Reflections on an action research project in teacher education:The Emancipatory Project under scrutiny

IBEN CHRISTIANSEN



IBEN CHRISTIANSEN is a professor in the School of Education and Development at the University of KwaZulu-Natal. Her work in mathematics education has focused on critical aspects of mathematics education for democracy, but she has also done work in research development of academics. In recent years her work has turned to mathematics teacher education, and she is heading an NRF funded research project on the interactions between students, materials and lecturers in calculus classes for teachers.

Abstract

The Advanced Certificate of Education (ACE) specialisation in mathematics (for the FET) at the University of KwaZulu-Natal includes a module on professional practice in mathematics education. As part of this module students complete an action research project on their own teaching. This article describes both the progression of one action research project and, in the light of this project, reflections on the module from a teacher education perspective. Measured against the outcomes, the action research project appeared to be highly successful, as the change in teaching not only proved to further the intended learning, but also helped the educator become aware of her own previously held assumptions about learners and learning. However, contrasting this one project against how the module developed in general, forced me to question the degree to which my agenda was as emancipatory as I had desired. By applying the notion of 'distortions' in a critical discursive analysis of the action research report, I attempt to unravel the underlying messages of the module. Through this, I reach the conclusion that while steps were certainly taken towards the emancipatory aim of helping educators become aware of distortions embodied in ideology, they also contributed to sustaining existing power relations and distortions.

Keywords: Teacher education; distortion; reflection; ideological discourse; mathematics education

The teacher education context – intentions and organisation

This article uses an Action Research project by Noxolo¹ as a starting point for reflecting on a teacher education course. At the time of this project Noxolo was enrolled in an ACE² Mathematics

¹ Noxolo is a pseudonym. The student has read through an earlier draft of this article and agreed to the disclosure of my analysis of her report.

² ACE: Advanced Certificate of Education. An upgrading/re-skilling in-service teacher education qualification.

programme at the University of Natal³, Pietermaritzburg. The programme consisted of four modules of mathematics, two general education modules and two mathematics education modules. This Action Research project was part of the mathematics education module in the last semester of the programme. The module is called Professional Practice in Mathematics Education (PPME). I was the facilitator of the module.

The communicated intention behind the module was that it should direct the educators attending the module to critically reflect on their own teaching and attempts to change it, applying the range of theories and experiences they had encountered in the three previous education modules. Thus, as the final module in the programme, one clear purpose was to bridge theory from previous modules and practice.

To this end the students were introduced to the notion of Action Research and guided through various steps of identifying a problem in their own teaching, planning a modification, carrying out the change in practice, gathering data on the learning, and using this data to reflect on the implemented teaching modification. Thus the module consisted of a directed Action Research project together with specific activities on lesson planning, curriculum planning, comparing the old and the new curriculum, and relating various theories to each other and to the educators' projects. The educators wrote reports on their Action Research and presented these to the class for purposes of assessment.

However the tacit purpose of the chosen activities was emancipatory. My goal was to encourage the educators to become aware of the ways in which the interactions of their classrooms, their perceptions of learning and teaching, their view on mathematics, their view of learners, their culture and their view of themselves as professionals and individuals may have been distorted through relationships of power (thus generally being exemplary of wider social structures) and ideology.

I never communicated with the students about this goal for a number of reasons. Firstly, I was uncertain about the extent this would have been well received and thus could have blocked communication between me and students. Secondly, these intentions were to some extent tacit; more a question of values informing my engagement in education in general than formulated outcomes. Thirdly, my choice was informed by theories of teaching and learning mathematics (cf. Brousseau, 1997). Had I communicated to my students that I wished them to identify and challenge taken-for-granted assumptions, the activity would most likely have changed its nature – from the desired engagement with practice, to students completing an exercise in a teacher education classroom (cf. Brousseau, 1997, 29-30). Thus I feared that this goal could not be communicated without removing some potential for learning. Yet this lack of transparency left many students in the dark regarding what was expected of them. In the light of that I – retrospectively – decided to engage in a critical reflection on the module and the extent to which the outcomes had been met.

Theoretical perspective: The notion of 'distortion'

In reflecting on the extent to which the module lived up to its emancipatory intent, I have used the notion of 'distortion'. According to West (undated), Habermas considers two major forms of distorted communication:

a) The distorted consensus embodied in ideology. Ideologies are systems of thought or value. Marx's theory of ideology implies that the values and beliefs of particular societies reflect the power of dominant groups, which impose their ideology on

³ The University of Natal merged with the University of Durban-Westville to form the new University of KwaZulu-Natal.

other groups and in the process disadvantage them – 'the ruling ideas are the ideas of the ruling class'. Thus, any cultural tradition is in part a product of power relations and to be fully understood must be considered in that light. We see this strongly exemplified in bourgeois ideology as a set of ideas legitimating capitalist society, and in patriarchy as a view of the relations between men and women that reflect the dominance of men (West, undated).

b) Distorted 'internal communication'. The childhood traumas of individuals distort their access to their real desires, beliefs and emotions. The result is neurosis. Freud's theory of the unconscious implies that access to our 'inner nature' is more or less problematic for all of us. The mind is not transparent to itself (West, undated).

To Habermas reflection is what we do when we see through distortions in the 'formative processes' (the past) of either individuals or societies (West, undated). Using this theoretical lens, I can say that the module was intended to encourage the educators to reflect on and identify systems of thought that had influenced their practices (and to a lesser extent to consider 'distorted internal communication').

The means of doing so was asking the educators to identify a problem in their practice and work towards changing it, but in order to go beyond the obvious they were required to choose a problem that was within theirs, not the learners' control (i.e. identifying a problem such as 'my teaching fails to motivate learners' rather than 'learners do not listen'). Furthermore the educators were encouraged to analyse learners' work in order to determine learners' thinking, rather than simply judge the correctness of their answers. This was intended not only to direct the educators to how learners may have tried to make sense of content in their own way and thereby also change the educators' perceptions of their abilities, but also to challenge the common perception of Mathematics as a subject mainly focusing on correct answers and algorithms. In later sections I will go into more detail about the ways in which the explicit and implicit purposes of the module were promoted.

In determining the extent to which outcomes and purposes were met in the course, I follow a path similar to the one suggested to the educators attending the module: I analyse my students' work and contrast it with my intentions and the values I claim to promote. As I am interested in the possible distortions reflected in Noxolo's report and what they tell me about my blind spots as a lecturer and course organiser; I use analysis of her discourse as a mirror for my own teaching. As I engage the content of her report further, I aim to assess the extent to which Noxolo had indeed engaged her own perceptions of learning and teaching, her view on mathematics, her view of learners, her view of herself as a professional and individual, and the extent to which these perceptions may have been distorted through relationships of power. It is this **unpacking** which allows me to question the success of the module.

The student/educator and her school context

Noxolo was an educator at an Ex-model C school (i.e. historically White and well resourced) at the time of the project. It was a multiracial school, though the majority of the learners were White. Most learners were from middle class families. An urban and a farming community surrounded the school. Both communities strongly supported the school in terms of discipline, finances, etc. All educators were qualified. There were four classes per grade with 24-35 learners in a class. The school had had a 100% matriculation rate for the previous ten years. At the time of the project, there were two Grade 11 higher grade maths classes and two Grade 11 standard grade maths classes. The class in Noxolo's project was a Grade 11 standard grade class with 24 learners.

Noxolo was a well-liked and highly successful student, who scored a first in most of her courses. Originally from another African country, she had taught herself isi-Xhosa and isi-Zulu

and conversed in four languages. She was quick to identify a problem and start to reorganise her teaching accordingly. In that sense, she was not a typical student. Other students were much more uncertain of what was expected of them and what type of problem identification/ formulation was acceptable (to me). This is an element which impacts on my reflections on the success of the course.

In what follows, I will describe the different stages of the action research and use these to reflect on the process, Noxolo's learning and in the light of these, the extent to which the course lived up to its implicit and explicit intentions.

The problem identification: Replacing one ideology with another

The Action Research cycle starts with the identification of a problem which in itself can be a starting point for identifying distortions. At the outset, and despite my insistence, many of the educators in the module did not formulate problems over which they had any control. Instead, they subscribed to learners' shortcomings or to systemic factors as explanations for failures in their practice. Obvious personal and ideological distortions could be at play here. Therefore, I repeatedly challenged the educators to identify a problem related to their mathematics teaching, over which they had control. This process of clarification is reflected in Noxolo's formulation of her problem from her report:

The problem I had was that my learners did not understand theorems and as a result, they resorted to memorising. Most of my learners even find it difficult to apply the theorems. When I look back, I feel that I am responsible for this problem, because each time I would just throw the theorem to my learners during the first lesson of the topic. So, the learners would be faced with a new topic and a new theorem. I used to show them how to prove the theorem and expect them to understand the proof and theorem as well as expect them to be able to apply the theorem. I noticed that the learners did not know where to start if I asked them to prove a theorem and that most of them had memorised it, and probably did not understand what they had written. I drew this conclusion because if I asked them about what they had written they would not be able to explain.

When I looked back, and thought about van Hiele's theory of understanding geometry [she lists references], I could see that I had assumed that my learners were at the formal level of understanding and that they would be able to construct their own proofs and to understand that they could prove something in more than one way. But what I overlooked was the fact that as the teacher I was supposed to make sure that they had mastered their previous level of understanding and that they had all the pre-knowledge for the next level.

Noxolo's realisation that learners do not necessarily understand and cannot necessarily apply a theorem after having it demonstrated and proven could be seen as exemplary of the constructivist understanding that "knowledge is not passively received but actively built up by the cognizing subject" (von Glasersfeld, 1989).⁴ As such, the encouragement of her to search for sources of problems in her teaching appears to have been successful in changing not only her

⁴ I hasten to say that this does not imply much about the types of activity that lead to learning, and thus cannot be used in simplistic ways to say that 'constructivism implies that learners must be active in the classroom in order to learn'. This constructivist thesis simply states the knower as an agent in coming to know, without denying experiences external to the knower. In this respect, this view distances itself from simplistic views of either 'extracting' knowledge directly from observations or being able to derive knowledge 'logically'. It is a more relativistic or fallibilistic view on knowledge and knowing, yet does not slip into seeing knowledge as arbitrary.

approach in the classroom but also her thinking about her own teaching. Thus, an explicit outcome seems to have been achieved.

However, this does not exclude the possibility of distortions. The normative measure for teaching expressed in the last sentence in the above quotation ("as the teacher I was supposed to make sure that they had mastered their previous level of understanding") could be an example of a distortion. 'Supposed to' does not imply that Noxolo sees this as a demand from an authority outside her classroom. However, it reflects an idealised perception of what is required in teaching. It assumes that it is possible for the educator to delay topics until the whole class is at the same 'level'; it assumes that it is possible for the educator to assess the level of each learner regularly; and it also assumes that it is possible within limited time to construct a reasonably accurate perception of learners' competencies and understanding. Finally, the formulation reflects an understanding of mathematics and mathematics learning since progression relies on relative mastery of previous concepts – a notion which has been challenged by analysis of concept development in mathematics (Sfard, 1991).

Noxolo's report is within the expected discourses of teacher education today, yet her own experiences from the classroom must have contradicted the content of her statement. Thus, it seems that her text is discursively distorted. This must be considered in the light of the fact that Noxolo was not only a successful educator with some power over the interactions in her classroom, she was also a student in a university programme with its own power relations and reproduction of particular distortions, and a top student with a pattern of being able to gain accolades from her lecturers. Thus the apparent ease with which this statement occurs in Noxolo's report allows me, as the facilitator of the module, to reflect on the distortions reproduced through my teaching, the programme as a whole, and the theoretical constructs of the related research. It draws attention to the power relations which are reproduced in the structural set-up of in-service teacher education, where theory is (even if 'only' implicitly) valued higher than practice; and it draws attention to present-day values in teacher education which makes learning, not only teaching, the responsibility of the educator.

Thus Noxolo may be reflecting on her own practice not only in the light of the theories she had encountered in her studies, but also in the light of the ideal practices implied by the recent South African national curriculum statements (NCS and RNCS). This is reflected in her reference to the desired practice of making her teaching 'learner-centred' in her rationale for her project:

The rationale for the action research was that I wanted to change my approach to teaching theorems and rules. I did not want my lessons to be teacher-centred, but to be learner-centred. I wanted my learners to discover the area, sine, and cosine rules with guidance. Because I wanted to apply Vygotsky's theory of development in my teaching, the learners had to continue working in groups. Vygotsky [references] suggests that we first learn things socially, and then we internalise them. Also, having learners be active helps them to understand.

Curriculum 2005 is obviously ideologically informed (Dowling, 1998), and as such attempts to have an ideological grip on educators.⁵ Educators have an obligation to be critical towards the curriculum, teaching materials, research reports, etc. (though this is not an obligation to disagree) (Christiansen, 2007b). However, if educators feel they 'must' buy into the values of the new curriculum, the obligation to be critical falls by the wayside. With or without the consent of teacher educators, this may drive teacher education to being intent on replacing one ideology

⁵ This was evident in the educators' responses in a discussion of the old versus the new curriculum. The common sentiment was that the old curriculum provided better guidance on a day-to-day level, but that the new curriculum was a necessary break-away from the Apartheid days and its ideological grip on the curriculum (Parker & Christiansen, undated).

with another – an intent reflected in research focused on educators' failure to implement the new curriculum. In those cases, teacher education may lose any emancipatory intent, explicit or implicit.

Principles for the action plan: My framing of the pedagogic process

The next phase of an Action Research project is to formulate principles for the plan of action; what will the educator do about the problem identified? While it appears to simply require creativity, perceptions of what is 'allowed' will obviously limit what actions the educator is willing to consider implementing. This phase offers an opportunity to engage educators in applying theories which they have encountered in previous ACE modules, an explicit outcome. It also offers the opportunity for the lecturer to engage the students' suggestions, facilitating a questioning of their perceptions of learning and teaching, their philosophies of mathematics, their relationship to power relations in the classroom, etc., thus challenging distortions in their practice.

Looking back, I can see that I expected the educators to implement teaching strategies other than lecturing and demonstrations followed by drills.⁶ In some ways this reflected my assumption that the educators had indeed assimilated values and ideas on teaching and learning from their previous educational modules. This came to stand in the way of doing away with distortions or blind spots, and thus exemplifies my own critique of teacher education from the previous section. Pedagogically this was also a problem. As I was aware that I did not want to insist on one particular set of values or style of teaching, I purposefully did not suggest to the students how they should change their teaching. Yet, it was also clear that I would not accept just any kind of problem or plan of action. Thus this phase lacked transparency and left most educators uncertain about how to proceed.

One very obvious example comes to mind. One educator had proposed the following problem: "What is the alternative to corporal punishment?" As the question focused on what the educator could do differently, I had approved. However, my interactions with this educator revealed the underlying belief that undesired behaviour must be punished. I strongly challenged this educator in order to direct him to confront his underlying assumptions, suggesting that he considered positive rather than negative reinforcement. Instead of engaging this, the educator eventually changed the problem. However, Noxolo's problem statement and proposed plan of action was much more in line with what I had envisioned, and thus I accepted it readily. It shows how strongly I framed the pedagogical process by foregrounding the development of a teaching practice in line with my ideas, over and above the emancipatory project.

Another aspect thereof was the way in which I introduced and regulated the use of theory in the course. This was reflected in explicit and implicit assessment criteria, where being able to link action plans and reflections to theory was desired. Yet, theories not only serve as a thinking tool in planning and reflecting on teaching; they also influence which goals can be envisioned as well as the plans for realising them. The presence of thinking tools interferes with our perceptions of reality, making clear how our perceptions are constructed and become social in nature (modelled, incidentally, by Activity Theory (Engeström, 1994)).

⁶ This must not be confused with the pedagogical paradigm referred to by Watkins (2007) as 'progressivism'. There is an abundance of papers which use 'constructivism' to refer to a particular approach to teaching. In my view, that is confusing a learning theory and a teaching approach. Thus, I prefer the use of 'progressivism' which so clearly is an ideologically (as well as theoretically) informed approach to teaching. The critiques of 'progressivism' are many – for one example, a discussion of how it limits the educator's power to inspire and motivate, see (Watson, 2007). In line with the thinking which has informed the national curriculum, 'progressivism' is clearly 'ideologically loaded'.

Thus the contradictions between Noxolo's relative ease with theory application and the struggles of the other students not only point to the difficulties that engaging theory and practice pose. They also point to the clear preference which I gave to a particular focus, in the process devaluing other approaches and reflective competencies. This is yet another way in which, through the existing power relations, I imposed an ideological distortion which is likely to have undermined the emancipatory intensions of the course.

Noxolo's expectations: My assumptions about content knowledge

The models for Action Research discussed in the PPME module did not contain a section on identifying expectations for a project. However a core reading for the module had been a text on the 'Hypothetical Learning Trajectory' (Simon, 1995). It identified the educator's implicit expectations for a lesson as the Hypothetical Learning Trajectory and listed a number of factors that would inform this, such as the educator's knowledge of mathematics, of mathematics learning, etc. In her report Noxolo never referred to Simon's paper, but there are clear signs of how it has informed her project and her thinking on it, and she has later acknowledged this influence (personal communication). For instance, in her report, she clarified her expectations for each part of the worksheet she developed. This enabled her to plan interventions and to design the worksheet in such a way that the learners were more likely to convert towards the intended learning:

I expected the learners to manage the first part of the worksheet on the area rule with ease. But I did anticipate that they would be stuck when they got to the part where they had to find expressions of areas of triangles like the following ...

Noxolo's design of the worksheets is a sign of mathematical competency. It manifested a strong understanding of the area, sine and cosine rules in trigonometry and their proofs. She designed the worksheet activities with the only input from me being on how to use variables to direct learners towards the generalisation. Her writing about the processes through which she intended the learners to go, also indicated understanding of mathematical competencies (generalising, proving, ...). In addition, Noxolo's approach revealed a pedagogical competency. It showed a willingness to trust learners and their cognitive abilities enough to let them work something out for themselves, even if guided strongly along the 'right' path.

The two things are hardly independent. If we can extrapolate from studies of educators of lower grade levels, educators can go a long way with relatively limited content knowledge (Bromme, 1994). Educators simply find ways of managing (*ibid*.). However, studies observed that an educator's mathematical knowledge

... contributes to his or her being able to stress important facts and ideas within the curriculum. This knowledge influences the quality of explanations given ... and the ability to integrate into their teaching student contributions that do not lie precisely on the teacher's intended level of meaning (Bromme, 1994, 77).

In the light of this, our educators may be in an impossible situation when we ask them to alter their teaching style. We know, or should know that due to the Apartheid legacy of South African education they may not have the content knowledge to manoeuvre comfortably in the openended teaching approaches implied by Curriculum 2005 and by our implicitly and explicitly conveyed values.

In that sense my well-intended module carried with it a strong favouring of those privileged enough by their collegial or private histories to master the content as well as the changes in educational discourse and intended practices. As a result, rather than direct the educators to identify and reflect on systems of thought that influence them, my teaching reflected the ideology

of power that comes with mastering dominant discourses. It was a distortion of what educators experience as valid and possible practices.

The implementation of the action project: Identity of educators; Philosophy of mathematics The structural regulations in which teaching is contextualised generally catch educators between 'moving through' the curriculum and ensuring that learning happens (Mellin-Olsen, 1991).⁷ This is a manifested distortion of teaching, to which I aimed at directing the educators' attention.

My means of doing this was to give the educators a task which required them to find out more about how their learners had constructed meaning in mathematics. The intention was for educators to experience how 'mis-conceptions' are often quite logical, given the learners' personal experiences. Though it appeared to ask the educators to take their attention away from their own teaching, it often made them reconsider it. Thus, many educators in the module confronted the assumption of their task being to 'travel through' or 'cover' the curriculum by keeping a constant content/time rate.

In Noxolo's case the change in focus manifested itself in directing the learners to re-invent the proof of the area rule:

- 1) Draw any triangle ABC.
- 2) Draw a perpendicular height from A to BC.
- 3) Express h in terms of angle B and side AB.
- 4) Express h in terms of angle C and side AC.
- 5) Now you have two equations, what can you say about them?
- 6) Use the result above to find the area of the triangle.

This approach to proof represents two shifts: (a) a shift towards a more learner and learningcentred practice; (b) a shift towards fore-grounding mathematics as a product of human engagement with the world.

The shift towards more learner-centred practices had a number of consequences in Noxolo's class. Noxolo claims that this approach improved the learners' confidence in themselves, which she links to their response when later asked to prove the sine rule: some constructed their own proofs rather than follow Noxolo's instructions. She was also surprised to see how one of the learners, whom she had considered weak, excelled. When the teaching approach allows learners to work in ways they find meaningful, the distortion which the educator holds of the learner may change, just as the learners' distortions of themselves or their constructed identities may change.

Of course this point can be held up as a mirror to my own teaching, showing that I failed to meet my intentions in more than one respect. As many of my students felt the course rather removed from what made sense in their classroom, both in terms of pedagogic and mathematical practices, the identity of these educators – most of whom have already suffered the degradation of Apartheid – was likely to be reconstructed as lacking, struggling or even failing. In addition, most of the educators never got to a point where they managed to change their view of their learners. So also in this respect the course failed in its emancipatory intention.

<u>The shift towards foregrounding mathematics as a human activity</u> was equally significant in Noxolo's work. Instead of viewing proofs only as methods of ensuring truth, the processes of

⁷ It is, in a sense, 'Taylorism' applied to education. It is the same ideology (or social technology, (cf. Skovsmose, 1994)) that is reflected in the approaches to curriculum which reduces overarching outcomes to that which can be assessed through a series of narrow criteria, or approaches which think that the essence of mathematics can be captured in lists of content (Niss & Jensen, 2002). For a general critique of constructing assessment criteria to reflect broader educational goals, see Blake, Smeyers, Smith, & Standish (2000).

discovering relationships and constructing proofs that also convey meaning are considered. It parallels mathematics to science in the sense that first we make observations, then we explain – and in mathematics, proof is the explanation (a point made by David Gale, here from (Wittmann, 2001)). To mathematicians, proofs are not just formalistic exercises of ensuring what they already know. Proofs are both justifications and explanations (and sometimes explorations as well). By engaging the learners in guided discovery of the area rule, they at the same time developed the explanation and justification of the rule. It is a world of difference from being told the rule.

An operative proof is a proof which is embedded in the exploration of a mathematical problem context and which is based on the effects of operations exerted thereby on meaningfully represented mathematical objects. ... For this reason operative proofs explain phenomena which were observed before ... and thus they contribute to understanding mathematics (Wittmann, 2001, 547).

This approach links the mathematical value of proof closely to its social and psychological functions:

To state a theorem is not to communicate information, it is always to confirm that what one says is true in a certain system; it is to declare oneself ready to support an opinion, to be ready to prove it (Brousseau, 1997, 15). Proof gets its mathematical value when it has been tested as a means of convincing and is obligatory for being convinced; this can be negotiated only among 'equals' ... (*ibid.* 5).

Many of the educators in the module had learned mathematics, in particular geometry, as a set of theorems and related proofs, which had to be reproduced in a particular form in the classroom and in examinations (van Wyk, 2008). To focus the teaching on the processes of conjecturing, testing, verifying, refuting, and defining as parts of proving has the potential to force educators to reconsider the status of mathematical knowledge, and thus confront the ideological positions that would claim mathematics to be above human experience. Yet it is something we hardly touch on in the ACE mathematics programme, except in the first mathematics education module where it is addressed from a more theoretical perspective. Overall, this view of mathematics is not consistently communicated in the ACE programme – a point Noxolo explicitly confirmed (personal communication).

Reflections on the action research project: Reflections on the emancipatory intentions of the course

Noxolo's reflections on her project showed a deepening understanding of the processes in place in the mathematics classroom and how to use them constructively. The observation that her learners knew more than she thought they did, challenged common perceptions of learners, and as such could be seen as exemplary of the power relations in classrooms and schools. The observation that the learners need to engage in challenging discussions for this approach to work was equally valuable in confronting Noxolo's perceptions of learners and possible types of classroom dialogue.

The question remains to what extent Noxolo saw the various elements as representative of more encompassing social and cultural issues. Did she see the democratisation of her classroom as linked to the broader democratisation processes of South Africa?

There is no doubt that educators are sharply aware of the inequalities and power relations which impact on the lives of their learners, their communities and themselves. The parallel between democratisation of society and democratisation of classrooms came up in discussions during the course. However, it only did so in general discussion, and not during action research projects. In the light of Habermas' notion of distortions, this makes sense: the power of

ideological distortions is exactly the same as the power of neuroses: they make the distortions appear natural. The module should be considered in this light. If the experiences of the educators are not contrasted and explicitly engaged as manifestations of general ideological patterns, they are not likely to lead to exemplary insights (Frankenstein, 1990).

Overall, contrasting Noxolo's highly successful Action Research project with the struggles of most of the other students has highlighted how the values and content of the course assumes the existence of and educators' alliance with a particular vision – a vision which is ideologically informed, and has roots not only in distancing the new curriculum from the old, but in certain notions of learning and teaching from which these educators may well feel dissociated. It thus shows that rather than living up to its emancipatory intention, in reality the course promoted replacing one ideology with another. The distortion continues.

It is not simply a distortion on the level of vision; it is also a distortion of educators' identities. The identity envisioned by Curriculum 2005, both explicitly (Christiansen, 2007a) and implicitly, is one of autonomous educators with the energy, commitment, knowledge, competencies and love to ensure that learning takes place. However, that is a vision which clashes with the reality of most classrooms, with the paradoxes faced by the educators in their daily practices, and with educators who rightfully need to negotiate their stance and interpretation of the new curriculum (Christiansen, 2004; Dowling, 1998).

The PPME course was designed to engage the educators in activities which would bring some of these concerns to the fore. However, it did not engage the educators' experiential reality sufficiently. Instead, it imposed and assumed a distancing from the daily practices which deny the educators' lived lives.

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References

- Blake N, Smeyers P, Smith R & Standish P 2000. Taking ignorance seriously. In N Blake, P Smeyers, R Smith & P Standish (eds), *Education in an age of nihilism*. London: Routledge/Falmer. 204-226.
- Bromme R 1994. Beyond subject matter: A psychological topology of teachers' professional knowledge. In R Biehler, RW Scholz, R Sträßer & B Winkelman (eds), *Didactics of Mathematics as a Scientific Discipline* (Vol. 13, 73-88). Dordrecht: Kluwer Academic Publishers.
- Brousseau G 1997. *Theory of didactical situations in mathematics* (N Balacheff, M Cooper, R Sutherland & V Warfield, Trans. Vol. 19). Dordrecht: Kluwer Academic Publishers.
- Christiansen IM 2004. Living with paradoxes: Walking the tightrope democratically. In R Balfour, T Buthelezi & C Mitchell (eds), *Teacher development at the centre of change*. Durban: KZNDE/Faculty of Education, UKZN. 21-32.
- Christiansen IM 2007a. Mathematical literacy as a school subject: Mathematical gaze or livelihood gaze? *African Journal of Research in Mathematics, Science and Technology Education*, **11**(1), 91-105.
- Christiansen IM 2007b. Some tensions in mathematics education for democracy. *Montana Mathematics Enthusiast*, **3**(3), 49-62.

- Dowling P 1998. *The sociology of mathematics education: Mathematical myths/pedagogic texts* (Vol. 7). London: Falmer Press.
- Engeström Y 1994. Teachers as collaborative thinkers: Activity-theoretical study of an innovative teacher team. In I Carlgren, G Handal & S Vaage (eds), *Teachers' minds and actions: Research on teachers' thinking and practice*. London: Falmer Press. 43-61.
- Frankenstein M 1990. *Relearning mathematics: A different third R radical maths*. London: Free Association Books.
- Mellin-Olsen S 1991. Hvordan tenker lærere om matematikkundervisning? Landås, Norway: Bergen Lærerhøgskole.
- Niss M & Jensen TH (eds) 2002. Kompetencer og matematiklæring: Ideer og inspiration til udvikling af matematikundervisning i Danmark (Vol. 18). Copenhagen: Undervisningsministeriet.
- Parker D & Christiansen IM (s.a.). Mathematics teachers' attitudes to the NCS: Caught between identities of change and being conveyers of knowledge. Unpublished manuscript, Pietermaritzburg.
- Sfard A 1991. On the dual nature of mathematical conceptions: Reflections on processes and objects as different sides of the same coin. *Educational Studies in Mathematics*, **22**(1), 1-36.
- Simon MA 1995. Reconstructing mathematics pedagogy from a constructivist perspective. *Journal for Research in Mathematics Education*, **26**(2), 114-145.
- Skovsmose O 1994. Towards a philosophy of critical mathematics education (Vol. 15). Dordrecht: Kluwer Academic Publishers.
- van Wyk AM 2008. 'Profound understanding of fundamental mathematics' and mathematical life histories of some teachers teaching mathematics in the intermediate phase in Kwazulu-Natal. Unpublished Masters, University of KwaZulu-Natal, Pietermaritzburg.
- von Glasersfeld E 1989. Constructivism in education. In T Husen & N Postlethwaite (eds), *International Encyclopedia of Education* (Vol. Supplementary). Oxford: Pergamon Press. 162-163.
- Watkins M 2007. Disparate bodies: The role of the teacher in contemporary pedagogic practice. *British* Journal of Sociology of Education, **28**(6), 767-781.
- West D (s.a.). Knowledge and human interests (Full lecture notes). Retrieved 7th April 2005, from http:// www.anu.edu.au/~u9012663/fsh.html.
- Wittmann EC 2001. The alpha and omega of teacher education: Organising mathematical activities. In D Holton (ed.), *The teaching and learning of mathematics at university level* (Vol. 7). Dordrecht: Kluwer. 539-552.