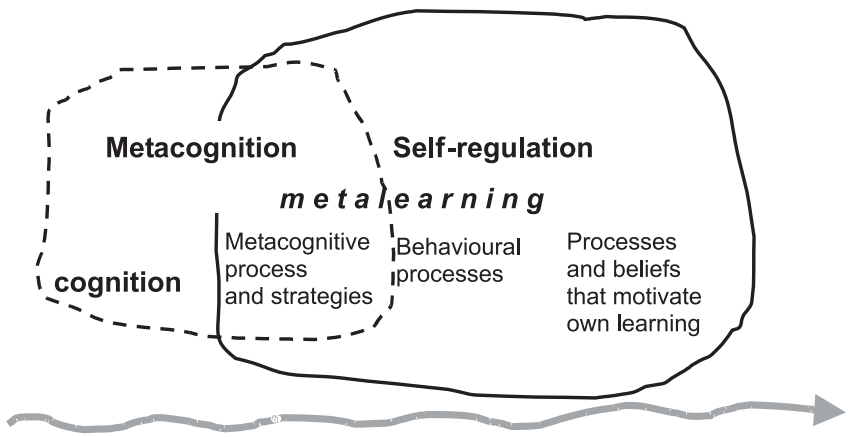

Figure 4. Concept map for metalearning that integrates the ideas of metacognition and self-regulated learning and connects metalearning to the flow of activities and contexts through which it is engaged and used

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Barab and Duffy (2000) describe individuals as being knowledgeably skilful and use the phrase '*knowing about*' to describe what is frequently defined as 'knowledge'.

a) Knowing about refers to an activity—not a thing.
b) Knowing about is always contextualised—not abstract.
c) Knowing about is reciprocally constructed within the individual environment-interaction—not objectively defined or subjectively created.
d) Knowing about is a functional stance on the interaction—not a fundamental truth. Conceived in this fashion, cognition and 'knowing about' are *not* entities owned by individuals or environments, but instead are distributed acts that exist in the flow of activity and involve persons acting in a functional (progressive) manner with other persons and available social, physical and intellectual resources. Although it is pervasive practice to attribute knowledge as the pre-requisite or the outcome of learning, in our conception knowing about, cognition and learning are simply different ways of describing the dynamics of evolving participation. (Barab & Duffy, 2000, pp. 25–26)

Viewed through this conceptualization of knowledge and cognition the capacity or potential to 'be aware of and take control of one's own learning' (Biggs, 1985) cannot be seen in isolation from the environment and the flow of activities in which this is taking place.

Where does the Reflections on Learning Inventory (RoLI) fit in?

This abstract discussion may only be of limited interest to most higher education teachers. They are more interested in practical ways of improving students' capacity to learn in their particular disciplinary and problem working contexts. They will be interested in helping students to understand their own learning behaviours better so that individual students understand why they adopt habits that are more or less effective in achieving learning goals in the contexts of their programmes of study.

> How one labels the overall model (self-regulation, learning to learn, metalearning, metacognition, etc.) is in some ways less important than the distinctiveness of sub-processes, such as goal setting, strategy use, self-evaluation, etc. If these processes are too abstract, teachers will not be able to use them as part of their tools to help students to learn. Teachers need to diagnose specific dysfunctions, such as setting goals that are unattainable or trying to learn without using an effective strategy, and remediate them in a focused way. (B. Zimmerman, personal communication, 2003.)

The researchers who have contributed to this volume on metalearning sought to do exactly this through the use of the Reflections on Learning Inventory (RoLI). The inventory is designed to engage students in a critical self-analysis of the way they learn as individuals. After processing the data, the results are fed back to students in the form of learning profiles, together with information that helps them interpret their profiles in terms of the potential consequences of the profile for their learning. This reflective process is aided by curriculum or counselling strategies that enable teachers to explore with students their understanding of their profile for their own learning. The researchers show that student engagement in this process can be encouraged by embedding the analysis and reflection in an assessment strategy that is consistent with the developmental intentions of the process. As the other contributions in this issue show

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(Lindblom-Ylänne, 2003; Lucas & Meyer, 2003; Meyer & Shanahan, 2003; Norton & Owens, 2003; Wisker, 2003 and previously published studies), the results of these interventions provide evidence that patterns of learning behaviours and related beliefs about learning can be revealed through using RoLI. Through their collective accounts the researchers demonstrate that the process can yield enhanced levels of students' awareness of their conceptions of and approaches to learning, thus fulfilling that part of the metalearning conception that relates to metacognition.

These studies also show that teachers can use this new knowledge about how their students are learning to help individual students develop learning strategies that are more appropriate for particular study contexts. They show that students develop personal knowledge about the ways they are learning (their own metalearning) and that in some cases this new knowledge can change beliefs and values and result in new ways of learning that are more consistent with the demands and requirements of the learning environment. Thus the researchers provide some evidence that metalearning influences future behaviours, fulfilling the part of the Biggs' definition that relates to proactive self-regulation.

In applying the RoLI the researchers sought to operationalize the concept of metalearning, believing that the inventory enables students to evaluate their beliefs and attitudes to learning and their competencies in aspects of learning that are relevant to academic study. Through this reflective and evaluative process, and the ensuing dialogue between teacher and student, practical strategies could be identified and implemented for improving learner effectiveness.

If the RoLI is developing metalearning, and metalearning is integral to self-regulated learning, then it should be possible to relate the RoLI tool to the model of self-regulated learning. Figure 5 tries to show the possible relationships of the RoLI to this model.

By completing the RoLI students are developing their competence in metalearning so that they become more expert at learning. Ertmer and Newby (1996, p. 1) define expert learners as people who 'use the knowledge they have gained of themselves as learners, of task requirements and of specific strategy use to deliberately select, control and monitor strategies needed to achieve desired learning goals'. Ertmer and Newby go on to say that

> expert learners notice when they are not learning and thus are likely to seek a strategic remedy when faced with learning difficulties … Novice learners, on the other hand, rarely reflect on their own performance and seldom evaluate or adjust their cognitive functioning to meet changing task demands or to correct unsuccessful performances. (Ertmer & Newby, 1996, p. 6)

The parallels with Biggs' notion of metalearning and Zimmerman's model of self-regulation are striking!

Some conclusions

By asking lots of people the question 'what do you understand by metalearning?' we can establish that it is not a concept that is widely recognized in UK higher education. Nevertheless, people who do not use the concept can construct meaningful explanations about what it might mean. People who are familiar with the concept reason that it means how I think about how I learn, or learning about learning. Flavell's (1979) conceptualization of

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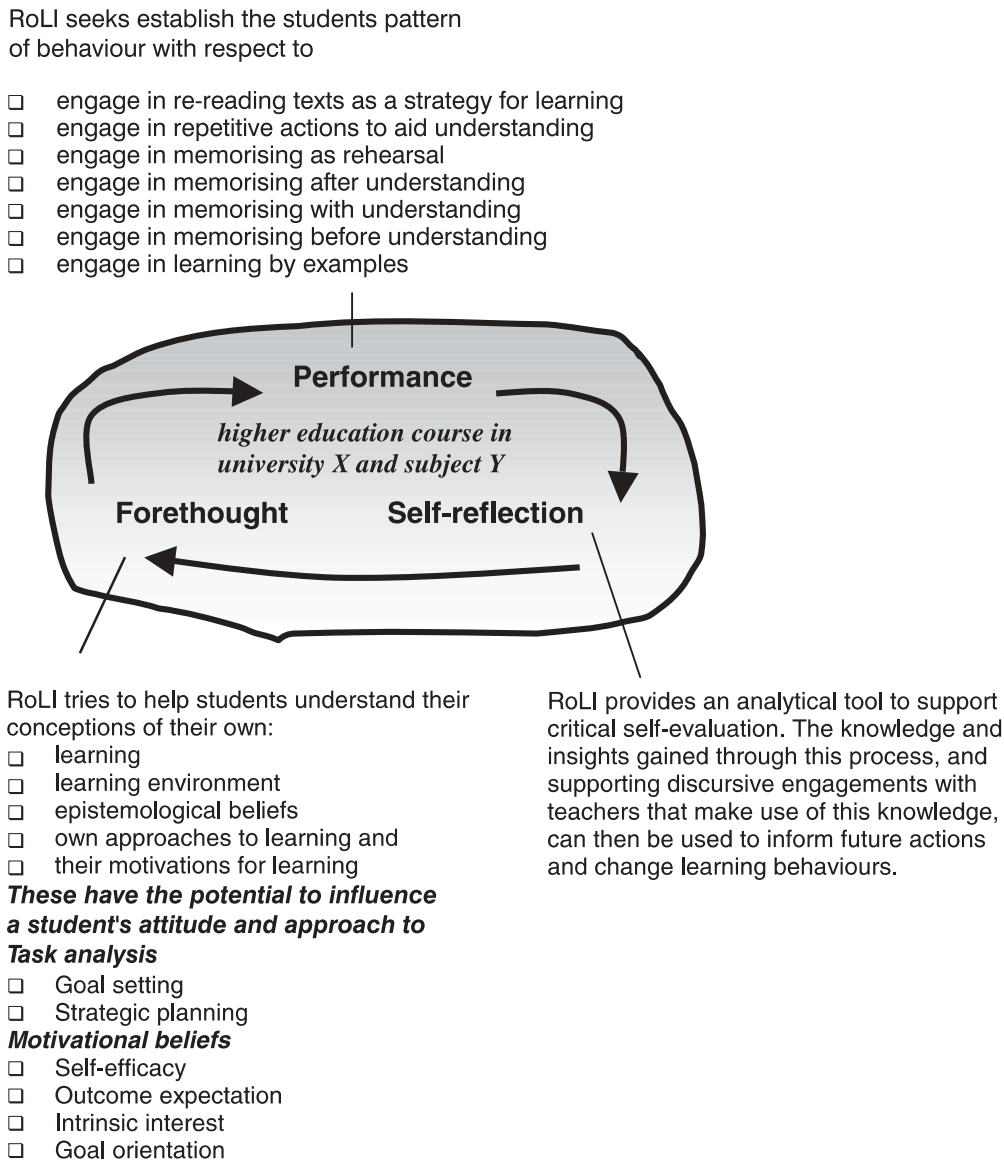

Figure 5. Relating the Reflections on Learning Inventory (RoLI) to the proactive model of self-regulated learning (Zimmerman, 2000, p. 226) in the contexts of a higher education course within a particular university and one or more disciplines

metacognition firmly locates metalearning within it. The critical question is whether metalearning adds anything useful to metacognition? I have concluded that it is useful to *me* because it helps *me* connect thinking about learning in a strategic sense to actions and behaviours that engage me in learning strategically. I also believe that *my* metalearning is important to *my* sense of identity. The readers will have to make up their own mind as to whether it is useful to them.

Acknowledgements

The process of collaborative enquiry used to develop the ideas and perspectives contained in this paper has helped me understand the idea of metalearning. The natural experiment involved many people and their contributions to my learning are more apparent in the formative version of this paper (Jackson, 2003a). I am very grateful to Professor Lin Norton for creating the opportunity to contribute to this learning project and to the symposium participants for sharing their knowledge and beliefs with me. I would particularly like to acknowledge the contributions made to my thinking by Professor John Cowan, Professor Barry Zimmerman, Professor Sari Lindblom-Ylänne, Dr Ursula Lucas, Professor John Stephenson, Dr Denise Chalmers, Dr John Peters, Professor John Biggs and Russel Law, all of whom generously shared their thoughts and ideas to help me learn.

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References

Barab, S. A. & Duffy, T. (2000) From practice fields to communities of practice, in: D. Jonassen & S. M. Lands (Eds) *Theoretical foundations of learning environments* (Mahwah, NJ: Lawrence Erlbaum Associates), 25–26.

Barab, S. A., Hay, K. E. & Yamagata-Lynch, L. C. (2001) Constructing networks of activity: an in situ research methodology, in: S. Barab & D. Kirshner (Eds) Rethinking methodology in the learning sciences, special issue of *The Journal of the Learning Sciences*, 10(1&2). Available online at: http://inkido.indiana.edu/situmethod (accessed 16 October 2004).

Biggs, J. B. (1985) The role of metalearning in study processes, *British Journal of Educational Psychology,* 55, 185–212.

Blakey, E. & Spence, S. (1990) *Developing metacognition. ERIC Digests.* Available online at: http://www.ericfacility.net/ericdigests/ed327218.html (accessed August 2003).

Cook, V. (1993) *Linguistics and second language acquisition* (London, Macmillan).

Davenport, T. H. & Prusak, L. P. (2000) *Working knowledge. How organizations manage what they know* (Cambridge, MA, Harvard Business School Press).

Dirkes, M. A. (1985) Metacognition: students in charge of their thinking, *Roper Review*, 8(2), 96–100 (EJ 329760).

Ertmer, P. A. & Newby, T. J. (1996) The expert learner: strategic, self-regulated and reflective, *Instructional Science,* 24, 1–24.

Flavell, J. H. (1979) Metacognition and cognitive monitoring. A new area of cognitive-developmental inquiry, *American Psychologist,* 34, 906–911.

Jackson, N. J. (2003a) Exploring the concept of metalearning, paper presented at *'Metalearning in higher education: taking account of the student perspective'*, *European Association for Research on Learning and Instruction, 10th Biennial Conference,* Padova, Italy, August. Available online at: http://www.ltsn.ac.uk/genericcentre (accessed August 2003).

Lindblom-Ylänne, S. (2003) Raising students' awareness of their approaches to study, paper presented at *'Metalearning in higher education: taking account of the student perspective'*, *European Association for Research on Learning and Instruction, 10th Biennial Conference,* Padova, Italy, August.

Livingstone, J. A. (1997) *Metacognition an overview.* Available online at: http://www.gse.buffalo.edu/fas/sheell/cep564/Metacog.htm (accessed August 2003).

Lucas, U. & Meyer, J. H. F. (2003) Understanding students' conceptions of learning and subject in 'introductory' courses: the case of introductory accounting, paper presented at *'Metalearning in higher education: taking account of the student perspective'*, *European Association for Research on Learning and Instruction, 10th Biennial Conference,* Padova, Italy, August.

Meyer, J. H. F. (2000) An overview of the development and application of the Reflections on Learning Inventory (RoLI), paper presented at the *RoLI Symposium,* Imperial College, London, September.

Meyer, J. & Shanahan, M. (2003) Developing metalearning capacity in students—actionable theory and practical lessons learned in first year economics, paper presented at *'Metalearning in higher education: taking account of the student perspective'*, *European Association for Research on Learning and Instruction, 10th Biennial Conference,* Padova, Italy, August.

Norton, L. & Owens, T. (2003) Encouraging metalearning in first year undergraduates, paper presented at *'Metalearning in higher education: taking account of the student perspective'*, *European Association for Research on Learning and Instruction, 10th Biennial Conference,* Padova, Italy, August.

Schunk, D. H. & Zimmerman, B. J. (1994) *Self-regulation of learning and performance: issues and educational applications* (Hillsdale, NJ, Lawrence Erlbaum Associates).

Schunk, D. H. & Zimmerman, B. J. (1997) Social origins of self-regulated competence, *Educational Psychologist,* 32, 195–208.

Schunk, D. H. & Zimmerman, B. J. (1998) *Self-regulated learning: from teaching to self-reflective practice* (New York, Guilford Press).

Wenden, A. (1998) *Learner strategies for learner autonomy* (London, Prentice Hall).

Wisker, G. (2003) Achieving a Doctorate: supporting international postgraduate students studying at a distance, paper presented at *'Metalearning in higher education: taking account of the student perspective'*, *European Association for Research on Learning and Instruction, 10th Biennial Conference*, Padora, Italy, August.

Zimmerman, B. (2000) Self-regulatory cycles of learning, in: G. A. Straka (Ed.) *Conceptions of self-directed learning, theoretical and conceptual considerations* (New York, Waxman), 221–234.

Zimmerman, B. & Schunk, D. H. (2004) Self-regulating intellectual processes and outcomes: a social cognitive perspective, in: D. Y. Dai & R. J. Steinberg (Eds) *Motivation, emotion and cognition: integrative perspectives on intellectual functioning and development* (Mahwah, NJ, Lawrence Erlbaum), 323–349.

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