

'Adults Learning Mathematics' as a community of practice and research

Tine Wedege (Roskilde University, Denmark)
Roseanne Benn (University of Exeter, Great Britain)
Jürgen Maasz (University of Linz, Austria)

'Adults learning mathematics' is a new research domain being cultivated between adult education and mathematics education. Some of the research questions are sociological, some psychological; other questions are educational or didactic. At the conference ALM-4 at Limerick in 1997, Tine Wedege started a meta-discussion about the nature of this new research domain. She formulated the question: could there be a specific problematique for research in adults' mathematics education ie a systematically linked problem field in which questions and answers about the subject field are formulated on the basis of a certain theoretical and/or methodological approach? The debate at the conference showed that this is a very complex issue.

In the workshop at ALM-5, we discussed whether our community of practice and research in ALM is situated within the didactics of mathematics (meaning the scientific discipline related to research and development work in mathematics education) or not? Do practice and research in ALM exceed the limits of the didactics of mathematics? Below three members of ALM, Tine Wedege, Roseanne Benn and Jürgen Maasz, formulate the problem as each of us see it.

'ALM' as subject area and research domain by Tine Wedege

'You live and learn' as the old saying goes. It refers to the school of life where fresh experience can change the foundation of our thoughts, actions and how we perceive ourselves. Formerly, the institutionalized framework of education (in the sense of formation) was only applied to children and young people. Now the right and the obligation concerning education does not stop with childhood and youth but also includes adult life. The idea of lifelong learning has become a guiding principle for restructuring education. Adult and further education programmes are highly prioritized in educational and labour market policy in the European Union, primarily with reference to technological development on the labour market. As I see it, politicians only talk about democracy to justify adult education at special occasions. The development of educational ideas and politics implies that adults, whether they like it or not, meet mathematics as a subject or integrated into other subjects in further education.

As in the area of adult education, research into adult education is a growth area. However, 'adults and mathematics' is not only a relatively uncultivated research domain on mathematics education, but it is also an area with increasing activity. In 1994, at the initiative of Diana Coben, inter alia, the first international forum for research, Adults Learning Mathematics (ALM), was formed. At the 8th International Congress on Mathematical Education, in Seville 1996 (ICME 8), for the first time one of the working groups was organized around the theme of 'Adults returning to mathematics education' (Working Group 18) with Gail FitzSimons as

chief organizer and Diana Coben (first chair of ALM) and John O'Donoghue (present chair of ALM) in the advisory panel. In the new international handbook on mathematics education there is an entry for 'adults' for the first time ever in a reference work on research on mathematics education. And it did not stop there: a whole chapter is devoted to the theme of 'adults and mathematics' (FitzSimons, Jungwirth, Maasz, Schlöglmann, 1996).

As a first conclusion, one might say that *the ALM community of practice and research is accepted as a domain within the didactics of mathematics* (meaning the scientific discipline related to research and development work in mathematics education). However, we have to remember the words of John O'Donoghue at ALM-4:

"We have a complex of problems. What constitutes our area? Is it a legitimate scientific activity? When we went to ICME last year, we made a choice. It was a hard decision: Is research in Adults Learning Mathematics a subfield of the field of Mathematics Education, or is it not?"

When I started my PhD in 1994 (see Wedege, 1995) and from time to time ever since, I have been asking myself if the didactics of mathematics was the right choice of scientific field. Right from the beginning, researchers in adult education asked me: 'Are you sure that the answers to your research questions are to be found or constructed within mathematics education?' Now, four years after, I experience 'Adults learning mathematics' as a new research domain being cultivated between adult and mathematics education.

An epistemological terminology

In the ICMI study, 'Mathematics Education as a Research Domain: A Search for Identity', central people within the didactics of mathematics (Balacheff, Howson, Kilpatrick, Sfard, Sierpiska and Steinbring) formulated some questions about research. The first three questions were: (1) What is the specific object of study in mathematics education? (2) What are the aims of research in mathematics education? (3) What are the specific research questions or *problématiques* of research in mathematics education?¹ (Sierpenska & Kilpatrick, 1998). In the workshop, we wanted to put these questions on the agenda. But in order to be able to discuss the issue, *Is research in Adults Learning Mathematics a sub-domain of the research domain of mathematics education, or is it not*, I suggested the use of a specific epistemological terminology (subject area; problem field; *problematique*; cf. Wedege, 1997).

In the research process we define the *subject area*, 'adults learning mathematics', and formulate a simple structure. Subjects in ALM might be, for example, the following phenomena: 'numeracy in adult vocational training'; 'basic mathematics in the Brazilian adult education'; 'adults' perception in relation to mathematics'; 'learning mathematics as part of lifelong learning' (See the Program ALM-5.).

¹ The last two questions were: (4) What are the results of research in mathematics education; and (5) What criteria should be used to evaluate the results of research in mathematics education? - Maybe the next step in ALM should be to discuss the issue: What should be quality criteria for research in 'adults learning mathematics'?

Taking our point of departure in a specific position, we then adopt a certain view of the subject and identify a *problem field* concerning the subject area by formulating *problem complexes*. In this way the subject is further structured and becomes a *subject field*. Problem complexes might be, for example, 'the neglect of developing adults' statistical literacy as an aspect of the key goal of adult education'; 'how can adults' every day experiences constitute the basis for learning mathematics?'; 'adults' mathematical understandings become identified with common sense'; 'the relationship between cognitive and affective components of learning mathematics'. (See the Program ALM-5).

According to the authors of the above mentioned chapter of the handbook, 'heterogeneity' is the very term for description of the field of research in adult teaching and learning of mathematics. (FitzSimons et al., 1996). While I agree that the domain (both the subject area and the problem field) would seem to show heterogeneity, in my opinion this has to do with, firstly, the great complexity of the subject and secondly, the fact that there does not exist a total paradigm or a 'grand narrative' concerning adults and mathematics. In the community of classical didactics of mathematics there also exist different, even mutual exclusive paradigms. One of them for instance is the strong orientation to the mathematical content, another is the social-constructivist paradigm. (Dörfler, 1993:80).

Within the community of ALM (and other communities of research), problem complexes are formulated in the form of research questions and answers about the subject field on the basis of a specific theoretical and/or methodological approach and a systematically linked problem field, a *problematique*, is constructed. The subject field is opened and closed at the same time in this process. New questions which could not be posed before the conceptualizing are formulated and as the complexity of the problem field is reduced other questions can't be formulated. The Danish proverb, 'Som man raaber i skoven får man svar' (corresponding to something like 'You get what you're asking for') represents the basic idea in this concept of *problematique*.

What is the subject area of ALM?

The first delimitation and structuring takes place by defining the subject area. We may find the first 'inner' identification of the subject of study in the Constitution of ALM. Here membership of the international research forum ALM is open to anyone interested in the objects of the Association:

"The object of the Association is to promote the learning of mathematics by adults through an international forum which brings together those engaged and interested in research and developments in the field of adult mathematics teaching and learning.

* Within ALM we understand the term 'mathematics' to include 'numeracy'."

The subject area is formulated in very broad terms as 'adult mathematics teaching and learning', and it is opened with the note that mathematics should be understood to include 'numeracy'. In 1992, before the foundation of ALM, Diana Coben points to the need for numeracy research and for an independent forum bringing together 'information and ideas of interest to numeracy practitioners and researchers, no matter which academic discipline or area of practice they emanate from.' (Coben, 1992:16). In the process of constructing a *problematique*, the definition of mathematics is a central task. When mathematics is defined to include numeracy we have moved out of the mathematics teaching in school and into society and adults' lived life.

As a second conclusion we might say that *the ALM practice and research are situated in the border area between sociology, adult education and mathematics education*. We have to work inter-disciplinary using theories and methodologies from other scientific fields than didactics of mathematics because our problem complexes integrate inter alia sociological and educational problems (See Roseanne Benn below).

Furthermore, the name of the community, Adults Learning Mathematics, gives a strong signal that the focus in research and practice should be the learners not the teaching nor the educational systems and the need of society. In the work presented at the first five conferences of ALM, the learners are mainly *adults* with brief schooling or non whose perspective with regard to education is about training themselves for the job on hand or for skilled work, or their needs in everyday life. The educational settings are numeracy classes, formal education at lower and higher secondary school, vocational training and education, and everyday work and life. At ICME, the need was felt to separate in two groups: (1) adults in basic and further education, and (2) adults returning to university. In the first group almost all the papers were presented by members of ALM. This was not the case in the second group.

If we look at three classical subject fields in the didactics of mathematics (mathematics teaching, learning mathematics, and mathematical knowledge) we have to note that, in ALM, 'teaching' includes 'math-containing teaching'; 'learning' includes 'learning in everyday life'; and 'knowing' includes 'adults' mathematical capacities and competencies developed in everyday life and their attitudes to mathematics'.

What is mathematics within ALM?

Within the didactics of mathematics the need has been felt to explain the research domain to representatives of other scientific communities, in particular the mathematics research community (Niss, 1993, in Sierpenska 1998). And, as stated by Anna Sfard:

"we are faced with the crucial question: What is knowledge, and, in particular, what is mathematical knowledge for us? *Here we find ourselves caught between two incompatible paradigms: the paradigm of human sciences (to which we belong as mathematics education researchers) and the paradigm of mathematics.* (...) we must make the problem explicit and cure the illness by making clear where we stand with respect to the issue of mathematical knowledge." (Anna Sfard, 1994, in Sierpenska, 1998:14, my underlining)

Within the community of ALM the need is not felt for a legitimating dialogue with the community of researchers in mathematics as such. However, Roseanne Benn suggests that the view of mathematics is a determinative factor for research and teaching. She outlines two different (incompatible) views of mathematics:

- a) Mathematics as a certain and neutral subject.
- b) Mathematics as a social construct.

And she argues that they lead to two fundamentally different approaches to teaching and learning mathematics. (Benn, 1997).

Two approaches inherent in adult education research.

In the community of practice and research, 'Adults learning mathematics', the construction and further development of a concept of 'numeracy' is a task that many researchers relate to (FitzSimons et al., 1996). The term 'numeracy' was introduced for the first time in the United Kingdom in the late '50s as a parallel to the concept of 'literacy'. The need was felt for a concept for necessary, basic arithmetical operations corresponding to the concept used for reading and writing skills. Several studies have subsequently examined the low level of numeracy in society. They represent, however, two different approaches to the subject area: an objective perspective (society's requirements of numeracy) and a subjective perspective (adults' individual need for numeracy).

The objective perspective is represented, *inter alia*, by a large-scale British study of the mathematical needs of adult life initiated in order to make recommendations concerning the curriculum in primary and secondary school. (Cockcroft, 1982) In the years since then there has been lively debate between educational planners and researchers in the English-speaking countries (the United Kingdom, the USA, Australia etc) about the content and meaning of the concept of 'numeracy'. The discussion has, *inter alia*, concerned questions such as: How broad is the competence? How deep? How general? How specific? Is numeracy also a matter of democracy?

The subjective perspective is represented by a large number of studies on 'adults and mathematics'. The research questions concern adults' ideas about and attitudes towards mathematics, math anxiety and blocks, adults' competencies as potential in the learning process etc. 'Mathematics count' was the title of the Cockcroft Report. 15 years later in 1997 a book entitled 'Adults count too' was published. Both of the books examine the low level of numeracy in society, but the two approaches are quite different. Roseanne Benn, argues that mathematics is not a value-free construct but is imbued with elitist notions which exclude and mystify. She recognizes but rejects the discourse of mathematics for social control where mathematical literacy is seen as a way of maintaining the status quo and producing conformist and economically productive citizens. Similarly, she rejects the approach where any problem with mathematics is located in the learner rather than the system (Benn, 1997).

As a third conclusion we might say that *the duality between the objective and subjective perspective is inherent in all ALM problematiques*. However, I would claim that the members of ALM are characterized by socio-political engagement. (Cf. FitzSimons, 1997:8) If we look at the proceedings from ALM 1-4 and the abstracts in the program of ALM 5, as a final conclusion we might say that *the overall purpose of ALM practice and research is 'empowerment' of the adults learning mathematics*.

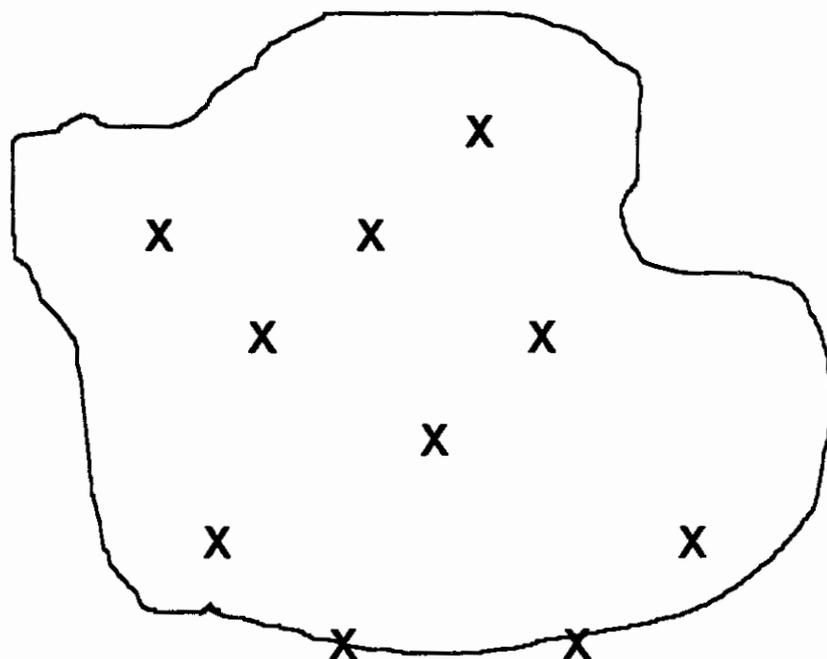
'ALM' as a moorland by Roseanne Benn

At ALM-4, Tine Wedege started a most interesting dialogue around the question as to whether there is a specific problematique for research into adults learning mathematics. The debate continued at ALM-5. The other two contributors discuss these issues further in this article: Tine Wedege by a theoretical analysis and Jürgen Maasz through thoughtful reflection. I should like to take a third path. I shall briefly examine the

question of what is the specific object of study or the area of research in adults learning mathematics through the lens of ALM-5.

We can identify the problem complex of adults learning mathematics with Figure 1 ie a series of questions lying within a bounded field. The question then becomes that of defining the boundary line. Is it that of the boundary of adult learning; or that of the boundary of mathematics education; an intersection of the two; or is the problem more complex? Is the field really bounded or would the analogy of a moorland with its connotation of informal uneven edges, public ownership, open access be more appropriate? Foucault's construction of academic disciplines as notions which control and bound our world are very apposite to our discussions. Does the investigation of adults learning mathematics need to sit inside established boundaries in order to gain status and power? Is it more advantageous to be on the periphery of a powerful centre (such as mainstream mathematics education) or risk being at the centre of a new but (or therefore) powerless centre?

Figure 1

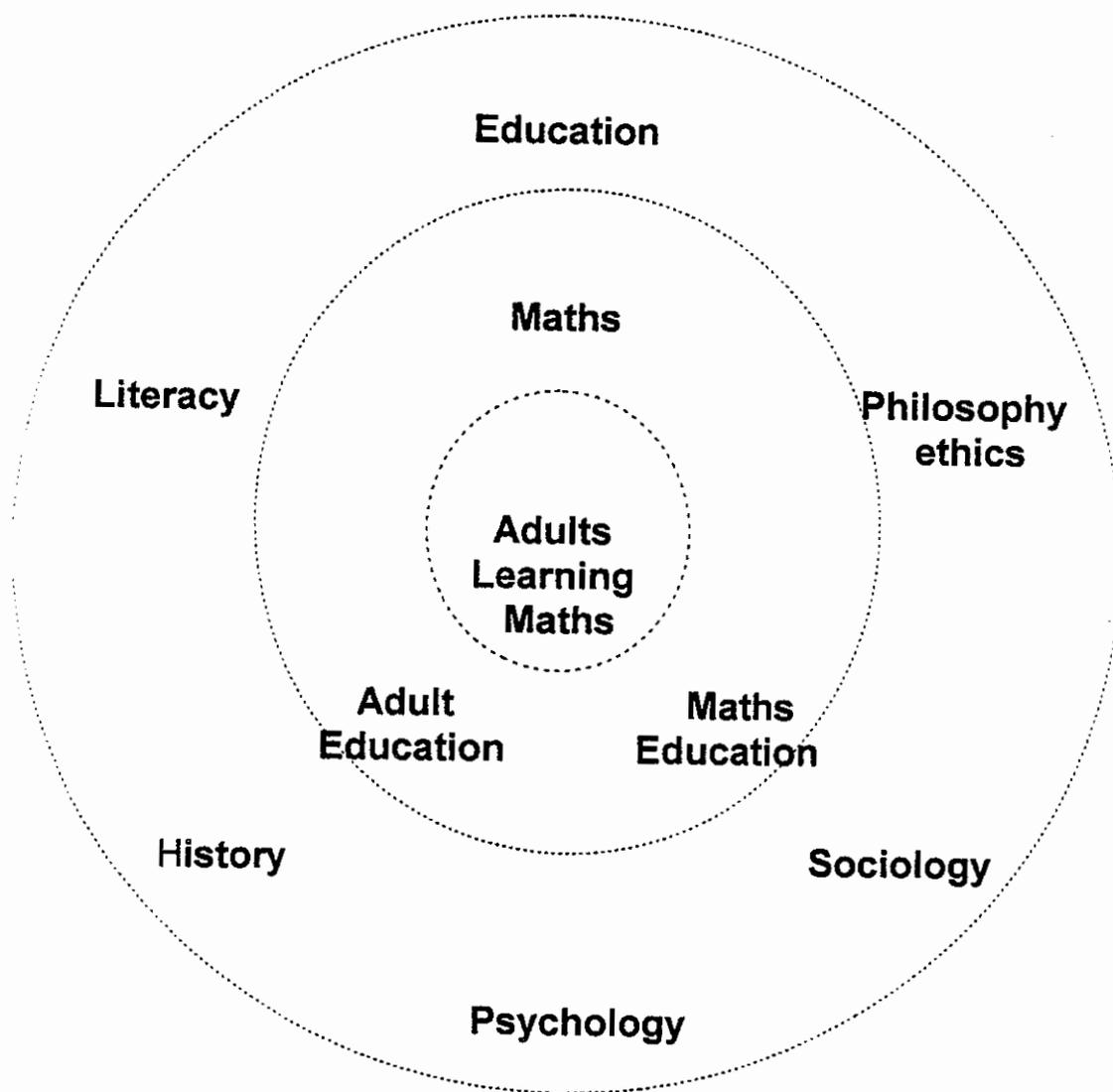


More questions. If we are looking at Adults Learning Mathematics as a community of practice and research, we might ask what are the aims of research and practice in adults learning mathematics. Research might be the creation of 'adults learning mathematics' knowledge: practice the induction of curriculum knowledge in others. But the distinction is not clear cut. One of the aims of research might also be to improve teachers' practice and students' understanding and learning. Is there a clear distinction between theoretical research knowledge and pragmatic empirical 'really useful' knowledge? It seems to me

that in the moorland of questions concerning adults learning mathematics, research and practice are fundamentally linked.

This still leaves open the question of the 'discipline' of adults learning mathematics. I suggest that Figure 2 gives a (very simplified) positioning with the 'field' drawing most heavily on adult education, mathematics education and mathematics but also being influenced by theories from philosophy, sociology, psychology, history, literacy and education.

Figure 2



But what do the ALM community think? An analysis of ALM-5 abstracts showed the following.

Analysis of ALM abstracts

Very little maths, history, philosophy/ethics, literacy

Workshops - practitioner research

pedagogy
andragogy - learner centred, autobiography
boundaries - informal/formal
transferable skills
psychological - emotional
cognition
radical/sociological - disadvantage

Research Papers/Plenaries

sociological - radical/social justice/disadvantage
boundaries - work/formal/informal
statistical analysis
teacher education/pedagogy
autobiography

These may be grouped in the following way.

- Maths education - pedagogical techniques

- Adult education -
 - andragogical/humanist/ student centred
 - social justice/empowerment
 - boundaries (work/formal)
 - autobiographical

- Psychological - affective/cognition

- Surveying the field

This might suggest that considering the current interests of ALM at this moment in time, mathematical theories should move to the outer circle.

I have no clear-cut conclusions only thoughts. To separate practice and research would be dangerous to both. Research looks to practice, in this if no other discipline, for its grassroots. Without the link to practice it would soon become sterile. Practice not bedded in research is vulnerable both to accusations of narrowness and parochial thinking but also to the low status that un-researched disciplines are accorded in our society. There may be two kinds of knowledge that of the scientific community of

researchers and the practical knowledge useful to teachers and learners. I would argue that they both belong to the moorland and ALM is the loser if it does not encourage investigations into both.

The question of the boundaries of the moorland is still open. I would suggest the ALM community as evidenced by ALM-5 has situated the problem complex mainly in adult education; somewhat in mathematics education (particularly practitioner research); a little in philosophy and psychology; and very little in mathematics, history or literacy. Two things do however seem very clear to me. Firstly that adults learning mathematics is fundamentally not a multi-disciplinary issue. It is genuinely interdisciplinary. Secondly, whilst the teaching is sound and dedicated, as a discipline it is still under-theorized and this is to its detriment.

'ALM' as a community of practice and research
by Jürgen Maasz

Why should ALM spend time to a 'meta - discussion'? Is it interesting or necessary for all ALM members or only a spleen of some university people?

My answer is: Each group of people should think and talk about their common understanding of their group, the aims of the group and the common activities. This is important for each member of a group because decisions on these points are a reason for joining or leaving the group. In other words: These decisions give answers to important questions like: Is this 'my' group? What do I get when I am a member of this group? What can I offer to the group?

Why do people join a group and spend time and money to work within a group like ALM?

My answer is: There are many reasons. One sort of reasons is connected with my next question - thinking, learning, discussions on theory and practice. Another kind of more important reasons is connected with feeling. Do ALM members feel like this? I enjoy ALM conferences. I like to meet the people there. I look forward to meeting them again. If I am right in this point ALM should even more think about common activities to improve this 'well feeling'. This includes searching for ideas about conference organization and communication within ALM during the rest of the year. Quite a few ALM members feel isolated at the place where they work. They would like to meet people or friends who are in a similar situation, who think about similar theories and who have similar experiences and problems. This might be a new source of motivation to work on.

Why should ALM be a 'community of practice and research'?

My answer is: Both practice and research is very interesting for me. I like to hear what other people do in their courses, I like to exchange experiences and to construct and discuss theories about learning and teaching. Lots of prejudices sometime blocks the formation of a community of practice and research: theory is too abstract and not useful, practice is boring and experiences from practice are singular and not important for all members. ALM is on the way to remove such prejudices by offering lots of positive examples. ALM members have different jobs. Research is a part of most jobs at universities. Teaching mathematics for adults is a part of most jobs. ALM should be open for all these people and what they want to be able to do a better job. In other words: ALM should be a community of practice and research, and not only of research.

Why is it necessary, or useful, to decide about the position of ALM between adult education and mathematics education?

My answer is: ALM is like a 5 year old child who needs the protection of parents. Perhaps 'adults learning mathematics' will have grown up in 20 years to an independent field of research. I have tried to talk and to cooperate with colleagues of pedagogic and of didactics of mathematics (maths education). My experience is that a lot of colleagues from pedagogic hate mathematics. They say NO to mathematics and refuse any discussion. A lot of colleagues from mathematics education concentrate their work on questions concerning first and secondary school. They say that adults learning mathematics is (or might be) an important domain and that someone should work on these issues. But they themselves have no time for this. In short: They tolerate us (ALM) more or less. Less means that you have no or very little chance to become university professor for mathematics education for teaching and learning in schools if you work in this ALM domain. My conclusion is: ALM should try to cooperate with both parents. We should write papers for conferences and publications in all directions including psychology and sociology (as long as possible and accepted) and grow to become adults.

References

- Benn, R. (1997). *Adults count too. Mathematics for empowerment*. Leicester: NIACE.
- Coben, D. (1992). 'What Do We Need To Know? Issues in numeracy research.' *Adults Learning*. Vol 4, no1, 15-16.
- Cockcroft, W.H. (Chairman of the Committee of Inquiry into the Teaching of Mathematics in Schools) (1982). *Mathematics counts*. London: Her Majesty's Stationery Office.
- Dörfler, Willibald (1993). 'Quality Criteria for Journals in the Field of Didactics of Mathematics.' In Nissen, G. & Blomhøj, M. (eds.): *'Matematikundervisning og Demokrati' II*. Initiativet vedr. Matematikundervisning. Statens Humanistiske Forskningsråd. Roskilde: IMFUFA, RUC. 75-88.
- FitzSimons, G.; Jungwirth, H.; Maasz, J.; Schlöglmann, W. (1996). 'Adults and Mathematics (Adult Numeracy).' In Bishop, A.J. et al. (eds.) *Handbook in Mathematics Education*. Dordrecht: Kluwer Academic. 755-784.
- FitzSimons, G. (ed.) (1997). *Adults returning to Study Mathematics*. Adelaide: The Australian Association of Mathematics Teachers Inc.
- Sierpenska, A.; Kilpatrick, J. (ed) (1998). *Mathematics Education as a Research Domain: A Search for Identity. An ICMI Study. Book 1*. London: Kluwer Academic Publishers.
- Wedege, T. (1995). 'Technological Competence and Mathematics.' In Coben, D. (ed.) *Mathematics with a Human Face. Adults Learning Maths - A Research Forum. ALM-2*. Proceedings of the Second Conference of ALM July '95. London: Goldsmiths University of London. 53-59.
- Wedege, T. (1997). 'Could there be a specific problematique for research in adult mathematics education?' In Coben, D.; O'Donoghue, J. (eds.) *Adults Learning Maths - A Research Forum. ALM-4*. Proceedings of the Fourth Conference of ALM July '97. London: Goldsmiths College 210-217.
- Wedege, T. (1998). 'Adults Knowing and Learning Mathematics. Introduction to a new field of research between adult education and mathematics education.'
- In Tøsse, S. et al. (eds.) *Corporate and Nonformal Learning. Adult Education Research in Nordic Countries*. Trondheim: Tapir Forlag. 177-197.