



HAL
open science

Degrees of disciplinarity in equipping mature students in higher education for engagement and success in lifelong learning

Robert Toynton

► **To cite this version:**

Robert Toynton. Degrees of disciplinarity in equipping mature students in higher education for engagement and success in lifelong learning. *Active Learning in Higher Education*, 2005, 6 (2), pp.106-117. 10.1177/1469787405054236 . hal-00571924

HAL Id: hal-00571924

<https://hal.science/hal-00571924>

Submitted on 1 Mar 2011

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Degrees of disciplinarity in equipping mature students in higher education for engagement and success in lifelong learning

ROBERT TOYNTON *University of Sheffield, UK*

ABSTRACT For the mature student, the recognition and validation of prior knowledge, much of which may be tacit, is central to both confidence and further learning. From a theoretical stance the use of interdisciplinary study or applying interdisciplinary approaches within monodisciplinary study should benefit the learning of the mature student. Such approaches also allow the learner to develop skills central to continued lifelong learning. The introduction of interdisciplinarity within part of an undergraduate programme at the University of Sheffield has been monitored over the last four years. The insights provided suggest that mature students may find this approach initially discomforting but this is outweighed by the learning and empowerment it provides. Interdisciplinarity has been equally challenging for the tutors, but their acknowledgement of learning through the process has been a positive outcome.

KEYWORDS: *interdisciplinarity, lifelong learning, mature student, prior knowledge, tacit knowledge*

Introduction

Over several years the Institute for Lifelong Learning within the School of Education at the University of Sheffield has developed part-time programmes of study to degree level aimed at the mature student. This is

not unique. That the programme includes multidisciplinary and interdisciplinary study as a deliberate stratagem to enhance the accessibility and learning experience for mature students, and that this stratagem has been adjusted as a result of research into the student experience (Toynton, 2000, 2001), may be of more interest. This article reflects on the ideas which instigated this development and which have arisen from the ongoing analysis of the student experience.

The immediate post-school and mature entrants to higher education represent positions within a continuum of experience and education. Here the terms mature student and adult learner are used synonymously to define those whose prior knowledge includes a significant element derived from work or life experience in addition to, or instead of, any prior formalized study. Amongst the defining attributes of the adult learner are a package of experience and values, personal patterns of learning and a whole range of competing interests and responsibilities (Rogers, 1996). An adult learner choosing to enter or re-enter higher education adds to this list their personal expectations of the learning process.

Higher education forms a distinct stage within the education and within the lives of young students progressing directly from school. To a mature student, studying at higher education level is an element within life rather than a stage of life and therefore has a personal landscape within which it must find a place. The 'lifelong learner' has been defined as an active member of the learning society, in which 'everyone recognizes the need to continue in education and training throughout working life' (NCIHE, 1997). This perspective, however, defines lifelong learning as an additional chosen activity, rather than an integral quality of life within which there is continual learning. From the perspective of the adult educator, lifelong learners are not simply those who have chosen, or have been pressured by circumstances, to return to formal education. They must also be enabled and empowered to benefit from the educational opportunities encountered in all aspects of their lives. This requires the acquisition, expansion or validation of those skills needed to enable and empower each individual. There is a responsibility on the educator to allow acquisition, directly or experientially, of such lifelong learning skills (Breivik, 2000).

For higher education to enable mature students to acquire the knowledge and skills necessary not only for successful completion of a degree programme but also for lifelong learning, the learning must be able to be integrated within the experience, expectations and learning styles of the adult. It is within this context that the degree of disciplinarity of study becomes significant.

Recognizing monodisciplinarity

Many adults returning to study do so to follow one area, one discipline or even one element of a discipline of particular interest or perceived to be of particular benefit. Adults entering higher education are entering a structure of learning which as the norm assumes the validity and benefits of studying a 'discipline'. The informal prior learning of the adult through home and workplace is largely nondisciplinary or interdisciplinary in these terms, and therefore an element of alienation or feeling of 'other' is inevitable as disciplinary learning commences.

Disciplines 'comprise knowledge depots that incorporate certain methods and reflect the social, cultural and institutional requirements' (Grace, 2000: 58). In undergraduate study the canon of knowledge and methodology are made explicit, but the social, cultural and institutional requirements normally remain unspoken or unrecognized. In addition to content, disciplines have cultures built around the discursive practices and the nature of the pedagogy (Weiner, 1994). This is also unrecognized by most at undergraduate level. 'To be a part of a discipline means to ask certain questions, to use a particular set of terms, and to study a relatively narrow set of things' (Giroux et al., 1988: 146). All of these may be alien to the adult learner, not just as new vocabulary but in its very disciplinarity. To the teacher in higher education 'monodisciplinarity' is the assumption and the norm defined only through how teaching and learning may vary from it. As such monodisciplinarity must be identified and named as that which is assumed by many of those teaching but alien to many of those adults learning.

Degrees of disciplinarity and adult learning

Adults gain confidence in learning through the recognition and validation of their prior knowledge (Toynton, 1998). Some of this knowledge will be recognized prior to their return to formal education, though there may also be much that is tacit. Dochy, De Rijdt and Dyck (2002) provide a conceptual map of prior knowledge. Their division and classification of the components of explicit knowledge form a very useful framework in considering the prior knowledge of the traditional student in higher education. However, tacit knowledge, represented as a lesser and undivided component by Dochy et al. (2002), may be of greater significance than explicit knowledge to the mature student. In addition, even the structure and definition of the explicit knowledge may itself be 'tacit' until validated through formal study since much of the tacit and explicit prior knowledge of the mature student may have been acquired incidentally and therefore outside any disciplinary or domain framework.

Identification and incorporation of the prior knowledge of the mature student may therefore raise problems. In essence, although a significant amount of the knowledge held by an adult returning to education may be tacit, this, in addition to experiential learning through work or home, is not held within a disciplinary framework. Therefore restricting such learners to a monodisciplinary framework may result in the non-recognition of prior knowledge, loss of confidence and of any perception of relevance. It may also result in structurally invoked cognitive dissonance since, according to Festinger (in Harman-Jones and Mills, 1999), direct experience exerts pressure on the cognition to conform to the experience. Disciplinary frameworks do not conform to adult life experience, as can be illustrated by the need for adult educators to be able to respond to learner questions which may initially appear tangential to the topic being studied. Although cognitive dissonance can be effectively used as an educational tool (Harman-Jones and Mills, 1999), it must be viewed as a negative effect where invoked incidentally by curriculum structure rather than deliberately through challenging content and perspective.

For study at undergraduate level to involve the acquisition of the skills necessary to become lifelong learners, students must embark on the journey to first develop an awareness of the restrictiveness of the discipline-based environment within which their studies are located, and then move beyond this environment to acquire or recognize the generic cognitive and analytic skills. Such movement beyond monodisciplinarity takes the learner into the field of multidisciplinarity and interdisciplinarity. Multidisciplinarity may 'allow the learner to synthesize the insights from the component disciplines' (Bradbeer, 1999), but it may also restrict the learner to these. Interdisciplinarity in contrast extends to a recognition and synthesis of epistemologies and traditions across the whole interdisciplinary area. This is summarized in Table 1.

Criticality is a skill which may originate from life experience. Paraphrasing Smith (1990): elements of such higher-order thinking are a continuous and intrinsic part of everyday thought. It is therefore not the ability to think critically, but the awareness of criticality and its importance

Table 1 Degree of disciplinarity and lifelong learning skills in adult learners

<i>Degree of disciplinarity</i>	<i>Lifelong learning skill</i>
Monodisciplinarity	critical awareness
Multidisciplinarity	comparative critical awareness
Interdisciplinarity	integration and reconstruction of knowledge

within a discipline which can be learned within higher education. 'Critical awareness' as used in Table 1 refers to this explicit criticality, but also to 'values awareness', defined by Jones and Merritt (1999) as the appreciation of the insights afforded by the philosophy of the area within which the discipline is situated.

However important critical awareness within one discipline may be, more closely matched to the schemata of the adult learner is the comparative critical awareness across disciplines which, once recognized, can allow the learner to achieve the important perspective of 'helicopter vision'. This is defined by Candy, Crebert and O'Leary (1994) in terms of the ability to view the approaches, products and processes of a discipline from a detached and comparative viewpoint. Through comparative critical awareness a learner is able to re-examine and value their learning within one discipline from other perspectives.

Teaching critical thinking in isolation from specific disciplines means teaching informal logic (Wallace, 2000). For a learner to be truly empowered through critical thinking as a transferable skill, more than one context or one discipline needs to be encountered. Furthermore, in order for this skill to form a development of prior life-skills, the acquisition of this skill must be experiential rather than taught.

Real life is interdisciplinary or nondisciplinary. The latter removes the very framework of definitions within the discourse, and therefore, although an ideal, is unhelpful as a concept in planning for teaching and learning. Interdisciplinarity is, however, both possible and useful as a way of linking the higher education experience of the mature student with the prior learning and knowledge, both recognized and tacit. Kitchener and King (1990) refer to seven stages of epistemological development in adults. The level reached may depend upon the complexity of life experiences (Pirttila-Backman and Kajanne, 2001), in which case this forms a possibly unrecognized and unvalued resource of experiential learning. When confronted with a 'new' study it is important to adult learner confidence and perceived relevance that there is recognition of ownership, validity and relevance of a reservoir of tacit and experiential knowledge in addition to recognized learning available both to evoke and validate this tacit knowledge (Toynton, 1998).

Approaching interdisciplinarity

A starting point for interdisciplinarity is that disciplines are themselves coalitions of subjects and therefore 'are also the sources of links that can be formed with other subjects' (Zverev, 1975). If disciplines are defined as 'ways of knowing rather than forms of knowledge . . . processes of thinking rather than products of thought' (Bruner, 1960), then an interdisciplinary

approach must go beyond the interrelationship of 'subject material' to investigate the commonalities and contrasts of approaches and ways of thinking about the material. Interdisciplinarity should challenge learners to justify the validity of the methods and knowledge claims within each discipline (Jones and Merritt, 1999). Through this, what may make the learning more relevant and potentially broaden the interest of the learner can also enhance understanding even within a single discipline.

Distinction must be drawn between interdisciplinarity and problem-based learning, though the latter may include elements of the former. Problem-based learning teaches 'both a method of approaching and an attitude towards problem solving' (Schwartz et al., 2001: 2). This is largely achieved through group work with tutor support. Benbow and McMahon (2001) describe how the presence of more experienced mature students amongst less experienced traditional students can lead to 'dysfunctional' groups owing to the significant difference in levels of prior experience of problem-solving. Problem-based learning requires 'cross-disciplinary' thinking, often without explicitly providing the tools. For traditional students this may therefore amount to an experiential encounter with a form of interdisciplinarity. However, since much of the problem-based learning researched at present lies within medicine, dentistry and engineering, much of this experience is in exploring the coalition nature of broad disciplines rather than being truly interdisciplinary.

Real interdisciplinarity need not be, or only be, at the level of curriculum design. Rather, interdisciplinarity can suffuse the teaching and learning process through such practices as the use of analogy and student choice of illustrative and assessed material. A well-designed monodisciplinary course can thereby access the advantages to the mature student of the interdisciplinary course. In either case the experience and knowledge of the tutor become crucial, since the tutor must be able to introduce the analogous material or judge the acceptability of the analogue proposed by the learner. Assessment also requires adjustment if such flexibility is to be accepted fully within the programme. This may be expensive in resource terms, since more than one tutor may need to be present throughout all taught sessions of an interdisciplinary course. Similarly the experience at Sheffield is that on designated interdisciplinary courses, all tutors need to input into the assessment of all student work, since the tutors also need to develop and share their interdisciplinary perspectives.

The learning prospects of a mature student must be improved where the educational experience is brought closer to the learning pattern of life experience. It is the task of the adult educator who, where mature students in higher education are involved, will be the university teacher, to facilitate this matching of present to past learning. However, the tutor must also be

aware that the prior knowledge, tacit or explicit, of the mature learner may distort the very information being taught (Roschelle, 1995), since the prior knowledge, whether correct or not, may form the structure for the acceptance of new knowledge. If access to the prior tacit knowledge is through interdisciplinarity, then a further role needs to be added to this process. In addition to validating such knowledge, recognition and correction or abandonment may also be required. Those experienced in adult education will recognize the existence of incorrectly learned knowledge, but also the benefit of its correction and abandonment being a process best achieved by the learner as realization rather than an imposed act.

The tutor and learner experience

Over the last four years elements of the undergraduate degree programme in the Institute for Lifelong Learning at the University of Sheffield have been evolving from the monodisciplinary and multidisciplinary approach to being truly interdisciplinary or using interdisciplinary approaches in discipline-based units. Examples of interdisciplinary units within this programme include 'Interrelationships in the Natural Sciences and Archaeology', 'Human and Natural Landscapes' and 'Evolution: Theory, Evidence and Applications'. Also interdisciplinary, but slightly less wide ranging, are units such as 'The Evolution of the Earth's Natural Systems' and 'Environments of the Holocene'. Discipline-based units in which an interdisciplinary approach is taken include 'Biogeography and Biodiversity' and 'Environmental Hydrogeology'. Over the last four years, using questionnaires and interviews, the reactions of both learners and tutors within one area of the programme have been sought. Details of student and tutor responses have been reported (Toynton, 2000) and initial analysis presented (Toynton, 2001). Table 2 and Table 3 summarize the conclusions based on the student and tutor responses, interviews with students and reflections by the tutors. Tutor reflection also takes account of previous research into reactions to interdisciplinarity in higher education by such authors as Astin (1992), Jones and Merritt (1999) and Vess (2001), though these researchers do not focus on the experience of mature learners within interdisciplinary learning and teaching.

From the learners' perspective the outcomes were largely positive. The evocation and valuing of prior recognized and tacit knowledge provided the learners with both confidence and a more central role in the learning experience, which they then had the confidence to use to good effect. The recognition of the acquisition of transferable skills (and in particular 'helicopter vision') provided an increase in the value learners placed on the whole experience. The negative aspects were the challenges to their

Table 2 Consequences of levels of disciplinary for adult learners

<i>Monodisciplinarity</i>	<i>Interdisciplinary approaches within disciplinary study</i>	<i>Interdisciplinarity</i>
Dissonance due to restrictiveness of study being counter to life experience	Dissonance reduced	Learning patterns reflect the learners' real life learning experiences
Much prior knowledge and experience perceived as irrelevant	Relevance given to some prior knowledge and experience	Prior knowledge and experience recognized and validated
Limit on evocation of tacit knowledge	Limit on evocation of tacit knowledge remains	Evocation of tacit knowledge
Feelings of value and confidence restricted to discipline knowledge	Feelings of value and confidence extend beyond discipline knowledge	Feelings of value and confidence extend beyond discipline knowledge
Non-awareness of transferability of learning/cognitive skills	Potential for realization of transferability of learning/cognitive skills	Transferability of learning/cognitive skills made explicit and demonstrated
Hierarchy may develop amongst learners based on level of (or level of recognition of) prior knowledge	Hierarchy may develop amongst learners based on level of (or level of recognition of) prior knowledge	Distribution of expertise between tutors and learners
Shared learning experience based on shared perception of learner-tutor divide	Weakening of shared nature of learning experience	Shared learning experience based on equality of value of prior knowledge
Learner there to be taught	Learner empowerment	Learner/tutor relationship changed. Individual learner may have equal or greater oversight than individual tutor
Known focus of interest	Retains focus of interest	At the outset the learners may need to be convinced of the benefits of the interdisciplinary approach
Remain within comfort zone of prior interest	Core activity remains within the comfort zone of prior interest	Most activity will be outside the learners' initial comfort zone

Table 3 Consequences of levels of disciplinarity for tutors

<i>Monodisciplinarity</i>	<i>Interdisciplinary approaches within disciplinary study</i>	<i>Interdisciplinarity</i>
Teaching unchallenging	Teaching more challenging. Tutor may have to learn beyond previous boundaries	Teaching challenging. Stimulating learning experience for tutors
Tutor can retain role of expert	Reduced potential for hierarchic tutor–learner relationship. Tutor must be willing to share role of expert to some extent	Tutors must be willing to relinquish role of sole expert. Learners achieve expertise beyond that of any individual tutor. Tutor may feel threatened by this
Assessment can be simple if preferred	Tasks and their assessment may be more individualized	Assignments require assessment by whole team with grading negotiated amongst tutors
Time/financially inexpensive (single tutor)	Time/financially inexpensive. Single tutor possible	Time/financially expensive. Tutoring team required

expectations of what the undergraduate learning experience should be. Not only could they not be passive learners, neither could they remain within the preconceived boundaries of their defined areas of interest. Discomfort shown through student evaluation on the initial interdisciplinary units, however, has been replaced by very positive student responses to the subsequent units, illustrating that positive aspects have not only been perceived, but also judged to outweigh the initial negative ones.

The tutors have found the changes equally challenging. True interdisciplinarity is more expensive in tutor time in requiring team teaching and team assessment. The latter highlights the need for an individual tutor to relinquish ‘ownership’ of an interdisciplinary module. The setting and grading of assignments have to be negotiated, since understandings within one discipline area need to be evaluated not only in themselves but in relation to other areas of study. This leads to the realization that the learners may achieve understandings novel to the individual tutor. Where tutors from various disciplines present sessions jointly, learning occurs between tutors as well as between learners and between tutors and learners. The

experience at Sheffield has been that recognizing and making clear to the learners that tutor–tutor learning takes place literally ‘in front of the class’ further engaged adult learners with the course. Tutors therefore have to be willing to share roles within a less hierarchic learning community.

Conclusions

Disciplinarity is an artifact not only of curriculum design, but also of approach. Interdisciplinarity may be provided through specifically designed units or through a particular approach being taken within units which could otherwise be defined as monodisciplinary. Both of these approaches are currently practised in the Institute for Lifelong Learning at the University of Sheffield.

Interdisciplinarity, in either guise, allows the adult learner to avoid the negative aspects of cognitive dissonance often produced by the unfamiliar structure of monodisciplinary study. Through the recognition that much of the prior knowledge of the adult learner, crucial to the accretion of further knowledge, is likely to be tacit, and furthermore, the schemata within which this knowledge is formed are also tacit, the greater the freedom given to the learner to adapt and interpret the taught material through their own understandings, the greater the learning is likely to be.

Since real life and therefore the learning experience of the adult is interdisciplinary, a degree of this interdisciplinarity in teaching and learning even at higher education level is essential. However, it must be realized that prior knowledge, so central to adult confidence in learning, may also distort further learning, and needs both validation and possible self-correction.

As a process, any degree of interdisciplinarity can enhance learning. As a destination, interdisciplinarity can enable the learner to operate intellectually and practically across the artificial boundaries of discipline. As a tool, it can furnish multiple perspectives on the discipline the learner has chosen and provide the level of criticality essential to the integration of prior knowledge, and thereby represent a key skill for lifelong learning. It is important to acknowledge here that the term ‘learner’ within this context applies both to the mature student and the tutor; both are involved in acquiring and applying lifelong learning skills.

References

- ASTIN, A. W. (1992) *What Matters in College? Four Critical Years Revisited*. San Francisco: Jossey-Bass.
- BENBOW, E. W. & MCMAHON, R. F. T. (2001) ‘Mature Students?’, in P. Schwartz, S. Mennin & G. Webb (eds) *Problem-based Learning: Case Studies, Experience and Practice*, pp. 121–5. London: Kogan Page.

- BRADBEER, J. (1999) 'Barriers to Interdisciplinarity: Disciplinary Discourses and Student Learning', *Journal of Geography in Higher Education* 23(3): 381–96.
- BREIVIK, P. S. (2000) 'Information Literacy and Lifelong Learning: The Magical Partnership', in K. Appleton, C. Macpherson & D. Orr (eds) *Lifelong Learning Conference: Selected Papers from the Inaugural International Lifelong Learning Conference*, pp. 1–6. Rockhampton: University of Central Queensland.
- BRUNER, J. S. (1960) *The Process of Education*. Cambridge, MA: Harvard University Press.
- CANDY, P. C., CREBERT, R. G. & O'LEARY, J. O. (1994) *Developing Lifelong Learners through Undergraduate Education*. Canberra: National Board of Employment, Education and Training.
- DOCHY, F., DE RIJDT, C. & DYCK, W. (2002) 'Cognitive Prerequisites and Learning: How Far Have We Progressed since Bloom? Implications for Educational Practice and Teaching', *Active Learning in Higher Education* 3(3): 265–84.
- GIROUX, H. A., SHUMWAY, D., SMITH, P. & SOSNOSKI, J. (1988) 'The Need for Cultural Studies', in H. A. Giroux (ed.) *Teachers as Intellectuals: Towards a Critical Pedagogy of Learning*, pp. 143–57. New York: Bergin and Garvey.
- GRACE, A. P. (2000) 'Building an Inclusive Pedagogy of Lifelong-Learning Community', in K. Appleton, C. Macpherson & D. Orr (eds) *Lifelong Learning Conference: Selected Papers from the Inaugural International Lifelong Learning Conference*, pp. 54–9. Rockhampton: University of Central Queensland.
- HARMAN-JONES, E. & MILLS, J. (eds) (1999) *Cognitive Dissonance: Progress on a Pivotal Theory in Social Psychology*. Washington, DC: American Psychological Association.
- JONES, P. C. & MERRITT, Q. (1999) 'The TALESSI Project: Promoting Active Learning for Interdisciplinarity, Values Awareness and Critical Thinking in Environmental Higher Education', *Journal of Geography in Higher Education* 23(3): 335–48.
- KITCHENER, K. S. & KING, P. M. (1990) 'Reflective Judgment Model: Ten Years of Research', in M. L. Commons, J. D. Sinnot, F. A. Richards & C. Armon (eds) *Adult Development, Volume 2: Models and Methods in the Study of Adolescent and Adult Thought*. New York: Praeger.
- NATIONAL COMMITTEE OF INQUIRY INTO HIGHER EDUCATION (NCIHE) (1997) *Higher Education in the Learning Society (Dearing Report)*. London: NCIHE.
- PIRTTILA-BACKMAN, A.-M. & KAJANNE, A. (2001) 'The Development of Implicit Epistemologies during Early and Middle Adulthood', *Journal of Adult Development* 8(2): 81–97.
- ROGERS, A. (1996) *Teaching Adults*. Buckingham: Open University Press.
- ROSCHELLE, J. (1995) 'Learning in Interactive Environments: Prior Knowledge and New Experience', in J. Falk & L. Dierking (eds) *Public Institutions for Personal Learning: Establishing a Research Agenda*. Washington, DC: The American Association of Museums. <http://www.astc.org/resource/educator/priorknw.htm> [accessed 20 October 2003].
- SCHWARTZ, P., MENNIN, S. & WEBB, G. (eds) (2001) *Problem-based Learning: Case Studies, Experience and Practice*. London: Kogan Page.
- SMITH, F. (1990) *To Think*. New York: Teachers College Press.
- TOYNTON, R. (1998) 'The Interactive Website as a Medium for Teaching and Learning: A Case Study in Presenting Introductory Science', in S. Banks, C. Graebner & D. McConnell (eds) *Networked Lifelong Learning: Proceedings of the 1998 International Conference*, pp. 1.33–1.41. Sheffield: University of Sheffield.

- TOYNTON, R. (2000) 'Diffusing the Obsession: A Strategy for Widening the Focus of Interest of Adult Learners', in K. Appleton, C. Macpherson & D. Orr (eds) *Lifelong Learning Conference: Selected Papers from the Inaugural International Lifelong Learning Conference*, pp. 77–82. Rockhampton: University of Central Queensland.
- TOYNTON, R. (2001) 'From Adult Education to Lifelong Learning through Interdisciplinarity and the Recognition of the Integration and Reconstruction of Learning', in L. West, N. Miller, D. O'Reilly & R. Allen (eds) *Travellers' Tales: From Adult Education to Lifelong Learning . . . and Beyond: Proceedings of the 31st Annual Conference of SCUTREA*, pp. 403–6. Nottingham: Pilgrim College, University of Nottingham.
- VESS, D. (2001) 'Exploration in Interdisciplinary Teaching and Learning: A Study of Learning Outcomes in an Interdisciplinary Fine Arts Course', *Inventio: Creative Thinking about Learning and Teaching* 3(1). <http://www.doiit.gmu.edu/inventio/spring01/vess/vess.htm> [accessed 27 October 2003].
- WALLACE, A. (2000) 'Thinking Critically about Critical Thinking', in K. Appleton, C. Macpherson & D. Orr (eds) *Lifelong Learning Conference: Selected Papers from the Inaugural International Lifelong Learning Conference*, pp. 279–84. Rockhampton: University of Central Queensland.
- WEINER, G. (1994) *Feminisms in Education: An Introduction*. Buckingham: Open University Press.
- ZVEREV, I. D. (1975) 'Interdisciplinarity in School Education in the U.S.S.R.', *Prospects: Quarterly Review of Education* 5: 445–55.

Biographical note

BOB TOYNTON read physical geography and geology at the University of Liverpool before taking his doctorate in hydrogeology at the University of East Anglia. His interest in the education of adults was developed while working in the museum sector, before taking an academic post at the University of Sheffield. Presently Director of Part-time Studies in the Institute for Lifelong Learning at the University of Sheffield, he oversees a multidisciplinary Combined Studies degree while directing and teaching on the interdisciplinary Natural and Human Environments track of this degree.

Address: The Institute for Lifelong Learning, School of Education, University of Sheffield, 196–198 West Street, Sheffield S1 4ET, UK.
[email: r.toynton@sheffield.ac.uk]