Action competence, Conflicting interests and Environmental Education

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*Action competence, Conflicting interests and Environmental education –
The MUVIN Programme*

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Karsten Schnack

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Preface

Introduction to this English version

The present English edition is a full translation of the publication 'Handle-kompetence, interessekonflikter og miljøundervisning – MUVIN-projektet' published in 1999 by Odense Universitetsforlag. Especially its focus on the development of students' action competence makes this report a distinctive publication. But also its focus on societal issues and conflicting interests related to the use of natural resources contributes to its character The basic focus is on environmental education as *education* and as a contribution to a functioning democracy.

In the translation everything has been done to keep the text as close as possible to the original Danish edition, and it hasn't been intended to make any updates of the content.

Nevertheless the main ideas and findings expressed here should be as relevant as ever for the development of environmental education as well as for education for sustainable development.

Kirsten Trolle is thanked for her thorough work with the English translation.

The authors, March 2009

From the original edition

The present publication introduces the research and findings derived from Phase 2 of the Danish MUVIN programme, 1994-96. MUVIN is an acronym for 'Miljø-undervisning i Norden' [Environmental Education in the Nordic countries],

which has been a target area under the Nordic Council of Ministers since 1992. The fundamental concepts of the MUVIN programme reflect ideas on the societal and cultural substance of environmental education evolved over the last ten years or so. Based on these notions, the pilot projects carried out by the participant MUVIN classes were to focus on conflicts of interest in natural resource utilisation, and on ethical and aesthetical aspects hereof.

Especially in Denmark, the MUVIN programme came to achieve quite a considerable scope thanks to the support and backup of our national Ministry of Education. In this, the efforts of Mr Ole Vig Jensen, then Minister of Education, towards prioritising the 'greening' of educations materialised as financial support to the MUVIN programme. Thus, altogether nearly a hundred Danish schools and gymnasiums [i.e. upper secondary schools] joined the MUVIN programme, the vast majority of which in Phase 2.

A booklet was prepared for participant teachers, entitled 'MUVIN-DK. Background information for participant Danish schools in 'Environmental Education in the Nordic Countries, 1994-96'. (English edition: Breiting and Janniche 1994).

The Research Centre for Environmental and Health Education of the Danish University of Education was responsible for running the MUVIN programme, with Søren Breiting as project manager (accountable to the ministry) and Kristian Hedegaard as project co-ordinator.

The school projects had associated follow research carried out during both Phase 1 and 2. Research findings from Phase 1 were published in a book, 'Miljøundervisning i Norden. Erfaringer fra de første MUVIN-skoler i Danmark' ['Environmental Education in the Nordic Countries. Experiences from the first MUVIN schools in Denmark'] (Breiting et al. 1994). The report now available presents the research from 91 pilot projects in primary/lower secondary education, covering 85 schools, which – for each school project – typically involved several MUVIN learning projects. Moreover, the history of environmental education in Denmark is placed in an international perspective. Research associated with the gymnasium work in Phase 2 was published in the paper 'Projektrapport for MUVIN, 2. fase' ['Environmental Education in the Danish gymnasium. MUVIN programme Report, Phase 2'] (Danish Ministry of Education, 1996), and consequently, the present report will not feature development work in gymnasiums and derived research.

In June 1997, all Danish schools received inspiration material on environmental education, published by the Danish Ministry of Education and entitled 'Miljøundervisning i udvikling. Erfaringer fra MUVIN-projektet' (Breiting 1997) ['Environmental Education in Transition. Experiences from the MUVIN programme'].

Further inspiration can be gleaned from the following book presenting learning projects from the involved schools and the teachers' reflections on these: 'Gå videre med miljøundervisning. 20 eksempler fra MUVIN-projektet' ['Getting on with environmental education. 20 showcases from the Danish MUVIN programme'] (Hedegaard Ed., 1996).

We wish to extend our warmest thanks to those 300 teachers or so who did not hesitate to embark on the MUVIN programme, and did so with such zeal, openness, and professionalism. All along, the essence of the MUVIN concept was that the philosophy and practice of environmental education should be developed by teachers and their students, with the support of project advisors and researchers. Therefore also a warm thanks to some 3,000 students who took part in MUVIN Phase 2, and to those – apart from the involved researchers – who served as our advisors at one or more schools: Anne-Margrethe Andersen, Lisbeth Bering, Peter Bering, Hans-Erik Berthelsen, Steffen Elmose, Hans Jantzen, Frank Jensen, Hans Peter Johansen, Thomas Karlsen (who also participated as a researcher at one of our case study schools), Ida Guldager Kristensen, Eigil Larsen, Carsten Maack, Tage Madsen, Finn Møller, Rikke Risom, and Søren Vinding. Thank you for your devoted effort and useful inputs to the research team.

A big thanks to Bjarne Knudsen, Bent Troen and Gunnar Topp for preparing our quantitative material for computerised analysis.

Finally, we were very happy with the trust and the great support received from the Danish Ministry of Education throughout the MUVIN process. Not least would we like to give them a big thanks for entrusting our Research Centre for Environmental and Health Education with conducting the entire practical part of the MUVIN programme.

The Authors, November 1999

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Introduction

The MUVIN research during Phase 2 reflects three combined efforts:

1. The efforts of the Nordic Council of Ministers since the 1977 Tbilisi Conference towards promoting environmental education in the Nordic countries through mutual inspiration and committed co-operations. In the first few years, this was done with considerable focus on drawing more attention to environmental education and on its wider dissemination, yet – since 1989 – with the purpose of qualitatively enhancing environmental education in the Nordic countries. Towards that end, the Nordic Council of Ministers granted financial support for contacts between Nordic MUVIN researchers.

2. The initiatives taken by Mr Ole Vig Jensen, then Danish Minister of Education, towards the 'greening' of educations, including the formulation of targets, content and curricular guidelines based on the Danish 1993 Act on Primary and Lower Secondary Education. As a sequel to the Act, tenders were invited for nine target areas, to provide the basis for large-scale development work. The MUVIN programme was not included in the invitation, yet can be seen as a tandem development project in relation to these target areas.

3. Ongoing research conducted by the Research Centre for Environmental and Health Education, in which we felt the entire MUVIN programme to be a practically unique opportunity for making advances in a praxis-oriented development of theory that would be relevant for environmental education in primary and secondary schools. As a result, the Research Centre put in a

far more substantive research effort than implicit in our agreement with the Danish Ministry of Education (Breiting 1996 b).

Altogether, those three efforts imply that Danish MUVIN research sought to make itself a useful tool in the schools' direct development by applying a form of action research, combined with the research team's focus on a rather more general development of value to environmental education. Thus, researchers would both engage in ongoing processes at the schools – since participating as advisors in the school projects evolving at the 10 selected case study schools – and also record teaching and learning aspects. The concept of 'dialogue research' (Andreasen and Jochumsen, 1990) embraces some of this reciprocal dynamism, although we did not commit ourselves to following the concept consistently.

The development of students' action competence related to environmental issues, as a target of environmental education, has already been a focus area of the Research Centre for Environmental and Health Education for several years (see also Jensen and Schnack 1993, Mogensen 1995a). Even though official background papers on the Nordic work does not actually use the term 'action competence', this was in good keeping with target set for MUVIN work at the Nordic level.

As a working basis, Danish schools were given a booklet (Breiting and Janniche 1994) outlining a few pedagogical issues related to working with environmental education, including definitions of key concepts and useful hints. One section was entitled 'Nogle holdepunkter i MUVIN-DK ['Basics of MUVIN-DK'] and provided the general guidelines for school work; for details, see also Chapter 4.

An overview of chapters

Following the introduction, the work with the MUVIN programme is placed in an international perspective. This ranges from the general concept of environmental education to deliberations as to where teachers might face particular challenges when working on environmental issues in class (Chapter 3). The following Chapter 4 further elaborates on the MUVIN programme, both in a Nordic perspective and as unfolded in Denmark.

Research under the MUVIN programme has as its special focus the development of action competence in students as a target for environmental education, and Chapter 5 presents the intentions and specific focal points of Danish MUVIN research in general.

Chapter 6, on action competence, expounds the theoretical content of the concept, also linking it up with critical theory and critical thinking. Moreover, using examples gained from work at the schools, the concept is tied into praxis. An environmental education with the aim of building action competence in students can be understood as politically formative. Obviously, this should not be taken in a narrow party political sense, but rather as developing skills that will allow them to participate as active citizens of a democracy. Political issues are essentially about interests and values and influential power-relations. This makes them key components of any environmental issue, both in regard to how it is understood and to how viable solutions are found.

Further to the theoretical presentations in Chapter 6, Chapter 7 proceeds to analyse aspects of environmental education with bearing on the development of action competence in students, starting out from the action concept and including possibilities and limitations for specific types of in-class activities.

Chapter 8 deals with the students' conceptual development of 'conflicts of interest related to the use of natural resources', also touching upon a more generalised conceptual development in students. The chapter ties into theories on how students actively develop their own notions and concepts, including 'constructivism', as related to the MUVIN learning concept.

Among other things, the general Nordic MUVIN programme tried to direct focus on aesthetical aspects involved in nature utilisation/education. This is dealt with in Chapter 9, based in part on how teachers tried to consider the aspect, and in part on theories on aesthetics and aesthetic activities.

The Danish section of the MUVIN programme encompassed far more than 200 learning projects, representing a multitude of approaches to how environmental education is implemented in practical terms. However, the better part of these learning projects would fall within the heading of 'cross-discipline topical education'.

In Chapter 10, we decided to have a closer look at two specific approaches to organising such learning projects, 'project-organised education' and 'the story-line approach'. By tradition, project-organised education is characterised by certain basic principles, which are discussed in relation to the actual MUVIN processes. The storyline approach is a relative newcomer and introduces new views on good education. It was used in a smaller number of MUVIN learning projects, and in a thought-provoking manner.

Though not amounting to actual evaluation research, our MUVIN research does include evaluative elements at several levels, and consequently Chapter 11 will discuss evaluation issues in environmental education. These can be identified as less manageable than evaluation addressing more conventional

education. Particular emphasis is placed on the prospective nature of evaluation, which is of particular interest for participants.

With reference to Chapter 5, on MUVIN research intent, Chapter 12 provides an overview of methods used and material collected during the project.

Based on Chapters 6 and 7, Chapter 13 summarises the quantitative findings of the project in terms of the action competence concept, including potential impacts of MUVIN education on the future development of action competence in the students.

The following Chapter 14 presents the teachers' more general views of environmental education that come within the MUVIN concept.

Moreover, any prospective evaluation of the learning outcomes should place significant emphasis on how students view them. Consequently, Chapter 15 summarises a number of MUVIN education aspects that students appeared to appreciate in particular.

The concluding Chapter 16 draws up a scenario of the focal points we envisage for the continued development of environmental education. They feature teacher qualification and in-service training, school development and further research in the field.

3

MUVIN in the light of international developments in environmental education

Development trends

Danish developments in environmental research can be considered from both a Nordic and an international perspective. The former encompasses in particular the Nordic joint initiatives following the 1977 Tbilisi Conference (see Undervisningsministeriet 1978) towards promoting environmental education in the Nordic countries, which in formal terms include the general MUVIN programme. This perspective was summarily outlined in the first Danish MUVIN research report (Breiting et al. 1994), and further background information is available in a status report commissioned by The Nordic Council (Goldbech and Jørgensen 1990).

In the 1983-1991 years, a series of five Nordic symposiums on environmental education were held. Right before their termination, The Nordic Council of Ministers convened a meeting in Grimstad on the renewal of potential further Nordic work on environmental education. As a spin-off of that meeting emerged what was later to be known as MUVIN. The meeting became quite a productive and energetic reunion of many and diversified ideas and views. The need for upgrading teachers' education and in-service training was pointed out, and it was generally felt that the dissemination **and** quality of environmental education in school should be promoted. As for the latter, there was some

response to certain radicalisations of the environmental education concept, propounded by Danish attendees in particular. At The Royal Danish School of Educational Studies, notions had already for quite some years revolved – ideologically and concretely – around a democratically founded understanding of environmental education as 'problem-oriented, conflict-aware and action-oriented' – first presented at the 1984 conference at the Scanticon, organised by the Danish Ministries of the Environment and Education (Schnack 1984). These notions, combined with thoughts propounded by the ministries suggesting greater emphasis on so-called aesthetical rather than e.g. scientific dimensions, helped to evolve the MUVIN concept footed by the Advisory Committee on Nordic School Co- operation (NSS) under the Nordic Council of Ministers.

This Nordic perspective cannot be understood unless considering its interplay with at least the following three international perspectives, the principal one being developments within nature conservation and environmental protection. In the greater context, this is the overarching perspective. Moreover, in the second place, there is the international development of environmental education pedagogy, and in the third place the development of environmental education based on development work in schools and similar innovative initiatives with close affinity to praxis.

The research paper on Phase 1 of the MUVIN programme (Breiting et al. 1994) included a brief account of international developments in this field. These have been dealt with in more detail by John Smyth (Smyth 1995), with an emphasis on their relations to international nature conservation, by John Dissinger (Dissinger 1983) with particular focus on the early coining of definitions and identity of environmental education, and by Stephen Sterling (Sterling 1992), who offers an in-depth presentation of developments in Great Britain, placed in an international framework.

The following will outline a few interesting trends for various aspects of the development.

Environmental education as a response to the environmental crisis

Clearly, environmental education originated from the dawning recognition in the 1960s of imminent environmental issues. Especially nature-savvies were observing with growing concern how pesticide spraying afflicted animal species far from the direct spraying targets, as showcased by Rachel Carson in her

1962 book 'Silent Spring' (Carson 1962). Moreover, the life sciences – notably the burgeoning ecology discipline – provided the conceptual framework, within which such issues were understood. Biology- concepts and formulations such as 'toxin accumulation ascending through the food chains' and 'natural equilibrium' came to be the verbal and conceptual idiom of choice, whenever those issues were dealt with. Geographers tended to fasten upon the population explosion and our increasing consumption of non-renewable resources.

Much to the regret of many biologists and other scientists, it proved difficult nay impossible to penetrate to the political levels and to adult population groups as such. Then, what would be more obvious than turning to the vast number of children and young in our schools? This seemed no less obvious, considering that the most knowledgeable on the imminent environmental problems happened to include education professionals. Thus, over the decades, we see an ever-increasing focus on making students 'environment-conscious', by raising their awareness of how immense and serious environmental problems are and – not least – stand to become in their lifetime.

To date, the vast majority of initiatives taken by nations worldwide to promote environmental education set out from this perspective. This gradually became tied into the goal of modifying student behaviour in a more environment-conscious direction, and a bulk of research on that subject emerged.

A typical title is the trend-setting paper 'Changing Learner Behaviour through Environmental Education' by Herold Hungerford and Trudi Volk (Hungerford and Volk 1990). Inter alia, the paper is based on a meta-analysis (Hines et al. 1986/87) of the host of studies proposing to uncover the factors influencing the general environmental behaviour of individuals. These studies were predominantly American and tended to focus on individual everyday actions, such as household waste sorting for recycling and economising on water. For the educational context, they set out from recognition of the limited effects of information mediated by schools: Knowledge does not invariably produce a change of attitude; nor does a new attitude or awareness invariably translate into new behaviours. So the question left unanswered was: How to organise a version of environmental education that would expediently bring about a desired, more 'environmental' behaviour in students?

As part of this effort, attempts were made to develop the students' emotional engagement in nature. Many projects tried to offer students positive nature experiences, as an antidote to the state of pessimism that easily befalls them when learning about environmental degradation. At the same time, the motivation given for nature experiences in education was that they make students more personally engaged in nature conservation – an argument first underpin-

ned by research in Thomas Tanner's small, yet groundbreaking study (Tanner 1980). The topic was later taken up in an international co-operation by Joy Palmer (1993). Notwithstanding, this rationale has been called to question, not least from Danish quarters, (Ed. Jensen 1989, Andersen et al. 1990, Dorf 1990).

Independently of the current interest in environmental education, there is an ongoing and erudite international discourse under the heading of 'Environmental Ethics', as reflected by the periodical of that name. Most of those offering their views appear to advocate a 'non-anthropocentric' value concept, meaning that they motivate their calls for considering nature with reference to something beyond mankind, usually nature itself. Needless to say, prevailing views on ends and means in environmental education are bound to reflect different views on environmental ethics, and the predominant environmental ethics hinted here appears to have been consistent with the predominant view of environmental education. Consequently, environmental ethics also forms part of an ideological reorientation of environmental education.

A move away from manipulative environmental education

In the MUVIN programme, we think fundamentally differently about means and ends in environmental education, since – as already mentioned – we took a radical turn away from the inherently manipulative approach of behaviour-modifying education and adopted a perspective on environmental education that targets the development of action competence in students (Jensen and Schnack, Eds. 1993). In 1992, at an international conference in Texas, a summary of this type of environmental education was presented as 'The new generation of environmental education'. We contrasted this approach with 'previous forms of environmental education', stressing that what we had here was a new paradigm in environmental education (Breiting 1993). (See the following overview, paraphrased after Breiting 1993).

NEW generation of environmental education	
Previous versions of E.E.	**New versions of E.E.**
Main target/Goal: Behaviour modification	**Main target/Goal:** Further development of 'action competence'
Characteristic aspects:	
We (environmentally conscious adults and teachers) know how best to solve environmental problems.	Decisions on how to solve environmental problems need to involve all.
Acceptance of leadership and adaptation to 'the system'.	Civic participation.
We must halt or delay the development.	There are several possible development trajectories.
The past as a gauge for today's activities.	Visions for the future.
A quest for living in harmony with nature (the notion of 'nature's balance').	A quest for earning the respect of posterity.
Nature has intrinsic value.	Humans have values and interests regarding life in and with nature.
Environmental ethics.	Ethics dealing with decent behaviour towards other humans, today and in the future.

... cont.

'Conservation' means preserving nature, avoiding human interference.	'Nature protection' is especially about allowing nature's diversity to unfold.
Argument for nature protection/ conservation: 'We pity the animals'.	Argument: 'It is a pity to deprive future generations of plant and animal species'.
Cause as few changes as possible to nature!	Avoid *irreversible* change to nature!
Human society as *opposed to* nature.	Man and nature are inseparable.
Natural science is considered the mainstay of environmental education.	Humanities and social sciences are no less important than natural science in environmental education.
Focus on natural ecology ('Nature's household').	Focus on human ecology ('Man's house holding with natural resources').
Nature experience is the pivot of environmental education.	Community experience is equally important.
The health concept is not prominent in environmental education.	The health concept is a key component of environmental education.
A trade-off between human life quality and environmental quality.	A trade-off between the needs/life quality of present resp. future generations.
Human needs as a factual, constant entity.	Human needs as a normative and culture-historical entity.
'Sustainable use' understood as utilisation within a nature-defined limit.	'Sustainable use' understood as a manmade measure of what we estimate as the acceptable limit to reasonable utilisation, allowing for availability to future generations.

... cont.

Focus on different values.	Focus on conflicting social interests, and on personal (inner) conflicts.
No focus on equality between individuals and peoples.	Considerable focus on equality between individuals and peoples.

This new environmental education paradigm has been evolved by the Danish Research Centre for Environment and Health over several years, with the MUVIN programme as its culmination so far.

A similar turn away from manipulative and behaviour-modifying environmental education is evidenced in other countries. Ian Robottom (Australia) has been most explicit in his critique, which included provocative interventions against the quantitative research methodology that used to prevail in trend-setting environmental education research. (See e.g. symposium paper 'Alternative Paradigms in Environmental Education Research' (Mrazek ed. 1993), including Robottom 1993).

It is no coincidence that this dispute was accompanied by a confrontation with the prevailing quantitative (and occasionally markedly positivist) research paradigm (see also chapter 12). This reflects the fact that critics of the manipulative environmental education also contest the dominance of scientific thinking, which bears down on both the substance and educational theory of environmental education. The related environmental education research is marked by research methods and philosophy adopted from natural science and from behaviourist psychology and sociology.

John Fien, another prominent Australian researcher taking part in this dispute, formulated his alternative thoughts along the lines of critical thought (Fien 1993b). This is treated in more detail in Chapter 6 on action competence. There were other major critical contributions from USA/The Netherlands (Wals 1992), Norway (Foros 1991), Canada (Hart, in Mrazek ed. 1993) and – under international auspices – notably from the OECD ENSI project (Environment and School Initiatives), with John Elliott (England) and Peter Porsch (Austria) as the most prominent contributors, and with a number of countries as participants, including Denmark (Christensen ed. 1994).

Man and nature

Now let us get back to how international environmental protection influenced

environmental education. Far into the 20th century, nature protection was more than anything about separating humans from a nature that needed protection, and the conservationists were believed to know best as to what to protect and how to go about it. This goes for national and internal initiatives alike. Gradually, the reciprocity of the man/nature relationship was considered more and more indisputable, today most directly expressed from official international quarters in the Rio Charter (UNCED 1992). Not only does it encourage the recognition that we cannot consider nature conservation in a given area unless also considering the interactivity between nature and those who live there; it also calls for making local people active participants. This goes for both decision phases and day-to-day work. Altogether, a shift from expertocracy to civic participation. However, when it comes to the real world, we are miles away from living up to that recognition.

Already a few years earlier, the formulations of the Brundtland Report on sustainable development (Our Common Future 1987) reflected in principle an overall endorsement of such radicalisation of nature protection. This indicates that we rather have a gradual merging of development philosophy – not least with focus on greater equality between third world and developed countries – and environmental protection, including nature protection.

This in turn rubbed off on views of environmental education, which was occasionally put equal to 'education towards sustainable development' or 'pro-sustainability' (Tilbury 1995). However, such understanding of the concept also met with critical responses, especially for wariness of some ecofascist interpretation of the function of education (Jickling 1992) towards sustainability.

School based innovations

Looking at the broad scope of pedagogical innovations globally, we find the same trend towards a more participatory approach, hence an approach to innovation that, more than earlier, relies on innovations to evolve among the actual participants in the pedagogical process. See e.g. Connelly and Clandinin (eds. 1988), Baird and Northfield (eds. 1992), Nørgaard (ed. 1992), and Black and Atkin (eds. 1996).

Or to put it differently: Instead of introducing actual innovations top-down, this approach will provide a setting for innovation at 'grass root level'. One proponent is Peter Porsch (1995), who argues for 'dynamic networks', offering examples from several western countries. Dynamic networks are set up by equals who wish to rely on their own ideas, and who search for mutual inspi-

ration and support in the complex and precarious situations so typical of our time. He contrasts such dynamic networks with hierarchical ones, which are based on a technical rationale, and which in concrete terms have a robust structure pinned on the belief that innovation has to come from the top and be worked downward through the network.

The general pedagogical concepts of MUVIN have their most obvious and direct roots in German critical theory and the concept of sociological imagination, which has had considerable following in the Nordic countries since the 1970s. As it is, the concept was already introduced in 1959 by C. Wright Mills, American sociologist (Mills 1959) (Schnack 1992a), and where action competence is concerned, there is a direct lineage from Mills' concept of 'sociological imagination' to our research. Mills calls for 'sociological imagination', in recognition of the fact that *it is impossible to understand an individual's life story and a society's development/history, unless we comprehend both at one and the same time'* (after Schnack 1992a p.81). Hence, a developed individual action competence vis-à-vis environmental problems does not manifest itself as a consistently environmentalist behaviour in a person's private life, but in that person's notions of how his/her actions impinge on the societal level, *and* in how such notions influence him/her, when making decisions with environmental implications.

When it comes to international developments in environmental education, there are obvious affinities between the MUVIN approach and the afore-mentioned OECD initiative ENSI (Environment and School Initiatives). However, the latter did not wish to work within the framework of a shared environmental education concept with a clear focus, such as the MUVIN focus on conflicts of interest in the use of natural resources Instead, environmental education was seen rather as an umbrella concept, to be used for teaching/learning programmes aimed to facilitate 'dynamic qualities' in students via multi-faceted work with their living environment. Thus, in the words of Peter Porsch (1995, p. 357):

> *This project was designed as a piece of cross-national curriculum development in which schools developed environmental education curricula that were consistent with two basic aims and four guiding principles:*
> *The aims were*
> - *to help students develop an understanding of the complex relationships between human beings and their environment,*
> - *to foster a learning process which requires students to develop 'dynamic' instead of 'static' qualities, e.g. 'exercising initiative', 'accepting responsibility' and 'taking action' to resolve real environmental problems within their locality.*

The four guiding principles were:
  - *Students should experience the environment as a sphere of personal experience, e.g. by identifying problems and issues within their local environment;*
  - *Students should examine their environment as a subject of inter-disciplinary learning and research;*
  - *Students should have opportunities to shape the environment as a sphere of socially important action;*
  - *Students should experience the environment as a challenge for initiative, independence and responsible decision making.*

Interestingly, the concluding statement of Porsch's paper is that these aspects are yet to colour actual education (op.cit. p. 361) :

> *... tendencies do not falsify the contention that the intrusion of dynamic elements into the curriculum is still a relatively marginal phenomenon, but they indicate that the pioneers among the teachers are not alone.*

Something similar is true of Danish teachers working on developing their students' action competence, a concept strikingly suggesting a combination of Porsch's 'dynamic qualities'.

Considered in the light of international developments in environmental education, the Danish MUVIN work clearly appears to embody a trend towards disengaging environmental education from vested environment protection interests, in which MUVIN departs fundamentally from mainstream environmental education. In addition, its bottom-up approach makes it akin to several innovative cases of development work, in general education.

However, it should be understood that for all known development work in education, a 'bottom-up approach' will require innovation to evolve in close interplay between actors at different levels. The framework set-up and ideas providing the basis of such development work will mostly be prescribed from a superior level or given by the project's initiators.

4

The MUVIN programme

MUVIN and its Nordic background

Phase 1 of the MUVIN programme ran from late 1991 to early 1993, (Breiting et al. 1994). Being a Nordic programme, MUVIN took place under the auspices of the 'Nordic joint initiatives' from the Nordic Council. The general idea was to follow up on the co-operations between Nordic countries towards developing teaching strategies and learning materials that took place from 1977 to 1982, and which from 1983 to 1991 had been conducted as 'Nordic symposiums on environmental education', see Chapter 3.

In MUVIN, the chief aim underwent a change, from seeking to draw more attention to environmental education as such, including dissemination of environmental education, towards a qualitative upgrading of environmental education.

To underpin that aim, our presentation to schools and other participants proposed that individual class projects would focus on whatever conflicts of interest the relevant environmental problem involved.

In Denmark, participation in the Nordic MUVIN programme was tied into a government initiative towards 'greening' primary/secondary schools and education as such. Thus, in its second phase, the MUVIN programme became a connecting link between the different target areas adopted for the implementation of the Folkeschool Act (1993). Apart from good graces with the Ministry of Education, this resulted in substantial programme grants.

The MUVIN programme in general

The MUVIN programme is a school-based development work, which – based on centrally coined learning goals and requirements – aimed to upgrade the involved teachers' environmental education skills *and* to develop pedagogical thinking on the praxis and theory of environmental education. The long-term goal is to enhance environmental education as an asset to the students' future lives.

Basically, there was a common platform for all five Nordic countries, which jointly co-ordinated between individual countries (including teacher and student interchange) and organised experience-sharing between involved researchers from each country.

The Danish research has been categorised as 'follow research' and will be dealt with in the following chapters. By contrast, MUVIN as a Nordic co-operation and development programme will only be touched upon summarily, since reference is made to a separate report from the Nordic coordinating group (Hedegaard ed. 1997).

As for programme components and general procedure, reference is made to the report from the Royal Danish School of Educational Studies to the Ministry of Education (Breiting and Hedegaard 1997). An overview of the MUVIN-DK structure in English is given in Janniche (1996), and in Breiting (1996c) outlining where MUVIN stands apart from mainstream environmental education.

The Pilot Phase and MUVIN Phase 2

The first MUVIN phase, known as the pilot phase, ran from 1991 to 1994. In Denmark, 6 primary and lower secondary schools and 3 gymnasium (upper secondary schools) took part. A summary of findings is given in the research paper on Phase 1 (Breiting et al. 1994).

Eventually, the second MUVIN phase became a sequel to the pilot phase, not just time-wise, but also very much in terms of experience reaped. Hence, it might be useful to revert to the postscript and recommendations of the first research paper, since most of the cited aspects were later integrated in Phase 2, either in its organisational setup or in its educational and research-related work components.

Postscript and recommendations (from MUVIN Phase 1)

It is the research team's general impression that MUVIN work has been rewarding to all those involved, be they the students in participant classes, their teachers, the Danish co-ordination group, or the research team. Most work accomplished was done out of an interest in developing environmental education and was generally based on good wills rather than extra resource allocations. All the same, the support of the Danish Ministry of Education and the Nordic Council of Ministers has been an invaluable factor.

The following experiences were reported at the evaluation conference held on Sep. 30 to Oct. 1, 1993:

The wide range of school types has been an asset. For instance, upper secondary school ('gymnasium') teachers reported that they rarely experienced this kind of pedagogical discussions in their own professional environments.

Teachers from primary/lower secondary schools respectively upper secondary schools would welcome a more extensive co-operation on concrete topics between the different types of school.

Generally, the broad team-teaching co-operations at each school were considered positive. However, when it comes to making appointments and co-ordinating, 'bottlenecks' can easily crop up whenever a team exceeds just a few teachers, and keeping all colleagues posted soon becomes impossible. There might be another task for us to take up here, summing up the practical experience gained from other team-teaching projects and making it available to new teachers joining teacher teams at the schools.

Especially, this may cause problems if the number of involved teachers at a school necessitates an actual project management, which is rarely equipped to ascertain that all teachers are familiar with the full grounding of the project. This issue is particularly sensitive with a programme such as MUVIN, since its intent is quite complex and its overall organisation is hard to grasp at a glance.

Setting up co-operations between schools is difficult without personal, preferably frequent contacts.

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This is particularly so for co-operations between Danish schools and schools in e.g. other Nordic countries, and hardly feasible without solid personal contacts and binding commitments.
Incidentally, participant Danish schools expressed some disappointment at the limited efforts to promote inter-Nordic school co-operations, given the widespread positive attitudes to such initiatives even with many classes looking to the rest of Europe these years.

There are a few major outstanding issues regarding the development of in-class work on environmental issues and its curricular integration.

This also goes for developing student co-influence and accountability, without causing teachers to renounce their role as the better informed.

The more teachers involved in teamwork around a class, the more vital is it for the team to organise their students' co-influence to ensure that it does not dwindle away.

The combination of in-service teacher training, school projects, advisory support and follow research was beneficial for most participant schools, though some would have preferred an even closer contact with their advisor.

The pedagogical basis of such a programme must be advertised very explicitly; otherwise it is hard to reach all teachers of a school. Besides, when it comes to practice, individual teachers usually take considerable time to adopt new concepts and possibly reorganise their teaching styles.

Conflicts of interest related to the use of natural resources proved an extremely fruitful pivot for development work, though several schools admitted that they found the approach unfamiliar and difficult. In order for students to acquire a concept, their teachers must already have acquired and applied it in their own reasoning.

There is a general need for an upgrading of teaching skills in social subjects.

cont. ...

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Product-orienting an environmental project holds promise; in that case, teachers must be prepared to allot the necessary (extra) time needed for quality productions.

All projects went very much into ethical issues, though often without clearing up that the involved issues were thus of a value-related nature. Obviously, there is room for improvement in this regard.

Even more so, when it comes to working on the aesthetics perspectives of environmental issues – first of all as a cognition tool, but also as a dimension of ethical issues. Moreover, there is room for qualifying the participants' aesthetical awareness by engaging in production?.

In a development work such as MUVIN, with a specific contentual and pedagogical target, it is all-important that the involved teachers begin to think along project lines *only after* truly familiarising themselves with the overarching intent of the development work.

Further to this, it would be desirable to provide on-site support to teachers, which would give them time and an obligation to commit their day-to-day intentions, deliberations, and experiences to a personal logbook.

Future work should further develop the benefits of making conflicts of interest related to the use of natural resources a special focus *and* relate to how environmental education can be made useful in building long-term action competence in students on environmental issues.

Other welcome inputs to long-term work on action competence would be research-based suggestions on how to create a learning environment that would bolster the students' confidence in their own influence.

Environmental education in the MUVIN sense requires an exceedingly broad skills base in participant teachers, so we may assume that in-service training and support for school-based development work in environmental education would have major spin-offs to the schools' overall curriculum and development.

(Breiting et al. 1994)

The school-based development work in MUVIN's Phase 2 took place in the 1994-95 academic year. Furthermore, the ten case study schools were allocated continuation grants for another year, against a commitment to disseminate their experience from MUVIN to fellow teachers and others.

The MUVIN programme was announced to all schools in the official news-letter published by the Department of Primary and Lower Secondary Education (Ministry of Education, February 1994), upon which interested schools could apply. The newsletter was mailed to all primary and lower secondary schools, to private independent schools and to continuation schools around Feb. 1, 1994, with a deadline for enrolment as early as Feb. 28. This resulted in approx. 200 applications.

Schools were selected for equal representation across the country. The selection procedure credited applications indicating an open mind in terms of their possible future participation in the programme That is, if an application featured a cut-and-dried learning project or indicated that the school wished to use MUVIN as leverage to additional support for other co-operations, then that would reduce their chance of selection.

Since a school's application would typically comprise 1-2 classes and involve 2-3 teachers, our selection also took account of how classes were distributed across the form levels. Finally, we also attached importance to indications that school management supported the project applied for.

Some schools filed two separate applications, others applied on behalf of the entire school. We had learnt from the pilot phase that 'a project' should only comprise one or few classes and very few teachers, so we only allocated a second project to six schools.

Eventually, Phase 2 involved 91 projects distributed on 85 primary/lower secondary schools. In Denmark, the second MUVIN phase thus became quite extensive compared to the pilot phase, and the most comprehensive development programme done in the Nordic countries.

MUVIN as school-based development work

Being allocated a MUVIN project had the following implications for a school: The Ministry would support the school, so e.g. three teachers could be freed for 15 hours of co-operation with the relevant advisor. The latter would visit the school a number of times both before and during the implementation of at least two learning projects in the 1994-95 academic year to discuss the general aim of environmental education and their concrete plans for MUVIN projects, and

whatever experience had been made during the process. Furthermore, the advisor would occasionally attend shorter teaching sessions.

Any school receiving government grants for one or more MUVIN projects also committed itself to allow for teachers taking part in regional seminar workshops. Three rounds of seminar workshops were held, where basically all involved teachers from the region could meet up for experience-sharing and content discussion with researchers and advisors. Other activities to support the networking aspect included the following:

- A Danish *newsletter* distributed 13 times helped to spread information, views and inspiration on a current basis.
- A secretariat staffed with Mr Kristian Hedegaard was set up at the Royal Danish School of Educational Studies (RDSES), so the schools always had just one place to inquire on all sorts of issues.
- In the relevant period, the RDSES also offered MUVIN *study groups*, as part of their ordinary course schedule.
- Also, *a Nordic secretariat* was placed at the RDSES and it published a Nordic newsletter up to December 1996.
- Funds were allocated for Nordic *exchange visits* for teachers and students.

For the ten case study schools, time freed for the teachers was twice the amount given to teachers at the remaining MUVIN schools, in order to cover the extra time required for teachers to take part in co-operation with the researcher.

In the 1994-95 academic year, all participant classes were to complete a minimum of two different MUVIN projects. This was a clear consequence of research experience from Phase 1. By having students go through more than one project, we underlined the work as being development work and not just a one-off event. This aspect of our mutual agreement with the schools proved most significant for their development.

In addition, the research team also doubled as advisors to a number of school projects. This dual role – as an advisor helping to design a project *and* a researcher scrutinizing what goes on – may seem questionable. On the other hand, if we part with a positivist research concept and acknowledge that any research is tinged by 'the eyes of the beholder', i.e. by the researcher's prior notions, this is not a major issue.

In real life, quality of work – both as an advisor and a researcher – will more likely reflect that person's ability to meet the teachers' thoughts and ideas with an open mind, ask productive questions at the right moments, communicate with the students in an informal manner, and not shy away from offering

hands-on advice to teachers if this could give the process a favourable direction.

Moreover, it is absolutely paramount for the involved teachers to maintain 'ownership' of the project, and whenever teachers decide to change their planning and implementation, this should not be done merely 'because the advisor says to.'

Ultimately, the aim of both advisor and researcher role was to help make each project align as closely as possible with the MUVIN intent. Practically, however, we did depart significantly from this principle, especially where classes and teachers were trying to combine their MUVIN development work with participation in other projects or campaigns.

Introductory regional work seminars

In August of 1994, the regional branches of the Royal Danish School of Educational Studies held eight regional work seminars. One purpose was to allow participants to:
· receive an oral introduction to MUVIN,
· learn of other MUVIN participants from their own region,
· meet central MUVIN managers, together with researchers and advisors,
· get to feel that a lot of people have joined this exciting programme,
· get an idea about MUVIN as a Nordic network.

The work seminars were very successful, with a lot of stimulating discussions. There was a widespread satisfaction, and everyone was keen to get started. There may have been one or two who felt that MUVIN was something other than they anticipated. Obviously, in development work, it is vital for such misconceptions to be cleared away at an early stage.

Only one out of 85 enlisted schools was not represented at the work seminars. Total attendance was 238. Two seminars featured Nordic representatives. Apart from their good contributions, they also served to underscore that this was part of a Nordic programme.

In the spring of 1995, a series of follow-up work seminars were held, of the same dimensions as the first ones. At this point, most teachers had completed the MUVIN projects at their schools, thus enabling meaningful sharing and discussion of teacher experience. Participant feedback on these seminars was so positive that we were requested to offer another round of seminars after a year. These took place in the spring of 1996.

Study groups under the Danish University of Education

The nine branches of the Royal Danish Schools of educational Studies each held local MUVIN study groups concurrently with the participants' in-class MUVIN projects. These study groups were lead by MUVIN researchers and advisors.

Each study group was 30 lessons, with three lessons/week. Most study groups were launched in the beginning of the 1994-95 academic year, with a number of scheduled lessons. These lessons featured fundamental MUVIN principles, including environmental education understood as something beyond natural science, conflicts of interest related to the use of natural resources, and how students can acquire a notion of these, how to create more student co-influence and learning accountability, project work, teacher role, and issues concerning ethics and aesthetics. After the course and for several months, a study group would mostly meet up seldom. Instead, they would be busy deliberating and formulating their local school projects and getting response from their advisor and the other members of their study group. The last part of study group work took place well into the new year, when the members had gained substantial experience from their individual school projects that could be worked on jointly by the study group.

The advisory function

The 22 advisors associated with the school projects were pivotal to the overall development work. Their distribution reflected a wish for each advisor to assist a number of MUVIN schools, which would enable experience transfer across schools and allow advisors to enter into the spirit of MUVIN work as much as possible. This solution proved a fruitful one.

The first research paper on MUVIN Phase 1 (Breiting et al. 1994) briefly mentioned the advisor function. However, it was a key focus throughout MUVIN work and was later treated in-depth in Hedegaard (1996). For instance, two rounds of advisor conferences were held, one purpose being to develop the individual advisor experience acquired by MUVIN project advisors *and* the advisory function in development work as such.

Background material provided to schools

One experience from the MUVIN pilot phase was that it was no straightforward matter to precisely communicate the fundamental ideas of a programme to all MUVIN teachers at the schools. Consequently, in June of 1994 – before the next term – we distributed background material to all participants (Breiting and Jan-

niche 1994). Moreover, as mentioned above, we had the fundamental ideas discussed in-depth at seminars, in study groups, and with the relevant advisors.

The following overview (from the background booklet) gives a few fixed points in project work that were taken up again and again. Next, there is an outline of the conceptual groundwork that was introduced to the schools before they embarked on their development work.

A few fixed points of MUVIN-DK

Teaching at a MUVIN project school implies that during an academic year, you will repeatedly take up environmental issues in class, with a view to broadening your teaching skills in environmental education.

Environmental issues are understood as societal issues.

The MUVIN concept of environmental education is inter-disciplinary and problem-oriented, with a strong emphasis on students' co-influence and co-responsibility.

The selected environmental projects will emphasise class work on conflicts of interest related to the use of natural resources, including the involved ethics and aesthetics aspects.

Whenever possible, students should have an opportunity to evaluate and consider the ethical aspects of the relevant issues.

It is a must for students to leave the school area and look into the societal issues of which environmental issues form part, including meeting people with different opinions on the environmental issue in point.

When working on a concrete environmental issue, getting to test possible actions to address the problems can provide students with fruitful experience.

Much emphasis is placed on MUVIN as a vehicle for spreading environmental education to fellow teachers with no prior engagement in environmental education.

… cont.

> Participant classes are strongly encouraged to make contact with other Nordic schools – MUVIN or otherwise – and set up co-operations with other Danish MUVIN schools.
>
> Current updates on the progress of MUVIN work to school management, board, and teaching staff will be helpful in creating a favourable environment for the project.
>
> MUVIN-DK draws upon experience reaped from the MUVIN pilot phase, and new experience etc. will be consolidated by follow research and be communicated to other Danish schools upon project termination.

Problem awareness and apathy

We believe that previous development work and other research has confirmed a risk of growing apathy and despondency, caused by a type of environmental education that primarily seeks to sensitise students to the seriousness of current environmental issues and impart to them how they should make their *own* day-to-day behaviour more environment-conscious. If that is indeed an inherent risk with this widespread type of environmental education, this should prompt some serious soul-searching among teachers. After all, the ultimate goal of environmental education is to let students grow into responsible and action-minded citizens, capable of seeing beyond their own noses, and with the perception that they can have influence, if they earn it. Precisely this reflects in our explicit target for today's environmental education, namely to develop action competence in our students.

At the same time, the concept of action competence parts with the notion that the primary teaching goal is to impart 'correct, environmentally friendly' actions to the students. This is for two reasons. Firstly, no one can actually tell what kind of 'environmentally correct' actions will be needed twenty years from now. Secondly, action competence involves more than what relates to displaying a specific behaviour in concrete terms.

As underscored in chapter 8 on concepts, an action-competent individual is a qualified participant, who both has the mind and the necessary capabilities to be a critical actor in democratic processes concerned with society versus our natural basis – and who translates his or her participation into action. Hence, developing action competence cannot readily be operationalised into fixed, definite entities.

Given the overarching and complex nature of the action competence concept, we found it expedient, for our dealings with teachers, to focus primarily at such aspects that we believe would provide sensible guidelines for school projects. A major aspect in this regard is the relationship between teacher resp. student roles. This relationship will be further dealt with below, under 'the democratisation of environmental education'.

Environmental issues understood as societal issues

Environmental issues are often identified as a man vs. nature quandary, with daily messages telling us to look after nature. More exhaustive analyses often point to a conflict between ecological and economic concerns, which is parallelised with the quandary between man and nature. Now, nature does not have a problem with the environment. It is humanity or rather, our human society that has a problematic way of utilising natural resources. This makes it a key issue for environmental education to make students understand environmental issues as societal issues.

This, we believe, is a big step forward in the history of environmental education, and it has indeed taken us years to get this far. It has been a problem that the mere term 'environmental education' often leads to the logical conclusion that this has to be about 'teaching environment', parallel to how we understand foreign language education (i.e. as 'teaching a foreign language'), 'mathematics education' (as 'teaching maths'), and so forth. However, environmental education should deal with *the issues* in how we utilise nature, which is quite another matter.

Conflicts of interest related to the use of natural resources

From the start, the Nordic presentation of the MUVIN programme made it clear that the schools' work on environmental education was to be with focus on 'conflicts of interest related to the use of natural resources', often translated 'conflicting interests in nature utilisation'. In the pilot phase, this notion was alien to the better part of the involved teachers, and despite considerable efforts to elaborate the concept and deepen the teachers' understanding of it – both before and during school projects – we found that much useful work remains to be done in this regard. On the other hand, we also learnt from concurrent reports from all five Nordic countries that teachers took this focus as not just a major challenge, but also a productive focus point that had helped broaden their own insights into environmental issues and environmental education.

Democratisation and environmental education

Initially, many teachers wondered at the strong emphasis on students' co-influence in our guide to the schools. Incidentally, we consider this a logical consequence of our efforts towards promoting action competence in students. This in turn has an important and sometimes surprising consequence, namely the need for an often radically different teacher role. Many teachers have certainly felt they were skating on thin ice when their students were to take over a significant share of responsibility for curriculum content and organisation. Periodically, this left them in a day-to-day teaching situation marked by insecurity and fear of chaos. On the other hand, in the many successful cases where students could actually shoulder their part of the task, the result was a bunch of students with a solid commitment, which in turn often spilled over to other learning situations.

5

The MUVIN research

This chapter deals with the general research intent, as formulated by the research team in the preparatory phase of the research work, in part for internal purposes, and in part as information to the Elementary/Lower secondary Dept. of the Danish Ministry of Education and other interested parties.

Research objectives

Danish research tied into this second MUVIN phase had the following general objectives, as described at project start:

1. To gather experience on the MUVIN environmental education concept reaped from school projects, to reflect on this experience, and to utilise experiences and thoughts in future theory building and praxis.

2. To differentiate and specify an understanding of environmental education aimed at developing action competence, including a clarification of several fundamental pedagogical issues and assumptions.

Research background

This research continues our own research during MUVIN's Phase 1 *and* studies carried out in the past 10 years or so among the fellows of the Research Centre, where developing action competence in students has come increasingly into

focus as a perspective for environmental education. Despite work in Denmark and abroad, our knowledge of several fundamentals regarding environmental education is still quite incomplete, both conceptually and empirically.

Hence, the proposed contribution of MUVIN research is more qualitative analyses and development of environmental education, rather than just a greater dissemination. We consider MUVIN's key focus on conflicts of interest related to the use of natural resources a productive attempt to add a distinctive edge to environmental education, which in turn will add more sense to our efforts towards enhancing the quality of environmental education and its dissemination.

In addition, this will also help preserve the social critical potential of environmental education, now that it is officially embraced by the Nordic countries.

An important aspect of our research background is the marked shift of perspective, from teaching towards learning, evident in much educational theory research these past years. That shift is in line with our wishes for Phase 2 MUVIN research.

Finally, we see MUVIN research as an opportunity to develop the Nordic research co-operations within environmental education and to contribute to an internationalisation of the research.

Key research issues

Analytically, the key research questions fall into a concept clarification resp. an empirical category. Emphasis is on a broader theoretical clarification than arising from empirical work alone, as will be seen from the following.

We should stress, however, that for reasons of time we could not give all issues an equally exhaustive treatment, and quality of work hinged largely upon how closely education at the schools aligned with the MUVIN ideals.

Concept clarification questions and aspects of work

We sought to illuminate these questions through literature studies and discussion.

· Conflicts of interest in the use of natural resources.
· The aesthetics dimension in relation to environmental education.

- Action competence as a goal for environmental education.
- Actions vs. activities in environmental education.
- Ethics aspects in environmental education.
- Critical thinking and environmental education.
- Concept formation in environmental education.
- Problem-orientation in environmental education.
- Evaluation issues in environmental education.

Empirical focus questions

1. In which ways do learning projects influence the students' confidence in their own influence?

It is assumed that 'confidence in one's own influence' is a significant category whenever environmental education aspires to build action competence in a democracy perspective. Moreover – and partly for the same reasons – we assume 'confidence in one's own influence' to form an integral part of the school's formative mission as such. These assumptions are argued for in our analyses of formation, democracy, action competence and environmental education. These analyses will not be unfolded here. Suffice it to say that

- The formulation should not be misread as overly individualistic. Obviously, 'one's own influence' usually means 'influencing together with others' - a circumstance that will require further elucidation.
- The expression 'confidence in one's own influence' is akin to the psychological term 'locus of control', yet should not be understood as a translation of this, since we do not wish side up with the behaviourist-inspired tradition that mostly uses that concept. It remains an open question what we can apply or learn from 'locus of control' studies.
- Given the risk of apathy, bolstering students' confidence in their own influence will mostly be implied, as a goal in its own right. All the same, there might well be situations where such confidence would seem somewhat exaggerated. Here – as in any formational perspective – our education target should be to shatter naïveté and have it replaced by a more subtle and qualified perception of surroundings and self.

This first empirical question should be read as reflecting our interest in:

- How empirical work can *per se* contribute to amplifying and operationalising the concept of 'confidence in one's own influence', *and*

- which teaching strategies were implicated for the purpose of bolstering the students' confidence in their own influence (in terms of environmental issues), *and*
- whether we can empirically identify changes in the students' confidence in their own influence (in terms of environmental issues), *and*
- whether any such changes can be ascribed to intentional or non-intentional processes in the learning environment.

2. *The students' acquirement of the conflict of interest concept and how they utilise it to understand environmental issues and action possibilities.*

The question, how do students actually acquire the conflict of interest concept, is paramount, since we understand environmental issues as societal issues constituted by conflicts of interest. In this context, 'concept' should be understood as a mode of understanding, thinking or perceiving the world. The nature and level of conflicts differ, and we would want students to form a fairly differentiated conceptual apparatus to deal with them. Moreover, conflict awareness or suppression is linked up with emotions, so forming an impression of this part of the conflict-of-interest concept would also be important.

3. *The significance of different types of action experience in environmental education*

In some contexts, it is claimed that environmental education should preferably lead to action – in others that action should preferably lead to environmental awareness. Regardless, it is interesting to investigate if action experiences can be traced empirically. It is interesting

- to locate the function of students' action experience in ongoing educational planning, and
- to examine if we can empirically identify something deserving the term 'action experience', whether resulting from learning projects or not.

The expression 'different types of action experience' should be taken to imply

- That we want to examine if such differences – as specified in MUVIN's Phase 1 – lend themselves to operationalisation and empirical identification, and
- That we will not let our empirical work be trammelled by an

exceedingly hermetic action concept, as is often done in normative contexts, but which might well leave us empty-handed, if applied in an empirical study.

The completed research

Our original research schedule covered the major work elements. For collected empirical data, we distinguished between the ten selected case study schools and the remaining 75 schools running MUVIN projects. For all school projects, we used student and teacher questionnaires to obtain general information and experiences, while additional data gathering methods were used at the case study schools, e.g. interviews and classroom observations. Overall, this enabled us to collect a considerable volume of empirical data, which makes our research in MUVIN's Phase 2 the most comprehensive empirical studies on environmental education in Denmark so far.

During the actual research process, we had to place more weight to some areas and pass more lightly over others, since our collected material did not cover the aspects equally well. Obviously, this final report reflects this circumstance. Finally, some aspects are left to be amplified in future papers.

6

Action competence as an aim for environmental education

Students' confidence in their own influencing possibilities

During an interview, one student at a MUVIN school expressed his hopes for the future as follows: *'I kind of doubt whether I'll get to live my life without... actually, the world seems to be crashing down around us'*. Six months and a project later did nothing to change his concern in this respect, neither did his confidence in his own influencing opportunities grow: *'It's all getting worse and worse... Why the hell doesn't anyone do something about it... that worries me a lot... once you start thinking about it, you're depressed for quite some time, god-dammit'*.

However, unlike these statements, other interviews allow us to maintain that many students do in fact possess some confidence that they have or could have influence – although they will probably find it hard to specify how. Here is the answer of one 5th grade girl, when asked if she and her classmates are too young to influence the public debate on a motor road project: *'Probably many would say we're too young for that... I don't think we are... I believe we could carry it on, really... we were thinking of asking some questions that no one else has asked – even though it's difficult'*. When asked if she believed some people's minds could be changed on the motor road project, if the class were to arrange a public display, she replied: *'Oh yes, of course I do – it only needs to be done just right'*.

The fact that our MUVIN research has probed the students' confidence in their own influencing opportunities (see empirical focus questions, Chapter 5) reflects the overarching educational ideal, of building action competence. In a democratic perspective, it is of paramount importance to what extent citizens see themselves as potential agents in societal development.

A tentative definition of action competence

The challenge facing environmental education – strengthening the students' action competence – cannot be considered as separate from the educational perspective. Expressed in slightly more general terms, the MUVIN challenge is to provide a basis for the students to gradually develop a lasting capability and desire to join in democratic processes concerning the conflict-ridden man-nature relationship as critical agents.

This democratic perspective for action competence implies that the concept as such is not context defined, in the sense that it points towards specific action possibilities or views of our future society. All the same, it is prescriptive, since concerning our obligation to relate to issues in an impartial and critically responsible manner, and to base our actions on whatever answers we find – thus participating in developing a democratic, equitable, and sustainable society.

This notion of action competence is the outcome of an ongoing discussion over several years at The Research Centre for Environmental and Health Education, The Royal Danish School of Educational Studies. This line of thought is introduced as political education in Schnack (1993b), where the two principal elements of the concept, *competence* and *action*, are stated as follows (p. 7):

Developing action competence becomes a formative ideal in a democratic perspective. At best, 'competence' should evoke associations to something about being able to (and wanting to?) to be a competent participant. And 'acting' needs to be read into the entire complex of distinctions concerning behaviour, activities, habits – and hence actions. Strictly speaking, actions may well consist of the same movements as kinds of behaviour, yet are invariably characterised by being conscious, reflected, and targeted. Consequently, we also must understand and explain actions by referring to motives and arguments, rather than to mechanisms and causes (Schnack 1977). Perhaps, this is expressed most succinctly by the term of intentionality. Actions are intentional.

The critical approach to environmental education

The following statement reflects the view of a MUVIN teacher, that environmental education should make a point of student commitment rather than 'just' giving them insights into different views on a specific environmental issue.

Who is right, and who is wrong? Who can create change, if so needed? Who should or will pay the cost? Altogether, questions, which, however controversial, we believe, must be dealt with. In our view, merely introducing students to such different views will not do; we have to make it a habit in our students that they must make their own choices, no matter how difficult.

In good keeping with this quotation and based on the debate in Denmark and abroad, environmental education and its praxis have changed perspective over the past few years (see Chapter 3).

This change of perspective is also reflected in the itemised list of issues found in the teacher background material that makes the pedagogical basis of MUVIN (Breiting & Janniche 1994, p.14). This material underlines, among other things, that environmental issues should not be seen as problems related to nature, but rather as societal issues. The key problem is people, and how they use natural resources – and not nature in itself. As a result, environmental issues are extensively linked to concepts such as societal organisation, development, power, and economics – while obviously also to concepts such as oxygen content and acid rain.

Possible solutions and actions need to be considered in this societal perspective. It stands to reason that having environmental problems solved remains first and foremost an adult responsibility. All the same, it is the schools' responsibility to encourage and prepare their students, enabling them to reflect critically and take part in debating future environmental problems from a societal perspective.

Another task for education, if environmental issues are to be tackled democratically in the longer term, is to develop the students' willingness to engage actively in such issues, individually or together with others. Consequently, the action perspective needs to be thought into a critically oriented environmental education. Knowledge and conviction about what you feel needs doing are too little avail, unless somehow translated into action.

This approach to environmental education also underlies the deliberations associated with the MUVIN methodological concepts. In MUVINs view, it would

often be beneficial for students to do problem-oriented and cross-disciplinary work in teaching and learning contexts, allowing them to perceive environmental issues as truly societal issues.

Altogether, these views serve to underline the wish for a sharpened profiling of environmental education. The social-critical role thus taken on by the school serves to provide students with a more acute understanding of how problems originate *and* an improved basis for suggesting solutions.

Conflicts of interest make the starting point

Experience reaped from a nationwide teacher course in environmental education, conducted by The Royal Danish School of Educational Studies, 'LK-88' (Ed. Schnack 1990), and MUVIN Phase 1 (Breiting et al. 1994) show that a naïve good guys vs. bad guys notion often prevails among students, meaning that specific people or groups (e.g. a farmer or manufacturer) are made to blame for environmental impacts. These persons and their action patterns may indeed be elements of the environmental issue at hand; however, in order to understand the issue, we also need to consider the fact that these individuals are often subjects to structural mechanisms and forces from which they cannot directly extricate themselves. Therefore, in order for environmental education to qualify students to tackling future environmental issues, a comprehensive, reflective, and critical approach is needed. Hardly ever is this just a matter of finding a scapegoat.

Environmental education is a quest for meaning, as much as a quest for knowledge. It goes without saying that considerable knowledge of environmental issues is required, inclusive academic knowledge. For instance, a 5th grade pupil might well have benefited from a few basics about electricity – while working on a topic on power consumption and environmental problems, he was absolutely certain that the power consumption of a family house could be computed simply by counting the number of wall outlets. However, the value and evaluation aspect must also be given a prominent place in the teaching. Another significant task is to uncover the more fundamental inherent interests and values of the issue, in order to relate them to possible solutions, make a critical choice between them, and finally suggest whatever action is believed to be most appropriate.

Thus, in our general experience – both from a number of school visits and from the teacher interviews – students tend to improve their understanding of the complex relations of environmental issues, if conflicts of interest are made the pivot of teaching. The thing is that this particular perspective allows

students to realise and identify the reasons why environmental issues cannot just be solved with smart technical solutions.

At the same time, the conflict perspective suggests that MUVIN ideas of environmental education are closely akin to fundamental ideas in critical theory, for instance as formulated by Gibson (1986, p.5):

> *Critical theory argues that the identification of conflicting interests is more truly revealing than other approaches. It yields valid representation of reality and probes more powerfully into the nature and causes of our social world. In its search for interests served by knowledge or social practices, critical theory claims to lay bare the springs of human action as it exposes the roots of injustice and inequality.*

Thus, although the critical approach to environmental education rests on the understanding that taking off from the conflict perspective is useful in education, this does not imply that MUVIN intends to foster pessimism, apathy and unnecessary anxiety. Quite the contrary. Still, if we want to help students understand their surrounding environment, then there is no alternative to having them work on complex entities that embody such conflicts.

Now and then someone voices the opinion that especially for the younger pupils, working on issues and conflicts with menacing prospects is just too tough on them. However, reports received from MUVIN teachers do not indicate this to be true. After all, most students are already familiar with the scarier perspectives of many major environmental issues. Actually, a deeper understanding of inherent conflicts of interest could just as well serve to demystify them and boost student engagement. As it is, most participant teachers did in fact find this approach to be an asset. In their report, a teaching team for grades 1-3 (7-10 years old) puts it as follows:

> *By starting out from a conflict perspective, we believe that pupils develop towards being observant and critical individuals, and that this will enable them to consider matters from several perspectives.*

Obviously, the task is to help students develop skills enabling them to deal with this type of issue in a manner that will not produce unwarranted anxiety and action paralysis. As often underlined by e.g. Fien (1993) and Giroux (1989), the all-important challenge is to complement 'the language of critique', which helps identify the issue at hand, with 'the language of possibility' which helps make a solution and action visible, meaningful, and feasible. This complementation is necessary in order to foster empowered individuals.

> *It is important to recognize that although educators often refuse, subvert,*
> *and, where necessary, critically appropriate dominant forms of knowledge,*
> *this does not mean that they should continue working exclusively within*
> *the language of critique. On the contrary, the major thrust of a critical*
> *pedagogy should centre on generating knowledge that presents concrete*
> *possibilities for empowering people. To put it more specifically, a critical*
> *pedagogy needs a language of possibility. (Giroux 1989, p. 103).*

This challenge has also been an essential part of environmental education in a MUVIN perspective, and in concrete terms this has caused various elements to be given higher curricular priority.

One such element is that the curriculum will include active and practical projects, during which students will move beyond the school confines to study an issue in its actual setting, including contacts and conversations with relevant stakeholders. (see Chapter 9).

Another element is the qualifying skills and capabilities for critical thinking that students may obtain by working in a manner addressing issues and conflicts. Several purposes are served, when pupils learn to search for relevant information, question its validity, measure and balance pros and cons, discuss and inquire into habits, traditions and prejudices, find possible flaws and omissions, investigate potentials for change, and suggest alternatives and possible action several purposes are served. For one thing, students become a little more qualified to find out how things could possibly be connected. What is more, they will likely also become more eager to take an active part in environmental issues in a less anxiety-ridden and action-paralysing manner, since better equipped to 'read' them. At the same time, social skills such as communicating, listening to others, working together, being responsible to one another can be strengthened. In addition, such skills can help to turn a pessimistic perspective into a more constructive one.

A last element is that students make their own experience in joining actions towards changing the environmental issue they are working on. Such participation can inform their understanding of the environmental issue in several ways. This, of course, involves factual understanding of the issue at hand, and understanding the action process itself – including possible barriers and obstacles. Another important aspect is that such actions offer a unique form of experience, which most often presents itself whenever you have been personally engaged and involved (see Chapter 7).

Components of action competence

Action competence can be described in more detail by a number of characteristic components, all of which must be seen in the light of the previous chapters. Finn Mogensen (1995) has provided a tentative analysis of the aspects of action competence based on the categorisation in the figure below. In MUVIN, we subscribe to this line of thought, although the components – in terms of focus questions and their major aspects (see Chapters 5 and 12) – have a slightly different twist. Regardless, we need to insist that action competence cannot be viewed as merely the sum of its elements. Components, dimensions, or aspects can be brought out by analysis, but they cannot be separated, neither theoretically nor in pedagogical praxis.

Cognitive

Knowing about the issue	Knowing how to do

Value based

| Search for normative arguments | **Action Competence** | Be aware of arguments communal potentials |

Social

Have the courage and feel responsible for action	Have preparedness and inclination to act

Personality related
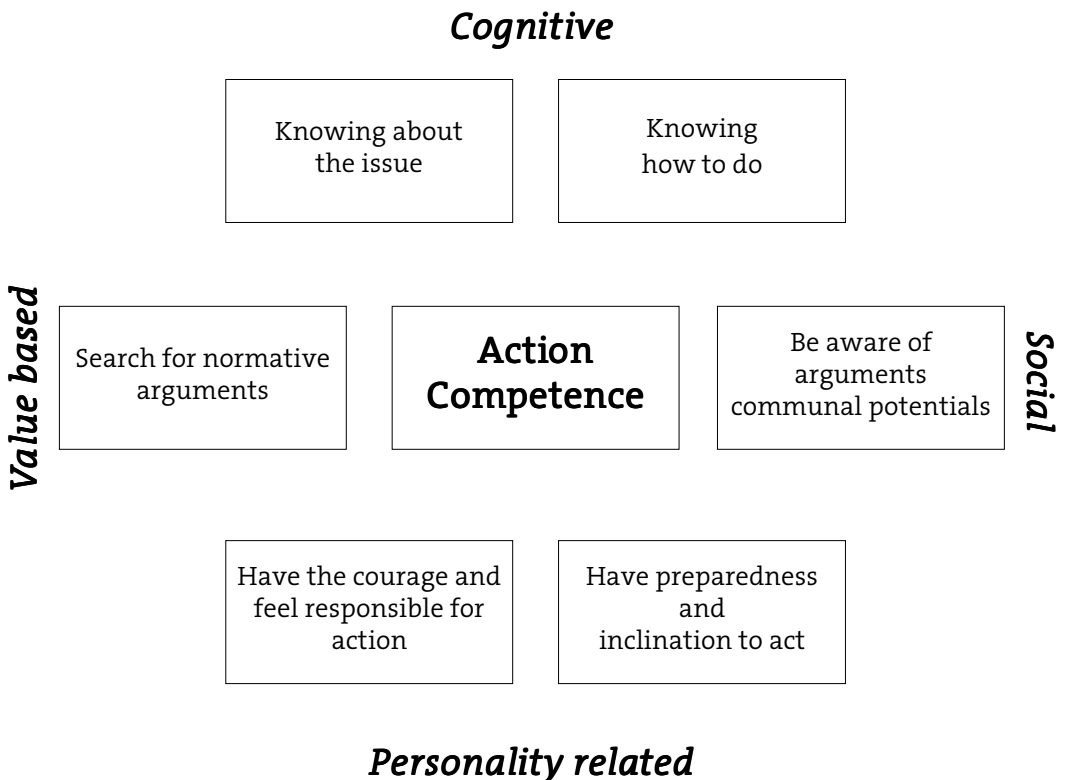
(Inspired by Mogensen 1995)

Obviously, action competence includes knowledge of environmental issues – objective facts and normative aspects as well. MUVIN is based on the assumption that education will strengthen action competence in the students,

whenever they subject an issue to critical investigation, analyses, and reflection – both in terms of its scientific aspects and its stakeholder-related aspects, which when combined can motivate how natural resources have been utilised.

Action competence implies that you will include normative arguments and views in a discussion of what constitutes the relevant issue, and what alternatives and visions can be suggested. This also serves to indicate that when dealing with environmental issues, it is necessary to reflect on normative aspects. In other words, that debating ethical issues makes sense.

Action competence is also about how – on your own and jointly – you can help to neutralise an environmental issue. It comprises both knowledge and hands-on experience as to which practical rules apply when you are acting in a democratic and responsible manner. Collective action experience could be of particular interest. Possibly, more than experience gained on an individual basis, these are potent antidotes to apathy, and they also embody a kind of reference to the joint decision-making processes that are a 'must' of a democratic tackling of environmental issues. In this perspective, a school class represents a community that will make a good starting point for experience in relation to this type of problem.

The personality dimension of action competence consists in the more profound and often markedly emotional impulses to action. These can be decisive in transforming action motivation and wish into actual empowerment. Anyhow, we would be mistaken to assume that our actions spring from sober, rational deliberations and calculations alone. There are additional aspects to be considered. These personality-related aspects are the willingness, courage, and inclination to involve oneself. And this is also a matter of taking responsibility for one's own and others' lives and trusting one's own power of action or influencing possibilities.

Hence, action competence is seen as a personal capacity embracing rather more than the intellectual-cognitive domain. It involves the entire personality, including many of the mental performance potentials and dispositions.

Action competence and critical thinking

As previously mentioned, critical thinking is a core component of the action competence concept. Competence implies responsible thinking. 'Responsible' means a certain willingness to motivate why you take one standpoint and choose one line of action instead of another. In this respect, action competence is closely connected with critical thinking, which covers both reflection and

commitment. Basically, the appropriateness, direction, and content of action should always be debatable. Or to put it differently: The important thing is to qualify a person's willingness to act – alone or with others – as suggested in the following statement made by a proponent of the American theory formation around 'critical thinking' (Brookfield 1987, p.254):

> *As critical thinkers we are engaged in a continual process of creating and re-creating our personal work, and political lives. We do not take our identities as settled; rather, we are aware of the scope of development in all areas of life. We see the future as open to our influence. We regard the world as changeable through our own individual actions and through collective action in concert with others who share our commitment to broader political and social changes. We do not accept the idea that because the things are the way they are now, they must always be this way. And we do not think that we (or anyone else) have the ultimate answer to life's ambiguities and problems. But we do have confidence in knowing, that those things in which we believe, and the actions we take arising out of these beliefs, spring from a process of careful analysis and testing against reality - in other words, from critical thinking.*

Moreover, with reference to the German tradition around 'critical theory', we should point out that being critical does not imply being 'against' or 'negative'. Instead, it implies placing circumstances in their circumstantial contexts and taking a sceptical stand vis-à-vis opinionated views and manifestations. Many societal aspects appear to be given and static entities, without history. Thus, they seem to exist with the inherent necessity of a law of nature. However, as expressed by Habermas, many societal relations are 'quasi-causal': At face value, they appear to be of an imperative or given nature without valid substance. The critical-theoretical reflection has as its task to penetrate beyond such relations – while not denying their existence and function.

This arguably makes stiff demands on the students, and all of us. However, the critical dimension behind the formative ideal of action competence inevitably involves a gradual breaking down of the naïveté with which we tend to meet the world.

In this, utopias, visions, and value clarification also play an important role. Our students need to learn not to take the given for granted. Instead, in an expression lent from Elbow (1973), they must practice 'playing the doubting game'. What he means by this is that students must learn that they should not take all so-called facts at face value – neither the one about acid rain, nor the one that says that 'development' cannot be swerved.

Thus, 'the critical' dimension indicates a specific way of relating to one's existence, for instance involving special attention to absolutes and practices that are merely justified by their long standing, or 'that's probably the way things have to be'. Critical thinking is also visionary thinking.

7

The action concept in education

A student group is busy examining a nearby natural area, which also has a brook. Based on their observations, the students write a letter to their local council:

> ... *You have been asked several times to clean up the stream, yet never had it done. THAT'S JUST TOO BAD. We measured practically no oxygen present. The water is black, stinks, and there is no animal life. Therefore we think that you, Herlev local council, MUST take action.*

The municipal technical administration replies, among other things, that the stream receives only rainwater and no industrial discharge (which the students assumed to be the cause of the stinking stream). Moreover, the administration states that the maintenance of the stream in question rests with another town council, and that due to water catchment the stream bears so little water in summer that it can perhaps look unpleasant. Yet, not a word about the stench and possible pollution.

The students accept this information. However, on their own initiative, they clear parts of the stream and banks of visible rubbish. Later, they revisit the stream together with the municipal environment officer, on which occasion they are told that due to overflow of sewage they are never to put their hands into the water. This comes as a surprise, since the students have already been told by the municipal administration that there is no problem with the water. However, since this is right before the summer holidays, this experience is not followed up.

In many MUVIN projects, teachers reflected on the action perspective in education and its implications for the development of action competence. The above example raises several issues relating to the 'doing something for the environment' aspect of education. Principally, this involves isolating the action concept proper: Does it involve concrete action (e.g. the students clearing the banks of the stream), or does it rather involve interfering in decision-making processes at the local level, e.g. action at the structural level? Next, it involves rather more fundamental reflections, as to how making experience in taking action individually and/or collectively, as part of the curriculum, could matter to the students.

This chapter will discuss those and other issues related to the action concept in education, based on experience gained from MUVIN projects.

The action concept

Both in international thinking on environmental education and in our domestic debate, several voices have stressed the importance of the action perspective in education (e.g. Fien 1993a, Schnack 1993b, Breiting et al. 1994, Jensen & Nielsen 1994, Waals 1994, and Mogensen 1995a).

Further to this discussion, the action concept itself has often been discussed and defined in relation to other concepts such as 'behaviour' and 'activities', thus allowing us to make it more clear what is the implication of making education more action-oriented.

The action concept implies a deliberate commitment in the acting person – that you have considered the matter and decided to act. Often, the behaviour concept will not encompass this aspect. As a result, 'behaviour' and its derivative concept 'behavioural modification' priate in the shorter and/or longer term? Thus, whenever we talk about modifying student behaviour as an element of environmental education, this tends to signal an education paradigm based on prescriptions and behavioural modification, rather than on democratic elements such as participation, dialogue and co-influence.

Another distinctive feature of the action concept is that whatever action you choose, it will address solving the problem or changing the conditions/circumstances that first created the problem. In adding this aspect to the action concept, this is qualified in relation to the activity concept. Hence, actions can be seen as specific activity. This criterion has to be included, since there is a tendency for any education involving activity, in which students perform a number of practical tasks (e.g. excursions, measurements) to be considered 'ac-

tion oriented'. Such initiatives are often quite valuable and necessary in education; however, we chose to not consider them as actions in a narrower sense.

These two criteria, about intentionality/deliberate commitment and addressing the root of the problem make the action concept quite exclusive. Thus defined, the concept provides us with a shared language, which allows a meaningful discussion of the action concept in an educative context. The more vague our action concept, the more difficult to specify the concept of action competence.

This understanding of action as something intentional coincides with the action/behaviour distinction of the English-language analytical tradition (Oxford philosophy), and with the more general action concept, evolved within the development psychology tradition known as Cultural-Historical School (Leontjew 1983).

The action aspect in education

When asked directly during interviews, teachers express a wide range of views on the action perspective in education. However, several teachers stress the need to respect that students should not be used as instruments according to the teachers' personal sympathies and antipathies.

> *Action possibilities in environmental education are hard to handle because, after all, we're in an educational context. Making activists of the students is not the task of the school. That is their own choice.*

Upon discussing the above issue at a meeting, one teacher writes to the advisor:

> *At your last visit, you asked us if we were involved in training 'mini-activists'. Actually, I've been thinking about that a lot. Being an activist is no easy matter — you need to be sure, you're fighting for a just case. Not every action or change is for the supreme good; regardless, my sympathies lie with the person of action. I hope that education, more than anything, will help to produce just a few students who are 'thoughtful observers' and will try to find out about the true facts of a case before action (they should not be mere spectators).*

In keeping with the quoted passage, environmental education does not prop-

ose to develop activists here and now – getting the students to work as 'mini-environmental officers'. We should always be mindful that the primary goal of environmental education is not to protect environment or nature, but rather to develop action competence in the children. Of course there is a relation between the two, yet they do not amount to the same thing. Education is not primarily meant to benefit nature/environment, but to benefit our students. Obviously, in the longer term, we intend to give our students the necessary skills to handle and attend to environmental issues; but at the end of the day, school and education are about educating oneself – and not about solving future problems.

There are two different perspectives on education. In the first case, the educational target is of a formative nature, since concerned with a specific critical way of relating to life (see previous chapter). In the second case, the educational target is limited to acquiring a set of specific behavioural patterns that can help to solve environmental issues here and now.

An evaluation to determine whether the first target has been achieved should consider, if the students are prepared to and master the art of involving themselves in given issues in a democratic manner and form their own criteria for choice of action. In this, the action aspect should be seen in a more long-term perspective, the direction of which is not given in advance. By contrast, an evaluation of the second target can be based on whether it was successful in making students adopt a more environmentally friendly behaviour. In other words, a direction for behavioural modification is set beforehand. In comparative terms, that makes it easier to evaluate. We can draw up endless numbers of different influencing methods, the characteristics and effects of which have also been studied in relation to environmental education (Hines et al. 1986).

Of course, influencing one another's behaviour is necessary, both in schools and in society at large. This is part of social life. And in many venues of life, limits to our individual scopes for self-expression are unavoidable in day-to-day living. For example, if a substance is found to have adverse impacts on the environment and deteriorate the living conditions of wildlife or humans, there is a lot of sense in banning that substance, thus enforcing a specific behavioural pattern. Such issues are substantial in environmental education.

For the present context, as previously mentioned, we found it essential to apply a fundamental philosophical distinction between the action vs. behavioural perspectives. And since we consider environmental education as a part of democracy education at school, action competence development is bound to be the overarching perspective.

A host of diverse influences from in- and outside the school will play into the students' gradual development of action competence. These all have elements of power and authority. For the sake of clearness, we will apply a slightly rough tripartite model: Behaviour adjustment, behaviour modification, and action competence development.

Behaviour regulation amounts to imposing laws, regulations, statutes, prohibitions, sanctions, taxation and other instruments that overtly encourage or even force the relevant individuals to do or abstain from specific actions. These have a concrete and explicit target, and their success criterion is whether behaviour is changed as desired.

Behaviour modification also results from many types of influencing. These are about appealing to people's intellect, emotions and/or conscience, in order to make them behave in a specific way, possibly change their habits or attitudes. Here, too, target and direction are given *a priori*.

In contrast, developing democratic action competence is a less specific matter. No concrete targets are given in advance. Through the interplay between knowledge, attitudes, experience, and independent reflection, an individual will develop – together with others – a critical awareness, and a willingness and ability to involve him-/herself. The success criterion is, whether students end up as more mature, and self-reliant persons, who are capable of critical thinking and will become responsible individuals and qualified participants in democratic processes.

Behaviour regulation displays the most overt use of power. In itself, there is no harm in that. However, the democracy perspective makes it all-important *who* exerts such power over whom, in what capacity, and to what extent such behaviour regulations are fair and responsible to weaker citizens. This is precisely what action competence is for – enabling individuals to take part in the use of power, and hence behaviour regulation, in a critical manner. This is the life blood of democracy.

Type	Content	Direction and target	Success criterion
Regulation of behaviour	laws, statutes, provisions, etc.	given	desired behavioural pattern
Modification of behaviour	appeal to intellect, emotions and/or conscience	given	desired behavioural pattern
Developing democratic action competence	critical awareness; willingness and ability to involve oneself	open	independent participants, capable of critical thinking

Action experience

The MUVIN ideas implicitly assume that actions in education should first and foremost be considered in terms of their pedagogical significance in developing the students' cognitive faculties – and not in terms of the material-societal importance of such actions. Or, to put it a bit differently: In an educational setting, it is important to discriminate between the value of an action in experiential terms (i.e. the action as a pedagogical tool, the value of which is based on pedagogical criteria), as opposed to its value in concrete-material terms.

One MUVIN teacher team was asked their opinion of the pedagogical value of starting out from students' action experience, and of including the action perspective as a curricular element:

> I, for one, find it invaluable - in terms of democracy – that students get to be far more conscious of their own possibilities for taking part in influencing and acting, which also strengthens their minds.

or

> ...at the personal level, such as self-confidence and strengthening the students' opportunities and confidence in their own actions – no doubt that will be an asset. I can go along with that, and in a social setting, too – in the sense that if a class can be in consonance about it, that will be an asset, too.

In another teacher team, the absence of an action phase was perceived as a definite omission:

> *The only improvement we can think of is that, in too many cases, the*
> *students did not get to see a concrete action in relation to an environmen-*
> *tal improvement.*

In general, students also seconded the value of implicating the action aspect. In our comprehensive questionnaire study (see Chapter 13), they were asked about their attitude to the view that, as a curricular element, students should try to take action vis-à-vis an environmental issue. In response, nearly 3/4 of those who answered the item indicated a positive attitude (n = 1150).

A distinction can be made between experience-based cognition and knowledge-based cognition. The former will presuppose and unfold in relation to an action, while no such condition attaches to the latter – as detailed in the chapter on the conceptual development in students. It would be rather more akin to the analytical discursive-symbolic form of cognition described by Hohr (Hohr 1994), since anchored in e.g. transferred information.

The experience-based cognition can be observed in connection with three levels of action experience, all of which are valuable in developing action competence (Mogensen 1995b):

· *declarative cognition*
    cognition of the objective content of a given action – i.e. what the action concerned. This can be the cognition of or understanding of circumstances around a given 'object of action', in which you put words and concepts to those circumstances – who, what, and why.

· *procedural cognition*
    cognition of the procedure and the action process – how the action was accomplished, and including cognition of any barriers met en route. In other words, this experience will produce a cognition of whatever resources can/will make the action a success or failure.

· *meta-cognition*
    a cognition that can seldom be explicitated, yet however may be the most decisive experience that an accomplished and successful action can produce: a multi-faceted sense of having accomplished something, and with some degree of success. It refers to a sense of confidence, that involving yourself – alone or with others – makes sense; confidence that you can contribute to influencing your conditions; and it refers to the satisfaction of having completed whatever you set yourself to accomplish and realize.

Several types of action experience

For the action perspective, we can distinguish between different degrees of or-
ganisation and levels regarding the action to be carried out – all of which yield
different types of action experience. The first regards whether an action is
individual, 'private' – or is carried out as a joint undertaking. The second regards
the target of an action: are individuals to change their behaviour, or does the
action target changes to structural-societal relations that will facilitate a solu-
tion.

In relation to the complexity of environmental issues, all action types are
relevant: action – alone or jointly – targeting either one's individual behaviour
or structural-societal conditions.

This reflects in some of the MUVIN projects. In one project on battery hens,
the 5th grade students found that if we would just stop buying eggs from
battery hens, this line of production would become uneconomic.

This solution compromises between an individual vs. a structural solu-
tion to a problem. On the one hand, the students are right: If no one wants to
buy eggs from battery hens, then they will no longer be produced. On the other
hand, the students do not realise the entire explanatory complex at structural
level, which inter alia is about production conditions for egg producers.

At a later point of their project, the students decided to make a questionnaire
survey, with the help of a journalist. The responses from this survey surprised
them a lot and occasioned some fruitful in-class discussions on attitudes vs.
behaviour, and about what kind of factors often weigh in heavily in situations
with problems and tradeoffs. The students summarised their views as follows:
*'We shouldn't cage hens. Too many people say one thing – and do something else.
People are so strange!'*

Finally, their indignation at such (to them) apparently illogical discrepancy
made the students propose that together, they would approach a journalist they
had met via the questionnaire survey, in order to voice their viewpoints. This
resulted in a feature in the local newspaper. Thus, the students did not feel that
the individual action level was 'enough'. They also had to try other ways of
acting – in this case at the societal level, by trying to influence others.

When actions are to have a mainly pedagogical function in education, then
a school setting has to attach much importance to shared vs. individual
experience. Essentially, experience is of course individual and personal *per se*.
We cannot make the experience of another. But we can still experience the *same*
as another person. In that case, you will have some shared experience, or
experience with common features.

Such shared experience is extremely valuable in education, notably if a shared awareness and conceptualisation can be developed around them. We call them collective experiences (Jacobsen, Schnack and Wahlgren 1980, p. 64-79, and Jensen & Schnack 1995, p. 216). A sufficient volume of relevant shared experiences is not always present, far from it – or they may not be accessible to processes in education that can make them collective. For both these reasons, we need to take an interest in experiences *made* jointly. These are often a necessary supplement to experience made individually, and a catalyst that enables to connect learning matter with our student's experience universe.

To this must be added the social aspects of experiencing together. This adds atmosphere to the project and to the class in general, and what is more, it also colours the very nature of such experience. It is beyond doubt that experience gained with others, with whom you have or thus get to have something in common, takes a special role in a person's consciousness and personality formation.

Another major argument for working with experience made in common and with collective experience in education is of a more political nature. Over-focusing on individual experiences can create a tendency to individualising environmental issues and whatever action is needed to solve them. Most of the time, solving environmental problems will also require intervention at the societal and structural level.

Potentials in empirical methods - the small steps approach

Although both teachers and students have come to realise the importance of action experience, we have few instances on record showing that students made such experience during the projects. Now, how can that be? We have already pointed to various problems concerning action experience. At the same time, we must admit that this was not a MUVIN requirement in the same way as the work on conflicts of interest. All the same, more than half the students from grades 5 and up maintain in their questionnaires that 'they have tried to take part in solving an environmental problem in-class', see also Chapter 13.

We have probed some students' activities, which we felt could implicate an action potential:

·   *As-if-situations*
    1st to 3rd grade work on trout pond farming by the river Gudenåen, and
    their teachers make the following comment:

We found using roleplaying to be a highly important educational tool. The students were to identify with the relevant stakeholders and put words to their individual parts. That was often a difficult task, since they so wanted to come up with a solution to the conflicts with a happy ending. However, that was not readily available, so they had to realise that the world is not black-and-white.

The students worked out 'interest profiles'. They drew or cut full-size silhouettes of the fish farmer and the angler and used speech bubbles to let them express their views regarding the use of the river. The students had the varied views made clear, and began to understand that weighing the pros and cons is not all that easy. With this as their starting point, they performed roleplays and small puppet plays, in which they let their actors retell the conflict perspective and also suggest possible solutions.

The point of such 'as-if situations' is that they can provide fruitful frameworks for the students to discuss and suggest various potential actions, which in this context can be seen as preliminaries to the action choices of adult life.

· *Qualification of skills*
   The projects offer many instances that students have acquired skills in making contacts outside school, interview citizens, make questionnaire surveys, approach municipal technical administrations and other authorities in order to ask concrete questions (clarification of case situations), and also trying to influence decisions and launch actions. This last part is illustrated by the initial case of this chapter. Such skills are essential elements of an action situation.

· *Activities that develop confidence in one's own co-influence*
   Presumably, the students' confidence in their co-influence is a major element of developing action competence. We will mention a few examples of the potentials students feel in various activities. Many students 'grow' and feel more important when they succeed in getting local newspapers, local radio, etc. interested in their work, and when they feel they have or gain influence. For instance, student interviews show that the class mentioned above believe that their features in local newspapers helped to influence people's attitudes towards battery hens. Moreover, the students' co-influence surely coloured their confidence in their own influence.

Barriers related to the action perspective of the projects

Why is it so difficult to integrate the action perspective in the projects in the understanding described above? A number of explanations suggest themselves - assuming that the teacher (and the students) *do* find this to be a significant dimension:

Very few teachers explicitate an affinity to specific educational theories. We have already (see Chapter 6) adduced that the development of action competence is closely allied with critical pedagogy. In many cases, a critical pedagogical awareness would cause teachers to ponder and question conventional teaching and whatever everyday problems and barriers crop up, when they try making their teaching more 'progressive' and outgoing – more action-oriented.

However, this paradox does not only result from their general teaching approach, but also from how they go about organising it in concrete terms. Since it is prerequisite for critical environmental education to start off from an issue (obviously an environmental one), it will come across as problem-oriented, to both students and teachers. The action perspective will not be perceived as natural to the same extent, if the project has been distinctly topic-oriented. A topic entitled 'Energy' will not invite an action aspect the same way as a topic entitled 'Under which circumstances is it possible to increase energy production in Denmark using renewable energy', since the latter title signals a topic that is both problem-oriented *and* formulated as a problem.

Another reason for the limited action perspective may be general confusion of ideas. Precisely because our advisors work at the schools focused far less on the action aspect than on the conflicts of interest, we may also have been remiss in finding out what teachers actually imagine when we talk about developing action competence in the students. Quite a few teachers will consider their own teaching action-oriented, in the sense that their students are investigative, active, get out and about, approach resource persons, etc., and become engaged in their projects because they find out that they are welcomed: People readily answer their questions and share their own knowledge. These will often be activities with the purpose of investigating and getting answers (often about case situations), yet not activities decided by the students themselves and targeting a solution of the environmental issue in point. In other words, such activities do not come within the concept of acting.

Conclusion

This chapter has illuminated the action perspective; however, this was not done from the simple assumption that action will *per se* lead to action competence. What matters is not just concrete action and action experience, but the interplay between theoretical and practical aspects, between dialogue and collective discussion, between teacher-controlled education and participant-controlled education, between group work and individual work, topical and non-topical, etc. Yet *also* with action-oriented project sequences.

8

Concept formation in students

Environmental education is about the world *and* about ourselves – and not least, about how we relate to the surrounding world. In this, our outlooks, or how we perceive or think of the world, obviously play a decisive role. And in this case, 'our' refers to the individual, the group, society and our culture. Outlooks are not purely imaginary, yet evolve as part of a life lived.

How we perceive the world and our interactions with it is an extremely complex phenomenon, embodying forms of experience, emotions, conceptions, ethics, visions, etc. When discussing academic quality in education, we may be inclined to fasten only upon the students' acquisition of the specialised concepts. However, general concepts may be no less important, as shown in the following chapter. Regardless of circumstances, it must be important for education to help students develop a maximum of common concepts - general and academic alike – and in the best possible agreement with what is found to adequately cover such concepts today.

What does it take for a student to master the concept of 'luxury'?

The following are transcripts of interviews with a 4th grade student (i.e. 10 years old), conducted while the class was working on a MUVIN project on resource consumption, built around designing first 'luxury houses' and later 'environmentally friendly houses'. At the time of interview, the work on luxury houses had been completed.

I: When you were to fit your houses, you were told to make them real luxury houses. Now, what does it actually mean when a house is a luxury house?

P: That's that you don't have to do anything much, you have many electrical appliances, so you don't have to spend a lot of time whipping it all with a beater. That you have a washer, so you don't have to do it by hand; a sauna, so you don't have to use a towel.

(Girl, 1st interview)

On re-interviewing the same girl 3½ months later, when both MUVIN projects were concluded, we had the following conversation:

I: What does it mean that something is luxury?
P: That you don't have to do a lot yourself, that you use an electrical beater and a washing machine – and then, you also use oil for heating.

The wordings of her replies are remarkably similar, and we found the same to be true when comparing other parts of the interviews. Thus, we can safely assume that they are a fair representation of this student's notion of luxury.

Also because of the MUVIN project, this sensible 4th grader has had an opportunity to use terms such as luxury, luxury gadgets, and luxury house lots of times. At this point, she can use the word 'luxury' so no one would prick an ear at it. She can both follow a conversation in which the word occurs, and she will spontaneously use the word in speech and writing.

The word or 'term' is one aspect of conceptualisation. Obviously, a term has no meaning to the student until its intention is also understood. However, although we may well learn terms and memorise them, we may still be clueless as to their meaning, i.e. intention.

As for the intention of 'luxury', we found that – like most of her classmates – this girl has acquired a functional concept of luxury, since able to use it in communication, and this is a major step. There is little doubt that among the aspects we need to keep track of when evaluating student outcomes in education, this functionality is one of the most important ones. In the relevant project, the luxury concept ended up as a frequently used term, and 'luxury houses' was later contrasted with 'environmentally friendly houses'.

The luxury concept combines readily with everyday expressions such as 'things' and 'house'. In reality, the concept of luxury was introduced to the class precisely via 'luxury house' and 'luxury things'.

Typically, when acquiring the intention of a concept, a student will first get to master aspects which – intellectually speaking - are easy to visualise in concrete terms, and those closest to the student's everyday life and conceptual universe. Other aspects of the intention may only develop in the student upon further reflection, either 'spontaneously' or in connection with activities started in-class.

The following conversation occurred later in the 2nd interview with the same girl:

I: Now, what if all people would rather have that kind of luxury house, but it was best for the environment to have environmentally friendly houses?
P: Well, but then couldn't they make some environmentally friendly luxury houses?
I: Is that possible?
P: I'd say so.
I: Then, how were they to make them?
P: Well, you could build a large house, and then you could – those who owned it – they could quit driving big limos and leaving all doors and windows open so they waste heat. And use oil for heating, but make sure to keep the heat inside and take care of the environment.
I: Now, if someone living in a cold developing country were to look at your environmentally friendly houses – how would they feel about them? Would they think of them as kind of environmentally friendly houses, or would they rather think of them as luxury houses?
P: Well, they'd probably see them as luxury houses.
I: If need be, could we make do with less than those environmentally friendly houses? - Some smaller ones, and less expensive to build, but environmentally friendly all the same?
P: Well...
I: Is there anything in particular that people need for habitation and living?
P: Yes, a freezer and a refrigerator and food.
I: Can't one live without a freezer and a refrigerator?
P: I suppose one could – then you'd just have to keep your things outdoors.

When teachers evaluate the students' potential conceptualisation of 'luxury' in the context of environmental education, the most significant aspects should probably reflect that luxury is something beyond the necessities of life, and that what a person considers 'necessities of life' is a relative matter, since depending on historical, cultural, and material conditions.

Nevertheless, what happens in practical terms, is that students typically acquire or are able to use the term (concept) and can put it to considerable use at a relatively intuitive level. Students have no problems identifying things they would term 'luxury things' (the 'concept extension'); however, they find it far more difficult to indicate which criteria they use for their evaluation, the defining characteristics (the 'concept intention'). A teacher can easily overlook the difference (Leach & Scott 1995), even though it could be quite vital to the student's concept formation. We might even think of it as a second stage of conceptualisation, and one that can be stimulated by the learning situation in particular. As for the 'luxury' concept, an amount of thoughtfulness in defining the criteria of what we choose to call luxury could help students find out for themselves – with the teacher as an intermediary – that the distinctive features of 'luxury' are not just 'abundance' and desirability, but it is also associated with something of a relative nature, and a perception that you can live (happily) without it.

In this context, we should also mention that precisely this is a natural sequence for acquiring new concepts – instead of setting out with having the concept defined (the familiar textbook approach), which implies that students are expected to acquire the concept intention *before* working with concept extension.

The students in this MUVIN project and the associated interviews only displayed a dawning understanding of these components of concept definition; all the same, this class will always be able to return to them, since sharing a powerful memory of the project. In connection with new topics, they will still present themselves as a potential reference and a source of renewed reflection.

Have concepts been in focus?

Given that MUVIN stands for environmental education with a particular emphasis on real life learning and students' co-influence, it may leave the impression that limited weight is given to conceptualisation. This is both true and false.

It is true that MUVIN is not 'environmental science'. We deliberately avoided the term in order not to evoke any associations with a conventional subject or discipline with a predetermined learning matter, or curriculum. Since MUVIN projects are typically problem- or topic-oriented realistic projects, they tend to appear without that much subject knowledge – and consequently, one is easily led to assume that conceptualisation does not figure.

Probably, for some projects, it is also true that conceptualisation has had little impact. For instance, we recorded teachers stating that their students could definitely have learnt more by 'ordinary teaching' – meaning: have acquired more subject matter knowledge by ordinary subject teaching. (However, a quantitative comparison of fundamentally different learning outcomes is difficult, nay impossible.) We also recorded several researcher observations that made us wonder why teachers did not plan for a rather more stringent summing-up and elucidation of whatever the students have learned – also in conceptual terms. On the other hand, such an afterthought or critique could also be called for vis-à-vis many other kinds of education – including more conventional academic education.

Still, assuming that the didactics of MUVIN-type environmental education do not attach importance to conceptualisation is a fundamental misconception. In fact, its basic identification of the nature of environmental issues is already linked up with the concept of conflicting interests related to the use of natural resources. Without such a concept, students cannot comprehend and understand the problematic relations of humans, culture and society vis-à-vis our natural basis. Indeed, this concept takes up such a prominent position in MUVIN that we devoted a special section to it later in this chapter.

Concepts in the MUVIN curriculum

Conflicts of interest related to use of nature is the only mandatory concept of the MUVIN 'curriculum'. Or, to put it differently, 'conflicts of interest' belongs to the 'key areas of MUVIN knowledge and proficiency' like we have described for all subject areas in the Danish folkeskole. But as we know, subject learning outcomes cannot be described exhaustively by their key areas of knowledge and proficiency. Similarly, the conceptual learning embodied by MUVIN didactics obviously is not restricted to the notion of conflicts of interest.

An environmental education curriculum will necessarily include a number of concepts, academic and non-academic alike. However, to avoid obstructing the basic educational intentions of MUVIN, we chose not to lay down a 'canon' of definite, fixed concepts (except 'conflict of interest', that is), to be made parts of all MUVIN projects. Moreover (see introduction), MUVIN does not amount to implementing or testing a complete curriculum.

In terms of conceptualisation, this accounts for a number of difficulties and educational opportunities, to be dealt with below.

Can concepts be 'forgotten' in education?

Given the outlined background, the most obvious difficulty lies with the fact that we (both teachers and students – and advisors) can 'forget' focusing on the concepts involved. In class, when you try to obtain concrete information on a particular environmental issue, and there is no textbook to focus on specific concepts – then 'bringing the environmental issue to life' can completely absorb the whole class. On the other hand, that is not to say that concepts are not actually being dealt with. But the teacher may not make a point of introducing any relevant conceptual terms; or maybe terms are introduced, yet with too little time allowed for the students to develop the adequate conceptual content of such terms.

All projects under study worked on concepts in some way or another; still, it is a fact that not all parties paid attention to that part – and were aware of the benefits of focusing on this in particular. We need to understand that even though the concepts you work on cannot be considered an *a priori* necessity for environmental education as such, they may be instrumental in comprehending the relevant topic or issue at hand. And it is impossible for anyone to prepare excellent teaching and provide good learning processes, unless you take seriously whatever issues you work on in concrete terms. Add to this that the key concepts of any given subject will also impinge on the understanding of several other topics. The more exemplary the selection and treatment of topics/issues, the more will this be the case.

This raises the whole intricate issue of transfer and contextual learning. In the course of the rampant mud-slinging between the proponents of disciplinary resp. interdisciplinary education, the parties have tended to blame the second type of education for producing contextual learning. However, this dispute lacks perspective. All learning processes tend towards contextuality. Presumably, as a countermeasure, we could focus on concepts precisely *as* concepts, in order to apply them in numerous and immediately diverse contexts and relations.

The progression issue

Another pitfall concerns the issue of progression. A fixed curriculum makes it possible to control progression in education. And at its best, a disciplinary education will offer good opportunities for systematic acquisition of concepts. Regardless, the difference between *teaching* and *learning* remains, and while you may control progression in teaching, it is incredibly difficult to keep track of progression in learning processes.

In a certain sense, we may say that learning processes always reflect progression, yet that teaching does not always encourage, guide, and support such progression. This is a challenge that environmental education also needs to address.

The potential of openness

Naturally, some positive possibilities also attach to the openness of the MUVIN concept when it comes to defining its conceptual content. Above all, this is a great asset – nay a must – whenever as in MUVIN you intend to implement education with a very high degree of students' co-influence, and with outgoing and investigative activity in relation to real-life environmental issues. In such an education, it should become apparent – more than usually – what is relevant and should therefore form part of the project. The very act of relating to what is relevant becomes an essential element of teaching and learning.

This makes stiff demands on both teachers and students in terms of finding their bearings in the world awareness and gradually rounding up, unearthing and penetrating issues that are worthwhile to understand and relate to. To some, that kind of demand is just too much in a school. All the same, MUVIN has maintained that this is what democracy requires from ordinary people (see Chapter 6).

Conceptualisation under such conditions is not always straightforward. En route, it is easy to feel frustrated at the difficulties of both teachers and students, in terms of arriving at a theoretical perspective to their work. Naturally, concepts have to be introduced or pointed out during lessons, time and time again. This goes for specialist and general concepts alike. We recorded examples of both (and transitions between them).

The interplay with the students' experience universe

We find it essential for conceptualisation to evolve in an interplay with the students' own universe of experience and praxis. In Denmark, the connection between formal knowledge and life experience was thematised in the evolution of critical pedagogy in the late 1970s, also inspired by Paolo Freire, Gutt and Salffner, C. Wright Mills, and Oskar Negt. From the latter, the term of 'parallelism' was derived and used to designate the phenomenon, that scholastic knowledge tends to be acquired 'alongside' the students' own experience universe, without influencing it in any major way (Jacobsen, Schnack &

Wahlgren 1980, p. 15). Such parallelism turns into a risk whenever political education or action competence in a democracy perspective is made the formative ideal, since the more theoretical, conceptual knowledge is not allowed to qualify a person's everyday experiences of how things appear at surface value.

Further to the above, it is a fundamental MUVIN assumption that more than anything, conceptualisation needs to evolve as a concept clarification and development. Even though words are important, it is their conceptual content, i.e. concept intention or just 'concepts' that makes them important in a formative perspective. In recent years, many studies inspired by constructivist paradigms have served to demonstrate the shallowness of learning processes, unless a deliberate effort is made to let students create or construct their own concepts.

No empty vessels

'Learning something at school' has often been put equal to acquiring something new – in part as skills (e.g. reading and writing), in part as being able to reproduce some kind of new knowledge. As for the acquisition of knowledge, school-starters in the past were far too often seen as 'empty vessels' to be filled up, or as 'tabula rasa' to be written on.

Today, in retrospect, we can associate this notion with behaviourist psychology, the philosophy and analyses of which assumed that – based on stimulus-response systems and patterns reflecting a positivist scientific outlook – it would be possible to provide objective descriptions of behaviour and e.g. learning. Well, 'in retrospect' may be somewhat disingenuous, for behaviourist views still pervade a lot of research engaged in studying people's general behaviour in relation to the environment, and also those dealing with learning outcomes of environmental education (Robottom 1993).

In Denmark, those simplistic views have been subject to critique, at least since the days of reformist pedagogy in the 1930s. However, only some time in the 1970s, with the advent of the critical theory of the Frankfurt School, and later in science education, following seminal studies in Australia and New Zealand of how students perceive natural phenomena (Gilbert, Osborne & Fensham 1982), did that critique begin to truly gain ground. The latter studies clearly demonstrated how differently children perceive a word such as 'animal' or 'plant'. To those involved in science education in English-spoken parts of the world, it came as a shock that even such rather simple categories turned out to have vastly different conceptual contents, when their scientific content was

compared to their conceptual content in the students. Gilbert, Osborne and Fensham carried on Kelly's thinking (Kelly 1955).

The first studies engendered a torrent of studies in several countries, notably addressing science education. By and large, these confirmed the initial findings. As a rule, students' concepts are highly divergent from the 'scientific concepts' that education intends students to acquire. And worse yet, it also turned out that although students were able to acquire scientific concepts through education, to the extent of reproducing them when examined by their teacher, they would typically stick to their own intentions alongside the new one. Outside school, whenever they needed the concepts, they would apply their own concepts rather than the 'correct' ones acquired at school (Solomon 1994).

Inspired by studies of children, studies of adult concepts were carried out. Here the same pattern emerged.

In our Nordic setting, Gustav Helldén has attracted particular notice due to his longitudinal studies of the development of a (nature-) ecological awareness in students. One of his explicit motivations was that this was a vital aspect of environmental education (Helldén 1992). In England, a research team also studied the ecological concepts of school children, yet without following the same students for several years, as did Helldén (see e.g. Leach et al. 1996).

Integrating an understanding of such aspects, to make it a curricular basis, has been called a 'constructivist approach to education' (Solomon 1994).

The schools formed within educational studies and research, which evolved in association with constructivist research and development projects, have been subject to fundamental critique on more than one occasion. A weighty critique is that the true constructivists entertain(ed) the naïve notion that, given the right circumstances a student can develop adequate concepts of natural phenomena etc. on his/her own. In other words, interacting with others who already master the content of the relevant concepts was downplayed.

Solomon sums up a few consequences of constructivist research, which she believes to be good points of departure in future work.

1. *Knowledge of the common misconceptions of children is valuable to teachers who then know what sort of problems students are likely to face, and which persuasive demonstrations might best be used.*
2. *If the ideas are embodied in everyday language they may live on alongside the scientific knowledge learnt at school. Appropriate cuing will be needed for retrieving scientific ideas and concepts.*
3. *Learning new or alternative explanations is a difficult process that needs the active collaboration of the learner.*

> 4. *Social reinforcement of life-world misconceptions can be the unfortunate outcome of small group discussions about them.*
>
> (Solomon 1994 p. 26 - 27)

These generalisations are based on research and experience from natural sciences education; still, there is every reason to be aware of them, regardless of subject area. Thus, they are also valuable to keep in mind for environmental education.

Generally, for environmental education, it took a long time for the constructivist views to be explicitated, both nationally and internationally. However, in 1994, a cross-sectional paper by Alistair Robertson took up the field. Robertson claims Arjen Wals' work (Wals 1992) to be among the few studies to explicitly take a constructivist point of departure. This has later been made up for (see e.g. Brody 1994), though not with a view of environmental education corresponding to the MUVIN concept.

In our MUVIN context, Robertson's article is especially interesting, for several reasons. It is, because it does not *a priori* equate environmental education with education in the environment, understood as living and inanimate nature; instead, it underscores that *'... environment' is not something that has a reality separate from ourselves and our social milieux'* and later continues about environmental problems, *'... Environmental problems are socially constructed, in terms of their conceptualised effects on human individuals, groups, and other living things and systems',* which is not inconsistent with the cognitive theoretical basis of the MUVIN research team.

Moreover, Robertson points out that: *'There is, however, little research lite-rature to inform our understanding of how others (pupils, students, colleagues) conceptualize environment, environmental issues, and human-environment relationships ...'* (Robertson 1994, p. 29). As a result of our focus on conflicting interests in use of natural resources, these concepts have been in focus for part of the MUVIN research. Incidentally, in the next few years, we can surely expect a flood of dissertations trying to expose how children and adolescents view different environmental issues. A case in point is a dissertation looking into children's views of the environmental impacts of cars (Batterham et al. 1996). We shall be curious to see how many of these studies and follow-up disser-tations will focus on the conflicts involved in such problems.

The concept of 'eco-friendliness'

We have previously mentioned specialist resp. general concepts. In environmental education, we also come across concepts with an in-between position. They are not disciplinary in terms of belonging to an established science subject; instead, they have been adopted by our everyday language as a result of disciplinary cognition. 'Environmentally friendly' or 'eco-friendly' is one such concept, as illustrated further in an interview:

> *I: ..... then you started making these here eco-houses, how... the ones you called environmentally friendly houses? - Now, what does it mean that something is eco-friendly?*
> *P: It means that it won't pollute a lot, and – of course, for an ordinary house and an eco-friendly house, of course the eco-friendly house will also be more expensive because you've like spent more money making it eco-friendly. But then, for myself, I find it's better to spend more money and then look after nature.*
> *I: Does looking after nature mean something to our health in the long term?*
> *P: Yes.*
> *I: In which way? Can you imagine that?*
> *P: Eh, I don't quite get it.*
> *I: You said we are to look after nature, so it's a good idea for us to spend more money on the houses, in order to make them eco-friendly. - But does that also matter to us people in the long term?*
> *P: Yes, it does, because there's this thing with something called CO_2 (I think that's what it's called) which gets emitted. We've learnt a whole lot about that. That it would actually be healthier if houses would not emit so much.*
>
> (4th grade girl, second interview.)

As the luxury concept, there are at least two dimensions to the concept of environmental friendliness: Describing something as environmentally friendly and hence as less damaging to nature is not just a resource aspect, but also has a pollution aspect (which is easy for students to concretise and identify.) At a general conceptual level, both these aspects are to do with a reduced environmental impact, or less drain on the Earth's resources; yet, in order for students to acquire the concept, its facets have to be brought into their learning context and be concretised.

Experience shows that in teaching, it is always possible to point out a number of shortfalls regarding the breadth or depth of treating topics and

subject matter. So what we can require of it is alone an atmosphere of reflection and inquiry into the applicability and scope of concepts.

Understanding interactions

Environmental education has a special ambition of imparting insights into interactions to the students. The origins of this ambition can be traced back to when environmental issues first began to be understood. Notably the explanations of ecological interactions in nature offered by ecology scientists made us understand that whatever humans do to nature in one location can potentially afflict our own environment somewhere else.

Interview with 4th grade girl

I: Do you think these are good ideas, fitting up houses in that manner?

P: Yes, if this was to be in real life, then yes. Because there are many... there's a lot of pollution going on. It would be a good idea for us to have some new eco-friendly houses.

I: Now, let's imagine that everyone in Denmark – they would either live in posh houses like those in Money Park, or in houses like those at Green Hill. Which houses do you think would be the best ones, if we were to look ahead, to your grandchildren? Which ones would they have found the best ones for us to use?

P: The eco-friendly ones, for else – if you happen to do something that would kill off the trees, then we can't have any oxygen and such – then I'd say the eco-friendly houses, because the others, they ... we spent too much electricity, so it fell out, and we had no electricity at all in class. So if that also happened to them...

I: What else do we get from nature? - You just mentioned that we need to take care not to make too much pollution. What now, when we build such houses – where do the materials come from?

P: I don't know. We didn't talk about that. I don't know. From all over the place, stones and such.

I: Could we say that they come from nature?

P: Yes.

I: What other kinds of environmental problems do we have in Denmark?

P: There's this thing about too much car exhaust, and there's too much exhaust gas in the air [interruption] ... and I think there are too few trees and such, and too little oxygen being let into the air, or so I think.

I: Is that something that's supposed to come from trees?
P: Yes.
I: Does it mean something to us humans that there's not a lot of oxygen around?
P: Yes, because otherwise we can't take in some air, and then the blood can't circulate, and all that sort of things. Then we can't live. So that's none too good.

<div align="right">(Girl, 2nd interview)</div>

The notion of understanding interactions is an important aspect of the subject matter in MUVIN. In the above case, we can list the following 'cause-effect' sequences:

Energy-consuming luxury houses produce too much air pollution
(like car exhausts) →
Air pollution affects trees →
Consequently, less atmospherical oxygen is formed →
Then people cannot live →
That's not that good (ethical evaluation.)

Such relation chains are highly significant when students are to look behind the obvious, visible phenomena of environmental issues. It is also evident that to students, they may easily come across as fuzzy and abstract, and thus carry less weight. Yet, the more effort a teacher puts into allowing students to construct such a contextual understanding – in an interplay with teacher and classmates – the more can we expect those students to apply their insights on real-life issues.

Incidentally, the contextual understanding cited above illustrates a widespread subject misconception, namely that plants and animals live by two complementary processes, implying an interaction in which plants ('trees') produce oxygen, while humans take up that oxygen. In other words, it is not understood that respiration is a universal process also found in e.g. trees. Moreover, the notion that forests product a net surplus of oxygen prevails among many students and teachers – probably influenced by the media.

Conflicts of interest in nature use

The inlet – a case

Two 7th grade girls (13 years old) write about their MUVIN project:

It all began one day when we were asked this question: 'What do you think is just too bad...?'

Our teacher explained that we were about to start on an environmental project, which, in our case, could be about conflicts of interest around Roskilde Fjord [an inlet]. We'd all love to do just that, since all of us had something or other concerning the inlet that we were discontented with. We were divided into three different groups, with one conflict of interest for each.

One was the business group. It was to work on Skallefabrikken [a sea shell processing plant]. Skallefabrikken is a plant producing chicken feed from oyster shells, which they suck up from the bottom of Roskilde Fjord. As a result, they produce a lot of holes in the seabed that gather a lot of ooze, which contributes to destroying life in the inlet. This has caused conflict of interest to arise between the shell plant and the fishermen, which was the conflict of interest the group worked on. The whole class went to visit Skallefabrikken, where we first asked questions prepared in-class, and were then shown over the place. The next day, the group built a model of the plant, so no one in our class was in doubt as to what Skallefabrikken looked like, and how it worked. We also had a visit by a neighbour to Skallefabrikken, right by the inlet. He told us how he had begun by writing a letter of protest to the Environmental Agency and had complained about the noise and all the dust emitted by the plant. In return, he was sent a thick book, with copies of all letters sent to the Environmental Agency concerning Skallefarikken. That made him feel he had been taken seriously and had also had his say in the matter. So democracy works, he said.

Another group – the fisheries group - ... contacted PW, who is an angler and net fisher. He came and told them about the advantages and disadvantages of being a fisherman. Being an angler and net fisher, [he] had no issue with the shell dredging, but he had problems with the huntsmen. A couple of days later, we had a visit by a professional fisher-man. He in turn was annoyed at the shell dredging, because it ruined his livelihood. They were just two remaining fishermen in Jægerspris [an inlet town] who lived by fishing, and they would chiefly catch eel. They believe

that the holes in the seabed made by the shell dredger destroy oxygen conditions. In addition, a lot of mud is being churned up in the inlet...

(Olsen and Rasmussen 1995)

In addition, the class found a number of newspaper articles dealing with the problems of shell dredging and the plant over the years. The project ended up with a parents' evening, where the students told about their investigations and results, and their own opinion of the problem.

This case illustrates how the students do not just acquire the term 'conflict of interest', but also add substance to it. Earlier in this chapter, we asked for both a concept clarification and a conceptualisation. The students' approach to their selected issue holds several desirable hallmarks of the exemplary project. Yet, it is also typical that the group fails to get hold of all those stakeholders with interests in the conflict; for instance, the special vested interest of the plant owner do not appear from the description.

By way of introduction, the teacher asks the students if they know of any environmental issues in their neighbourhood. Several items are brought up, and among these, the class jointly chooses to look into conflicts of interest related to the inlet Roskilde Fjord. As previously outlined, an important feature of the MUVIN ideas is precisely that students take part in deciding on a topic (issue) and on working procedures. However, that does not imply that there is no need for the teacher's support and help, especially in terms of getting the class to focus on conflicting interests in the selected environmental issue. In the Roskilde Fjord case, the concept of conflict of interest is introduced at the outset.

From understanding views to general insight

In project work, delimiting the issue is of essence, and in the Roskilde Fjord project, the content was centred upon conflicting interests in relation to the extraction of oyster shells from the seafloor of the inlet. In this, another MUVIN goal is served: that the topic must be related to the use of natural resources.

As in many other MUVIN projects, the class invited representatives of different interests (e.g. angler, fisherman, neighbour to the plant). This helped students to understand the environmental issue as a conflict of interest between a number of individuals/groups, rather than a nature-versus-people conflict. In our experience, talking about conflicts of interest between nature and people is not productive. Notwithstanding, this is a frequent notion, both in the work of the schools and in media treatment of environmental issues.

When students ask different people about their attitudes towards an environmental issue, they often find diverging views among these people. In an interview, a 5th grade student said:

...that some think one thing, and others something different – and of course we have to get to agree... after all, this is a democratic country... there is more than one side to it... of course those who are against have their reasons.

Apparently, this student has understood that there are arguments and grounds associated with different interests. Or as the teacher put it, about the same class:

The students realised that a point of view does not come from out of the blue. It is often anchored in people's material circumstances. To the students, this came as a surprise.

(Hedegaard ed. 1996 p. 98-99)

The 'conflict of interest'-concept provides the students with a conceptual tool that lets them see beyond the statements of such representatives, also allowing them to analyse people's legitimate, obvious or covert interests in the relevant case (i.e. the environmental issue). Together with these interests, fundamental values emerge, which can be examined and integrated in the students' analysis, with a view to identifying ethical arguments and attitudes.

This mode of thinking of environmental issues – in fact of any societal issue – offers considerable opportunities for generalisation and transfer. This is a vital part of being a politically aware individual. Furthermore, the quantitative questionnaire survey indicates that about 1/3 of all students from 5th grade and up have developed a 'conflict of interest'-concept of use of natural resources that they can apply spontaneously. For more details, see Chapter 13.

Our experience from previous development work on environmental education (Schnack ed. 1990, Christensen and Schnack 1991, Breiting et al. 1994, Christensen ed. 1994) indicate a risk of students getting the naïve notion that environmental conflicts is merely a matter of 'good' and 'bad' actors.

The first MUVIN report (Dorf 1994) suggested that using a three-level analysis for conflicts of interest regarding the use of natural resources would impart a deeper understanding of environmental issues as societal issues:

1. Personal conflict
2. Interpersonal conflict
3. Structural conflict

Obviously, any conflict or controversy will somehow involve parties who disagree. For practically all our class projects those parties are personified (interpersonal conflicts). This is clearly the easiest way to concretise a controversial issue and also made one of the fixed points of our MUVIN development work (Breiting and Janniche 1994), in continuation of experience gained from the pilot phase. Still, as already mentioned, this is just one among several types of conflict. In other cases, the conflict will either be some form of personal dilemma, or it will be associated with or caused by structures or trends in societal development.

The tendency for conflicts to be described as interpersonal can evoke a feeling of having to take sides, even where this is practically impossible. You feel obliged to be for one party and consequently against the other. During the evaluation of the Roskilde Fjord project mentioned above, a student said:

> *... the thing about conflicts of interest was a hard one, 'cause you couldn't find out whom to side with.*

In the same evaluation, the teacher related that one of the positive effects of the project was that students realised that things are not black-and-white in real life, and that decisions are often compromises.

Adults often find it hard to think of conflicts without responding emotionally or with anxiety. If party to the conflict ourselves, we will often respond spontaneously with self-defence or aggressiveness. Of course, such behaviour is counterproductive to democratic processes; all the same, students must be aware of it and preferably be confronted with it themselves. Often, students have a hard time thinking of countermeasures. For instance, considerable problems sometimes crop up when a class working on controversial issues in modern industrialised farming is visited by a farmer representing just that sector.

> *Regrettably, our farmer often construed a demonstration of conflict of interest as a personal attack on his nature management. So in order not to appear inhospitable, students were often circumspect in asking him questions.*

To better understand the potentials of the 'conflict of interest'-concept, as a component of developing action competence in the students, our quantitative questionnaire survey also focused on students' feelings in relation to the conflict perspective; see Chapter 13.

Introduction to the 'conflict of interest'-concept

The MUVIN work has demonstrated that most teachers find it highly rewarding to work on environmental issues based on the 'conflict of interest'-concept; still, they also underscore that this is a challenge and not at all straightforward; see also Chapter 14.

Although defining environmental issues as composed from conflicting interests amounts to a qualification, it is often necessary to translate this idea into a language, which is rather more concrete and directly comprehensible to schoolchildren. This naturally reflects the fundamental role of the teacher as a universal facilitator – making the apparently incomprehensible more accessible. In some cases, facilitating means 'popularising' the more or less scientific concepts into something that is more akin to the students' own experiences and outlooks. In the process, those concepts will normally lose some of their precision and theoretical succinctness; however, this is a necessary sacrifice in order to allow the students to change and build a new understanding in their own minds. In other words, a necessary condition of acquiring new insights.

However, it is paramount for the teacher to reflect on which everyday concepts should be introduced, and how these are to be followed up in subsequent teaching. See the overview from Solomon shown previously in this chapter, the everyday concept can easily lead to parallelisms. The entire process reflects an exceedingly difficult and complex dialectical relationship between individuals involved, and consequently, we would often be well advised not to set up too fixed standards for this process. The familiar divide – already mentioned in the previous chapter on constructivism – between teaching and the learning processes evolving in individual students can never be overcome altogether. On the other hand, the proficiency of a seasoned teacher is demonstrated precisely by his or her ability to be both creative and critical-reflective throughout the process.

The MUVIN work showcases several pedagogically inspirational 'translations' and efforts to make it easier for students to grasp the general idea.

For further reflections on the learning processes involved, it might be worthwhile to look into the conceptual images involved in the language resp. models that were used to introduce the concept (see also the chapter on aesthetics aspects).

In some cases, models stem from problematic stereotypes; in other cases they may make the beginnings of a more subtle and succinct understanding, as exemplified below.

A single project talks about friend and enemy. Perhaps this archetypical statement on friend/enemy is perfectly easy to understand for the youngest

students. In addition, it is in good keeping with fundamental structures in most fairy tales and action films. This is about the battle between good and evil. In some cases, and with some reservation, environmental issues can be considered through such spectacles; however, this is never to become the only and final form of understanding and cognition.

One way of 'translating' is expressed by using the word pair 'for' vs. 'against' something (as shown by the example on p. 23, pp. 59-60, and p. 5-66 in Hedegaard ed. 1996). The 'for-vs.-against-nature' model is slightly less emotional than friend/enemy. It is often possible to find people who consider themselves exponents of a group of people who are for or against in relation to a controversy. On other occasions, the students themselves will engage in in-class discussions for and against something. This proved successful on several occasions and often happened in connection with different kinds of roleplaying, which can spur significant learning processes when you get an opportunity to stand up for an attitude that is miles apart from your own.

> *I think a lot started thinking more about what they were buying. That was a good one, having to be for and against battery hens. We learnt a lot from that.*
>
> (9th grade student – 15 years old)
> (Hedegaard ed. 1996 p. 65)

This class had worked using the process that the teachers called 'structured controversy', with reference to the article 'Critical thinking through structured controversy' (Johnson & Johnson 1988.) The teachers divide the process into four phases:

a. the conflict, in which you work on your own point of view and are challenged by opposite views
b. the debate, in which both parties introduce and debate their views
c. search for agreement, in which both parties try to agree
d. individual work, in which student arrive at their personal opinions

Among those teachers who tried using the 'pro and con model' to introduce and explain the idea of conflict of interest, most had found it to be successful, and that even quite young students were able to handle it. Some teachers find that with the youngest grades, this is actually the only possible approach to introducing the concept.

A 9th grade class also used the model of two opposites, in this case being for resp. against chemical sprays on cultivated lands. However, one of the students explained, there can be a snag with the 'pro or con' approach: 'Actually, one cannot be for chemical sprays'. The student has definitely got a point here; but it just so happened that the teachers had chosen to work on environmental issues based on a black-or-white reasoning. The teachers justified their approach by stating that conflicts of interest should not be made 'too muddled and inscrutable'.

Admittedly, the 'pro-vs.-con' version can often be a good model in a school setting; still this also should not be the only or final way of understanding conflicts of interest related to environmental issues that students are confronted with. It is a must for students, throughout their years at school, to be allowed to work on conflicts of interest at all three levels and, not least, on the relations between them. It is also vital that students apply themselves to the intention of the concept, and that it is linked up with varied examples of nature use.

Sometimes, symbols are easier to work with; however, we need to be mindful of the risk that symbols are given connotations, upon which general-isations should not be based. For instance, two teachers introduced the 'conflict of interest' concept to a 7th grade class simply by drawing two angry men, with a vertical line between them. Under each angry man, the students were asked to write arguments for and against the environmental issue they were working on. The issue was whether or not dogs should be allowed to be unleashed in the forest. The template worked well; however, in the longer term, we would consider it important for the teacher to positively discourage students from forming an unconscious notion that conflicts of interest related to use of natural resources are invariably 'something about angry men'.

The use of introductory cases

Several schools used teacher-produced case stories to introduce the 'conflict of interest'-concept to their classes, inspired by a case, 'Dalby Mose' ('The Moor of Dalby') which was used by way of example by the MUVIN study groups. ('Dalby Mose' is presented in Breiting 1997 p. 61).

At one school, they made several cases, and the following one proved especially suitable as an introduction:

In brief, the 'Margrethe Case' is about old Margrethe, who has been living in her little cabin in the depths of the country for more than fifty years. One day, a county environmental engineer knocks at her door, saying that he would

like to take a water sample from her well. As it turns out, the water has far too much nitrate, so the county orders Margrethe to fill up her well and lay on water from the water company. The old woman fails to understand why that should be necessary. What is more, having water laid on by the water company will cost her a good 30.000 d.kr. (•4,000) – and of course, Margrethe does not have that kind of money.

In the teacher's version, the case is far more detailed and narrative, so the students really get an idea of Margrethe's frugal, yet content life in the country, and of her dilemmas or personal conflicts as a result of the environmental protection requirement. (A full-length version of the case is found in the Danish MUVIN newsletter no. 4, January 1995).

The story made a good setting for the subsequent in-class discussion. This is the teacher's logbook entry:

> *The students' assignment was to come up with solutions for Margrethe's problems, and personally, I had the impression that my intentions with the assignment were fulfilled. Foreseeably, the students had a lot of empathy for Margrethe; however, several were also able to appreciate that other perspectives were involved, e.g. health-related and moral. Practically all the children experienced that there was no easy solution, and further to this, it was interesting to hear their diversified suggestions, ranging from total action paralysis, over hopes of winning a pools dividend, to saying 'Oh, to hell with it' and letting Margrethe stay on until her possible forceful displacement.*

Such cases often make a good introduction, since allowing a discussion framework to be set up, in which several key discussions can be embedded, and enabling a possible first understanding of the concept to form in the students.

After interviewing some students, in continuation of the project featuring the Margrethe case, the researcher writes:

> *... When interviewed, no students explicitly mention these cases during our conversation on conflicts of interest – and unfortunately, I was not 'quick enough' to ask them directly. However, the students remember all cases, although associating them with conflicts in general, or with conflicts of interest concerning money, rather than with conflicts of interest concerning the use of natural resources.*

This problem recurs in other school projects. For instance, in the younger grades (grades 1-3), projects often deal with 'limited' conflicts, e.g. involving only two stakeholders; in this case, it is difficult to visualise that conflicts of interest are linked up especially with different views of how our natural basis should be used.

9

Aesthetic aspects in environmental education

A glimpse of a MUVIN project

In a carpentry workshop, several 9th grade students are working on various practical- artistic productions related to their project work. A team of two boys are doing a 'quick', botched-up job – a minimum solution, though I (the researcher) still get the general idea. Near by, another boy is sanding a box, completely lost to the world. Here I don't get the general idea, no matter how hard I try. However, he is quite absorbed in his work and rightly concerned whether he will manage to complete it in time. He has made a two-compartment box. One compartment is lined with fine-grit sandpaper. The other one has been sandpapered endlessly. 'Try and feel it', he says, almost rapt. And I have to admit that it does feel good. And there is a marked contrast to the other compartment. There are some great experiences here. A sensing box. He is being incredibly meticulous about it, and I can understand why. Actually, I feel a bit dumb asking him what he is making. Somehow, with his 'try and feel it', he already answered my question. But I ask all the same – after all I need to see a connection with his topic. And he doesn't mind, and instead answers with a seriousness matching his assiduity and engagement. 'You see, that's the good and bad sides of genetic engineering'. As an extra point, he is now making the outer surface shiny and smooth. Especially this part makes him worry he may not make it in time. His point is that, taken at face value, genetic engineering appears to be good and reliable; however, if you look (or feel) its inside,

you'll find something soft and something rough. - He was allowed to
continue sandpapering at home, and fortunately got to finish it.

Beyond doubt, this is a case of practical-artistic, aesthetic, or artistic quality. By contrast, such quality was absent in the work done by the two boys in the near-by team. However, their product was vastly easier to integrate into the interdisciplinary project work, since it was obviously a factory billowing smoke. The domains of individual subjects or cognitional/expressive modes have different criteria that are not always easily reconciled. Furthermore, this snap-shot of the situation serves to remind us that aesthetics in a broad sense often take on a life of their own beyond the work on the topic proper.

The aesthetics concept

As part of MUVIN's basic concepts, teachers were to focus on 'the aesthetics aspects' of environmental education. The background material provided to the schools (Breiting and Janniche 1994) underscored that this focus on aesthetics should not just be understood as judging whether they 'liked' something; much rather, it should be understood as reflecting aesthetic cognitional modes, complementing the more rational cognitional modes applied by e.g. scientists. An excerpt from the text: *'The distinctive feature is precisely that using creativity's aesthetical modes of expression lets us capture, process, and express emotions and engagement that may be quite essential to students' outcome of an environmental education project.'* (op. cit. p. 25). The boy's work on his sensing box exemplifies this in the small way.

Looking across the many MUVIN projects, we typically find that teachers were better at paying attention to the aesthetics aspect of learning represented by creative productions than to aesthetics as a source of reflexion in their students. This probably owes to the fact that we do not apply a fully conscious aesthetics concept on a daily basis.

In ordinary speech, the linguistic form 'aesthetical' is used more commonly than ''aesthetics'', and the former is typically used in a context reflecting a positive judgement of something heard or seen. Similarly, a statement implying that something is considered un-aesthetical reflects a definitely negative judgement. For instance, we use to talk about waste dumped in nature as being un-aesthetical, in the meaning of unpleasant. Anyhow, such judgements are linked up with sensory perceptions, and in our context, we may say that it is a matter of pleasing, resp. displeasing our senses. Of course, in a broader sense, this

is not just about our senses, but also about comparing our personal mental images of what we perceive as nice and agreeable with whatever inputs reach us via our senses.

Otherwise, the aesthetics concept is often more explicitly associated with performing and experiencing art. In that case, we can refer to the aesthetical properties of a painting, a sculpture, or another work of art, regardless of whether it is 'nice' in the conventional sense of the word. All experiences can be understood as aesthetical, in so far as they are anchored in our senses; but of course they do not all concern the arts. At best, we may talk of an art object when people have deliberately rendered something in a form that appeals to others. Deliberate design is one element of creating an art object. Probably, this is the one reason why we often associate aesthetics with something expressive and productive, although it is basically of a sensuous and receptive nature.

The aesthetical mode of cognition

As hinted in the preliminary example, aesthetic aspects are likely directly linked up with the sensory dimension. However, sensory perception only makes sense because it helps cognition here and now, and later, when experience is processed, it may linger (consciously or unconsciously) in the mind, thus forming an element of experience building - perhaps mostly in an intuitive manner, more or less coloured by emotions.

This is precisely the interesting thing about the aesthetics aspects: They offer a wider cognitional scope than is possible with rational processing of facts. In this lies the cogency of the arts, and hence a vital reason for taking up aesthetics aspects when students work on environmental issues, even if their work is unrelated to the arts.

A thought-provoking contribution comes from Hansjörg Hohr, German-Norwegian theorist. His particular point is that besides emotion and analytical thinking, aesthetics refer to a third category, as evident from the following passage (Hohr and Pedersen 1996, p. 25):

Constructing meaning and coherence is the most basic function of aesthetics. Thus, the aesthetical does not merely represent an intermediate between emotion and analytical thinking, but a specific mode of experience that is irreplaceable. It represents totality in how we experience the world and this stops it from disintegrating into shreds of facts.

Moreover, he makes it a point that aesthetics is not confined to the arts realm, but rather constitutes our entire man-made universe. This also makes it a political and societal matter. The fact that something has a shape, and a man-made one, is quintessential to Hohr's understanding of the aesthetical (Hohr 1994).

When trying to define the aesthetical, he starts out from everyday objects. These are man-made form, embodying and communicating a specific form of knowledge. He exemplifies his point with an Aran-knit sweater. Precisely this type of sweater is composed from different patterns in a way that makes each sweater completely unique to its owner. No two sweaters are identical.

By virtue of its patterns and manufacture, the sweater communicates some highly specific information. Particular symbols, designs, colours, texture and production methods do not merely characterise the sweater in objective terms. Its design also refers to certain wishes for the person wearing it: that he or she may have a good life, good hunting, net a good catch, or similar. Such distinctive features also signal a declaration of love from its creator (in this case a woman) to the user (here a man). Thus, in Hohr's reasoning, the Aran-knit sweater forms part of a complex man-woman communication system.

Hohr's example may seem quaint. However, he used it to underscore that the very 'design expression' of the sweater becomes the vehicle of a multi-facetted message. In other words, it holds more information than can be read from its colour and shape. Or, in Hohr's terms, its design expression conceals its message.

His point is that an everyday object – exemplified by the sweater – serves to demonstrate that many cognition objects cannot be uncovered by conventional cognitive processes. Meaning that 'decoding' the embedded message of that design expression requires a particular mode of cognition.

This is the mode of cognition Hohr terms aesthetical. It is a mode of cognition that does not confine itself to logical and analytical thinking. By contrast, this mode uses a far more holistic approach. It relies on impressions, perceptions, emotions and intuitions to which the exact laws and rules of the analytical mode do not apply. In Hohr's words, this is a 'sensuous symbolic mode of interaction'. Moreover, and characteristically, the aesthetical departs from and is formulated by form – and not merely by words and figures. This implies that a maximum of senses are at work simultaneously: seeing, smelling, hearing, feeling.

Another implication is that creating processes and expressions of form will enable us to communicate thoughts, feelings, impressions that defy communication by traditional means; using more holistic forms of expression allows us to convey totality and other things unspeakable.

Reality and aesthetics

When working on an environmental issue, aesthetical modes of cognition are reinforced in the students' learning processes whenever they leave their classroom to examine aspects of the issue at hand, thus seeking out 'the real world' as part of their learning. Usually, the argument given for doing so is that this will allow the students to collect information. However, there is every reason to assume that this will also provide the issue at hand with an authentic and holistic atmosphere, meaning that students will get a better feel for the relevant issue and may discover aspects that would otherwise go unnoticed. Moreover, it is a well-known fact that such activity elements are a potent motivational factor.

The same goes for bringing 'the outside world' into the classroom, in the form of visiting teachers, or letting students study concrete materials.

The following examples will show that such investigative, practical and inspirational activities made key elements of several MUVIN projects. We will relate them with aspects of the students' efforts to communicate their experiences or messages to others. As a matter of fact, once students got preoccupied with an environmental issue, this often came up on the students' request, reflecting their need to 'do something'. Here, many students worked on alternatives to the present state of affairs, and with creative productions.

Different types of activity in MUVIN projects

Our collected data show that both students and teachers valued the activity-type elements of their projects very highly. Thus, one of the open questionnaire items inquired after what students found to be most important/valuable in their MUVIN work. Out of the answers submitted, nearly 40% of the students indicated that to them, practical activities involving sensuous and experiential modes of contact with the surrounding society had been pivotal. Motivations are legion, but apart from indications that such activities had generally made an inspirational and stimulating learning element, a 7th grade boy emphasised for instance, *Going out in nature to look and feel it all, so we could get to know about environmental problems.'*

The teacher questionnaires also touched upon this aspect. Two open items asked their opinion about 'general positive aspects of MUVIN', resp. 'focus of their specific projects'. For both items, more than half the teachers indicated, among other things, that they found such activity-based and investigative elements to be an asset. For the latter item, one teacher team underscored the

importance of a multi-faceted approach in education. *'The students have to make use of all their senses. We made a number of out-of-school visits, used visiting teachers and hands-on work'.*

As for their purpose and temporal deployment within projects, the broad range of activities can be organised into three partly overlapping categories.

One category of activities provided motivational and inspirational elements when the relevant environmental issue was introduced to the students. This first category includes activities intended as 'eye-openers' and to sensitise them to the issue.

A second category of activities consists of investigative and acquisitional activities, intended to deepen students' knowledge and understanding of their respective fields of work.

Finally, a third category of MUVIN project activities aimed at communicating the students' experience to others – and occasionally suggesting solutions to the relevant environmental issue.

The three activity categories are discussed in more detail below.

Motivational and attention-creating activities

When launching their projects, some teachers took pride in trying out different approaches, meant to raise the students' attention and turn them on to the specific issue in an open and non-prescriptive fashion.

At one school, the teachers intended to provide a learning environment that, based on a fantasy trip, would allow students to form their own images and fantasies in relation to the subject they were going to work on. The following passage, cited from the logbook of a 9th grade student, exemplifies this:

It was almost like my soul left my body. You'd be sitting on a big hill, taking in the view and the warmth of the sunrays, the yellow hillside, the stream, the tall trees, and my flower ended up as a beautiful red poppy. We were also to picture something that definitely would not fit into nature. I imagined a huge grey plant, with lots of smoke, right in the middle of my otherwise so pretty landscape. I threw my poppy into the water and started walking back to my hilltop, which is where my dream ended. We sat up and made a sketch of our dream. My personal view of our dream journey is quite positive. I believe we should do this a bit more often, because you start making up good images and ideas, so you feel more up to embarking on the project.

This and other examples of unconventional introductions to an environmental topic demonstrated the importance of adding, by way of introduction, an unpredictable and unruly element. As hinted by the citation, this makes learning more engaging and stimulating. At the cognitional level, it helps activate the students' own conceptions and is helpful in creating a shared focus on a few key elements of whatever topic the class will proceed to work on.

At another school, teachers had planned start off by directing the students' attention to the many different and conflicting interests concerning the use of some local farmlands and areas adjoining an inlet. So the class biked around the school neighbourhood for a full school day. Before their trip, they were instructed to take special note of any interest they suspected that farmers, huntsmen, fishermen, tourists, ornithologists, etc. might have, based on what they saw and experienced. Building on this introduction, the students were strongly motivated to adopt a concrete and unconventional approach to their work on conflicts of interest. In addition, students and teachers got to share a nice experience.

A third school wished to introduce an environmental education project in combination with the students' 9th grade (16 years old) work experience programme. While visiting the workplaces, the students were to take note of any environment-related issues, conflicts of interest, wastes, re-cycling, etc. This provided an opportunity for the students to have specific and conceptual experiences regarding several environmental topics that they found rewarding to work on afterwards. To the teachers involved, the key point was for the students to experience the environmental aspects as a matter of concern.

Overall, judged by experience from a number of MUVIN projects, such alternative introductory activities played a key role, by virtue of the motivational and engagement-building aspects they added to the project – while also, at the cognitional and personality-related level, opening up to and prodding the students towards a more personal involvement in their work. This proved helpful in making students take some 'ownership' of whichever topic they were embarking on.

Investigative and acquisitional activities

The practical elements of MUVIN projects mostly amounted to students investigating and familiarising themselves with the issue at hand. Excursions were the most frequently used activity. A considerable range of different excursion destinations were included, e.g. to motorway or bridge building sites, district heating and power plants, factories, natural areas, and fish farms.

Experience reaped from many projects confirms the general assumption that excursions are valuable, since deepening the students' awareness (Andersen et al. 1995). Occasionally, however, we found that the students' experience remained unstructured and inadequate. In some cases, this can be traced back to e.g. students taking information at face value, satisfying themselves with incomplete answers.

There is no doubt, however, that students greatly appreciate excursions and similar itinerant activities. Student interviews confirm that to them, such activities contribute to making education interesting and exciting. Moreover, by bringing the participants of a learning process closer together socially, an excursion will often help to enrich the learning environment with a humane and vibrant atmosphere.

In addition, from a students' viewpoint, excursions and similar activities can hold several positive and challenging elements, in the nature of being conducive to sensing, surprising, thought-provoking, episodical and visualising, stimulating, instructive, emotional, and social. None of these aspects should be underestimated in education.

Students from two different 5th grade forms (12 years old) expressed what they felt to be the most important outcome of being in a MUVIN project, as follows, *'Making studies on environmental issues, so I could see for myself what environmental problems were about.'* And: *'I think doing interviews was the most fun; because it was great fun to learn about other people's opinions.'*

Most of the time, students had prepared their questions beforehand, to be answered by various resource persons during the excursion proper. In addition, such excursion activities were sometimes followed up by students preparing drawings, texts, or clay or papier mâché models showing what they had seen. It was found that such creative work as follow-up on experience reaped often enhanced student outcomes of an activity, since contributing to additional discussion and reflection on their experience; also noted in Andersen et al. 1995.

Drawing up a questionnaire often made an independent mini-project, during which invited experts, e.g. journalists, were asked for advice. Such a feature often made students feel that their work was endowed with a touch of professionalism, was taken seriously, and that they could actually expect getting relevant information, and meeting the experts was also helpful in enhancing the aesthetics aspects of the project. That apart, students also found the actual task of asking people in streets, shopping malls etc. very exciting – and most of the time, people were even extremely willing to answer.

Such activities contribute to making this type of learning stand out from education, in which the subject matter is largely given beforehand and delivered

by a textbook or a teacher. The results of the students' questionnaire survey were hard to predict, so in several cases, they eventually caused the subsequent teaching to be changed.

The interview method was also used in several cases. Many of its educational assets – both in the introductory phase and during the students' 'field work' conducting interviews – are identical with those found for questionnaire work. What is more, those interviews could sometimes interfere with and dispute the students' preconceived ideas, thus qualifying their critical thinking and reflection, which we consider vital to a continuing development of action competence in students. For instance, one teacher wrote:

> *What students found difficult was to change perspectives. Once the students had emotionally decided on a viewpoint, they became good at rationalising after the event and thinking out arguments to support their views. They put up a marked resistance against taking several viewpoints over and over. They perceived me as someone who could never be 'pleased'. As it were, the interview situation with strangers turned out to be the way out of this dead end. All of a sudden, here was an authentic situation, because they met people who did not feel they had to oblige everyone – they were free to stand up for their view and only argue on that basis. And so they did.*

Having to interview strangers in the street, or just make a phone call to ask for information put the students in a situation that required them to reconsider and weigh what precisely they wanted to know from that person.

Apart from the benefits of reconsidering the issue before meeting this stranger, this is also valuable at another cognitional level. The thing about such situations is that they tend to call forth particular memory images since, apart from their factual aspects (what was this about!), they encompass personal experiences and feelings (what was the situation like, and how did you feel just then!). In a subsequent situation, they will find it easier to recall what the interview was about, since linked up with the actual person who listened to and answered their questions.

In addition, including role-playing has proved a rewarding learning activity. Based on an actual conflict of interest, students were to find – and argue from – different positions vis-à-vis the issue at hand. The idea was then for them to acquaint themselves with the views and perceptions of e.g. an individual or a group, implying that a great many types or levels of arguments had to be included: rational, normative, and emotional. In some cases, the students would

play the stakeholders' roles themselves; in other cases they would prepare cartoons, puppets or life-size cardboard silhouettes, each expressing his or her views and interests.

In conclusion to the activities we have termed investigative and acquisitional, these appear to be valuable in terms of cognition, both in a more rational sense and in a more subjective-personality related understanding. Activities make a fruitful tool for illuminating factual aspects of the issue, both because they connect notions *of* reality *with* reality itself, and because their authenticity and concrete urgency often call forth additional questions and wonder. Furthermore, they add renewed interest and presence to education, thus boosting the students' engagement both in learning and in the environmental issue at hand.

Communicative activities

On several occasions, students' wishes to communicate their new insights and experiences to others evolved into independent activities. This way, activities became vehicles for students to express their attitudes and views about the issues of their particular projects. Such independent activities might include making posters, graphics and exhibitions; in other cases, the students' activity was a role-play, in which they would perform as the relevant stakeholder groups of the environmental issue; or they would make puppets representing their gallery of characters. Their audience would mostly be parents or other classes. One class organised a panel debate, in which they presented and argued for different positions involved in an issue they had been working on for a while. Interestingly, in this case, the stakeholders to be represented by the students were invited to attend the discussion – and ended up taking an active part after the performance. In another case, students and their teachers made a theatrical play that was performed at a Nordic theatre festival on children and environment, NORMA (in translation short for Nordic Environmental Actors).

MUVIN projects give proof that such communicative activities can contribute to enhancing student outcomes of education at many levels. The education becomes more vivid in the students' minds and memories; it brings out a broader spectrum of their capabilities and talents, and it helps them process their emotions, attitudes, and insights. One particularly significant aspect could be that students experience for themselves that a learning process is not just about getting to know more about something; they also come to realise that their acquired knowledge is usable, and as a result, they gain experience in conveying a message, starting a debate or trying to exert their influence.

Perceptions and aesthetics

The carpentry shop mentioned in the introduction also had two girls who had chosen a project on windmills. They made a tableau of a landscape and called it *'a perfect landscape until a windmill turns up and ruins it'*. They were skilful and had taken pains. However, the researcher found that the windmill looked great in the landscape. Asked why they felt the windmill ruined the landscape, they replied: *'Cause it's ugly!'*

The girls' practical work had undoubtedly coloured their understanding, which showcases how aesthetic activity can incorporate aspects of an issue that might otherwise have been left out of consideration. Presumably, the above exchange also serves to demonstrate how an aesthetic activity can be closely associated with attitudes. In this case, the interesting question would be how the girls felt about alternative sources of energy, including windmills, and whether it differed from the researcher's.

A common denominator of the many types of MUVIN activity exemplified above is that they involve and draw upon an exceedingly broad spectrum of the students' mental capacities – namely those related to their ability to both understand and express themselves in several ways. As underscored previously, the hallmark of the aesthetical is that it is closely linked to a sensuous component – something about forming, using and expressing sensory inputs.

Thus, when describing their MUVIN project, a teacher group says:

...to ensure that everyone would experience/sense nature and varied expressions of the stream, we spent a day together at the stream; and to ensure that they would also be able to express whatever they had sensed, they drew sketches on that day together, and later 'painting motifs from the stream' was one activity among many.

This project embodies two related – albeit different – aesthetical dimensions, the receptive, vs. the expressive, both of which formed parts of the MUVIN projects – in multifarious ways, and both individually and combined. They will be treated in the following section.

The receptive understanding of aesthetics

In the first (receptive) dimension, the aesthetical is understood as a separate mode of cognition, based on the direct sensing in a situation, in which several senses and emotions are awakened, rather than on rational analysis and under-

standing. Thus, it is a distinctive feature of impressions resulting from this cognition process that they are perceived as holistic and coherent, since embracing a number of sources.

They are associated with non-analytical categories of understanding, such as perceptual images, intuitions and emotions, though obviously not unfolding wholly independently of the concepts, insights and prior experience that we render in the analytical idiom of logic: concepts, words, figures.

The non-analytical categories of understanding play a pre-eminent role, because the student is not a neutral object to the cognition process, but constantly figures as an interpreting, feeling and perceiving 'party' to the course of events. As amply illustrated above, the broad variety of activities allowed students to investigate numerous aspects of whatever issues they worked on. The following citation is from a teacher's account of his MUVIN project. It serves to underline that the receptive aesthetics elements of activities are special, in that they touch and engage the students in a manner that goes beyond the stringently cognitional, since greatly involving the student's feelings, intuitions, and emotions.

The actual background of the passage cited below was a students' interview with two elderly people who were quite distressed at living too close to a road with heavy traffic:

> .... *a few opinionated views were shifted when the students met the resident couple from the Ringway neighbourhood. Some old people who suffered visibly under noise and smoke and who, in terms of housing, were in a living hell. But the fact was that they didn't have the money – or energy – to move. ... So now environment came to be an issue of someone's well being.*

The expressive understanding of aesthetics

In the second (expressive) understanding, the aesthetical is associated with communicating and conveying a message to others. That is, students are allowed to express their understanding and opinion of the topic using their own form of expression, in which they try to connect and capture the facetted aspects of the topic, or as expressed by Hohr, *'of holistic forms in which the context creates the meaning'* (Hohr 1994, p. 178).

In Hansjörg Hohr's understanding, expressing oneself in an aesthetic idiom implies expressing thoughts and ideas through a 'work form' or 'expression

form', meaning that thoughts and ideas have to be 'couched' in a form that is open to the senses. Moreover, these are thoughts and ideas that cannot be put to words – or defy formulation using a discursive language.

In our MUVIN context, students would work on expressing experience reaped or ideas for possible solutions in order to communicate them. To do so, as already mentioned, they produced posters, graphics, paintings, video, role-plays or theatrical plays. These media let the students express emotions and feelings in a way that would not have been possible, had they only relied on 'the language of logic'.

Both understandings in combination

Both in a motivational/attention-creating and in an investigative/acquisitional perspective, the students' activities chiefly worked within the receptive under-standing of the aesthetical, since they had a cognitional function. By contrast, communicative students' activities were based on the expressive understanding of the aesthetical, since intended to produce something meant for conveying a message.

In some cases, albeit only a few, a MUVIN project would combine both modes of aesthetic understanding, as suggested by the students' experiences during their trip to the stream and the subsequent further treatment, cited above.

This example points to an interesting connection between understanding of subject matter and productive activity within the same field. We get to understand maths better if we solve mathematical problems – and we get to understand the democracy concept better if we take part in democratic decision processes. Similarly, there appears to be a connection between students using e.g. paintings to express themselves on a given topic *and* their capacity and sensitivity to catching and interpreting aspects of the same topic from real life. This is what Hohr calls the aesthetic form of interaction (Hohr 1994).

That circumstance could be a principal argument for involving the aesthe-tical in educational contexts. The dialectics between the receptive and the expressive implies a mutual reinforcement, thus emphasising the cognitional function of the aesthetical.

The fundamental importance of aesthetics

One of the challenges to teachers in environmental education is to create a set-ting in which students can meet the environmental issues in an active and sensing manner that will allow them to form their own ideas and understandings, not least via aesthetics aspects.

For instance, in one MUVIN project on people's use of watercourses, the aesthetics perspectives emerged in several ways during the learning process. These 1-3 grade students (7-9 years old) approached and talked to the involved stakeholders – the fisherman and the fishpond owner. In addition, they interviewed ordinary people about their views, talked to official experts, examined the historical aspects, and they made simple scientific experiments and studies at the stream to demonstrate how nature responded to the impacts. They made large 3D models showing how a fishpond worked, and terminated their project with role-play and puppet theatre performances before their parents, presenting their proposed solutions to the issues.

Naturally, as part of such a project, students need to grasp the key analytical aspects of environmental issues, which as can be seen from the above, often was difficult enough. All the same, if students get to meet the parties involved in the conflict, feel their concerns and resignation, as in the case of the two elderly people, or their inspiration, engagement and hope, this will allow them to grasp those often unspoken and complex emotional and normative elements of the environmental issue, which in turn will help develop action competence.

10

Project work and storyline

We chose to deal with two specific work modes separately, namely project work and the storyline approach. Though neither approach – in its undiluted form – was frequently applied by the schools organising MUVIN projects, we still consider them to be of interest. In general terms, most MUVIN-processes can be characterised as variations on whole-class teaching combined with a wide range of activities. They testify how experienced teachers are able to adapt and adjust their teaching to current needs.

Looking into the project work mode is appropriate, since it is a common form of problem orientation it is particularly relevant to environmental education in the sense of the MUVIN project. In addition, a large number of MUVIN teachers refer to their MUVIN teaching as 'projects'.

We selected the storyline approach because it diverges strongly from how most people in Denmark believe environmental education should be organised. We try to consider it as reflecting a coherent pedagogical understanding of how children learn. Moreover, Danish teachers and schools take an increasing interest in the storyline approach, so we would like to contribute to the continuing reflection upon its potentials and limitations.

The project work and storyline work modes have a common key aspect, namely that both draw upon and challenge the students' notions about the world around them. Moreover, in-class work is organised as group work, with considerable opportunities for students to co-influence their own work.

Problem-oriented education / project work

Problem-oriented education

Environmental education deals with conflicting concerns and interests in man's dealings with nature, which present themselves as problems, conflicts, and dilemmas. In that sense, environmental education can be seen as problem-oriented *per se*. Obviously, however, that does not necessarily imply a problem-oriented teaching *method*. For instance, a teacher might very well deliver a presentation on environmental issues or hand out an assignment sheet, on which the students are to enter correct answers to questions regarding today's lesson on an environmental issue.

Thus, it is warranted to distinguish between teaching that merely *deals with* issues, and teaching that is also *organised* so as to enable students (together with their teachers) to gradually unearth and expose the issues involved. It is the latter approach that is known as problem-oriented education in an educational theory context.

For teachers, a problem-oriented work mode tends to come naturally, whenever we engage in topics that represent obvious problems in our own environment. And in this context, environmental problems have an educative quality in that they cannot be solved just like that, and that there is no such thing as an indisputably right answer to many of the involved issues. Precisely for that reason, some feel that teaching environmental problems is too difficult, since they cannot readily be cut down to assignments that students can carry out. However, in terms of problem-oriented education, precisely that can be considered an advantage. These issues are not dealt with once and for all; instead, they let themselves be unfolded into complex issues well suited for inter-subject investigation and reflection.

The MUVIN focus on interest conflicts in the man-nature relationship brought out the open-endedness of environmental issues, which presumably contributed to the more or less pronounced problem-orientation of many MUVIN projects. Another key factor is that the general objective is about developing action competence in a democratic perspective. This opens up to letting students gain experience with exerting considerable co-influence, and with pinpointing and investigating major environmental issues. Here again, different types of problem-oriented education would appear obvious choices.

This is not to say that their use is particularly easy or methodologically straightforward. Of course, a lot of adaptations will be made in day-to-day praxis. The extent of problem-orientation may vary considerably, and so may the balance of teacher/student influence in terms of formulating and structuring the work with the involved issues. Moreover, there are several variants of and

seamless transitions to the particular type of problem-oriented education mostly referred to as project work.

Project work

Project work has become a generic term covering large parts of alternative and progressive education. Similar to 'interdisciplinarity', 'project work' has become a buzz word in wide circles, invariably causing the subtler details, the critical dimensions and whatever edges could give rise to conflicts, to fade away once the concept was fully embraced.

From the mid-70s and throughout the 80s, the project work concept has spread across the entire Danish education system. It first originated in tertiary education, with Roskilde University as its first centre in Denmark. Initially marketed by more or less leftist, critical educators, the concept took a while lose its controversial ring – even after educational economy analyses had demonstrated that trade and industry needed new competences and skills in at least part of the workforce.

The project work concept also spread to segments of the education system providing more general education – in part as a countermove to the motivational crisis and the rampant debate of school fatigue, in part in response to a renewed problem of subject-overcrowding, and finally manifesting the pedagogical reflections of many teachers and educators as to which types of knowledge and skills are valuable in a democracy perspective.

During this process, project work as a teaching and working mode had to be adjusted to a number of circumstances. There have been modification, dilution and mergers with other concepts of education.

As a result, the project work concept is hard to define today, and lengthy discussions to determine whether or not something is 'true' project work would hardly make sense. On the other hand, it is reasonable to maintain that *project work is a specific type of problem-oriented teaching-learning that is project-organised, interdisciplinary, experience-based, and participant controlled.* (Illeris 1974 and 1981, Schnack 1978 and 1993a, Holten-Andersen, et al. 1980, Borgnakke 1983, Daniel, et al. 1985, Kristensen 1991 and 1997).

A successful project work requires participators (including teachers) to broaden their notions of learning and teaching, from different variants of presentations and examinations towards active investigation of pertinent problem issues.

As indicated earlier 'problem' should be understood as 'issue' to signal that

we are dealing with something other than a practical, technical, or individual problem. In order for problems to be suited for project work in education, they need to be unfolded in cognitive contexts that allow us to clarify some of their major underlying aspects. So the general point of project work is to gain insights about such issues from working with them, rather than 'solving' them.

The 'project' term refers especially to the fact that the work mode embodies a number of characteristic phases, one of which being an end product, in which the student will present the results of the undertaken study using a given form.

The phases are often described as 'introduction' (including aspects such as framing, participant requirements and group formation), 'problem/topic selection', 'problem definition and formulation', 'planning', 'execution', 'production of project product' – and 'evaluation', possibly split into a more retrospective evaluation of product and process and a more prospective post-processing.

These phases provide an overview of the work mode and remind participators that work mode will necessarily be transformed en route including the guidance role of the teacher. Moreover, they ensure a certain progression throughout the process – in principle and with some exercise jointly managed by all participators.

However, all experience indicates that it is important to stress that phases should not be seen as a string of pearls. It is not necessarily a virtue to pass through all phases one by one, without ever having to return to a previous phase. There is a lot of cognition value in realising that some things need adjustment in the process, even if they take time and may make the final product come across as less impressive at face value.

In project work, we try to create coherency by introducing relevant sources of cognition and knowledge to the extent they can help participators get on in relation to their chosen issue. In this context, subjects and other sources of insight are seen as tools, offering knowledge, theories, potential explanations and investigation methods.

A critical-pedagogical view of project work is not experiential pedagogical in a logical-inductive sense. Students are not meant to induce or generalise alone from single experiences to general contexts. This would be entirely uncritical. On the other hand, it is often beneficial to start out from one's own experience, and by any standards, it is essential to combine general knowledge and personal perceptions, scientific concepts and individual experience, theory and practice.

Given its strong emphasis on co-influence, project work as a teaching method is normally termed as 'participant controlled'. This implies a tendency

to talk about participants – as a collective – rather than students, and also an emphasis on the fact that their co-influence is not just on various choice situations, but on a more protracted process, a project to be managed.

Project work and environmental education

Since the Danish Act on General Education introduced project assignments for grades 9 and 10 in 1996, project work has re-emerged as a topic of current interest in Danish schools. For one thing, the new exam method is bound to necessitate lots of experiments with project work in senior grades. Moreover, it is obvious that this new challenge needs to have a top-down impact in our schools, so students are faced with the demands for more independent, investigative work before reaching their project assignment.

And many MUVIN schools do in fact define their curricular activities in project terms. It seems to come naturally. And the inherent ideas of environmental education match the new requirements regarding interdisciplinary processes, team teaching, and project assignments. At one school, the teachers said, quite characteristically:

> *Our team was involved in both MUVIN and a pilot study on project work. So it felt natural to try to integrate the two part projects, also because we found that the implicit MUVIN perspectives on environmental issues – especially regarding 'conflicts of interest'- were relevant in relation to project work as a method.*

It is also quite conceivable that in years to come, teachers engaged in environmental education will utilise the Education Act's direct and implicit demands for project work and interdisciplinarity. In addition, teachers engaged in project work can find substantial content and perspective in the ideas of environmental education – including content of a nature satisfying the express statements regarding the 'greening' of education made both in the preamble to the Danish Act on Folkeskolen *and* by the minister in the preface to the book specifying the relevant curricular objectives and key areas of proficiency & knowledge. (Danish Ministry of Education 1994a).

This is undoubtedly a fruitful coincidence, since it represents more than a formal combination of form and substance. These years, project work as well as environmental education are being integrated in our schools, based on fundamental notions of general education and democracy. The target of

environmental education to develop action competence is in good keeping with the general perspectives of project work, seen as a critical pedagogical approach to learning, and not as a mere method.

In MUVIN, we have reaped quite some experience with this combination that holds a number of potentials and difficulties. As for the general implementation of project work in Danish compulsory education, we refer to the relevant target area of the Danish Ministry of Education (Kristensen 1997). Below, we will mention some MUVIN experiences.

Students' co-influence

In the two latest environmental education projects, we have tried to give higher priority to students' co-influence, both in terms of topic selection, teaching matter and form. In the first project, the youngest students were 9-10 years old and the oldest were 12-13 years old. Overall, our experience was positive. Students were able to offer constructive suggestions, and very much so. There is no doubt they came up with relevant suggestions that we teachers had not thought about. What is more, students are more committed to pursuing the targets they set for themselves. We found it to be all-important that the topic is specified in concrete terms and well-defined. This makes it easier for both teachers and students to stay on track.

This is how one teacher describes experience with one of the key pedagogical principles, students' co-influence in education. As mentioned, the priority given to co-influence on project work is so high that projects are usually said to be participant-managed. However, it is hard to determine where the line is drawn.

In MUVIN, actual participant-controlled groups were tried precisely in relation to the project assignment – with students who had little prior experience in being co-responsible for their own learning. There were the familiar pitfalls, and with a more stringent external control those students could no doubt have covered some more ground. On the other hand, gaining experience and training in handling problem formulation and work set-up on their own was a significant part of the project content. The fact that several students were not particularly good at it could invite a despondent attitude in an educational development context. On the other hand, this would also make a strong case for a more systematic effort to promote it – not least in a teaching targeting the development of action competence.

Among MUVIN projects, there is ample evidence that the extent of student co-influence and participation can be increased beyond the usual level, and that both students and teachers tend to rise with their tasks.

Regardless, a clarification of frameworks and mutual expectations plays a considerable role – including (see the above citation) that the topic is specified and defined in concrete terms. Obviously, it is important for project work to evolve into a *work mode* in its concrete application, meaning that well-defined frames, roles, expectations, and agreements are needed. Depending on the general situation, this may then be done more or less rigorously, yet still allowing for contingency and improvisation. After all, projects are problem-oriented, and therefore need room for unfolding as participants learn more.

Several MUVIN projects set out so open-endedly that teachers in later projects decided to tighten up a bit. This goes for the content-side in particular. Teachers may find it difficult to combine a wish for extensive student co-decision with a specialist qualification of their projects. Two problem complexes seem to be involved here: In part, managing to *introduce* relevant specialist concepts and forms of understanding, and in part, to successfully *sustain* quality within the learning processes.

Introduction of relevant concepts

When it comes to introducing relevant concepts, we need to keep in mind that project work is *teaching*, meaning that a learning goal is set for the students' work, and that planning and organisation is involved, for which one or more teachers have a shared responsibility. After all, teachers' responsibility include challenging the students' previous understanding of the world and adding essential perspectives to their understanding and solving of problems. Thus, the teachers must ask lots of questions; still, they also have to introduce their students to major concepts, theories and perspectives. With project work, this is often done indirectly – or directly, if you wish – when during their projects, students come across literature and individuals who stand up for something and make their point. However, a helping hand from the teacher is often needed.

As it is, most teachers will surely find it easier to interfere than to hold back. Thus, in MUVIN, we saw a number of problem-oriented and more or less project-oriented processes gradually slip into what resembled whole-class teaching. But precisely the teachers who staked on applying project work seriously occasionally felt that despite the exciting processes, they would have to do more in the way of introducing and integrating certain concepts and perspectives from the subjects (see also Chapter 8).

In MUVIN projects, the most central special concept is 'interest conflicts' or 'conflicting interests'. And this has proved less than straightforward or easy for students to uncover on their own. In order for this concept – reflecting the societal nature of environmental issues – and the entire conflict perspective to become pivotal in the projects, it typically has to be introduced instead of waiting for students to come across it by chance.

Experience gained from MUVIN underlines the pedagogical challenge that has to be considered during the planning process. Several classes that embarked head-on and wholeheartedly on a project, unfolding engaging and exciting teaching and learning, never came to grasp the conceptualisation of nature as the source for human activities and the conflict perspective. To make up for this, several later projects ended up rather more teacher-controlled than the involved teachers would actually have wanted. Apparently, in order to stay clear of both these pitfalls, it is all-important for teachers to fully consider and discuss with the students which general requirements – including topical ones – should be made for a planned project, e.g. for problem formulations to include or suggest a conflict perspective on the man-nature relationship. In one MUVIN 9th grade class (16 years old students), it was felt to be quite a relief, when the project advisor made such a suggestion.

It is worth noting that some MUVIN projects seem to indicate that this issue is easier to handle with younger grades, where an adaptation of the project work model comes naturally – since most children accept that they have to walk, before they can run. One among many adaptations was tried out in a 2nd grade class, where the teachers decided to keep the class together, except for the product phase. In the teachers' words:

Our reasons for this choice were:
- that the children were just 8-9 years old, so they needed a lot of teacher control
- that we wanted the children to share a lot of experiences that we could refer to during future projects
- that the children should familiarise themselves with the four phases of the project work: 1) selecting a topic, 2) formulating the problem, 3) communal phase, and 4) product phase
- that we wished to ensure interdisciplinarity wherever possible – meaning that we would include only such methods and concepts from the subjects that were needed in order for the children to gain an essential insight in a given environmental issue
- that we wanted to ensure that the relevant environmental problem was dealt with as a societal issue, wherever possible.

Such teaching-learning will allow the students to learn about the issue they are working with – while also gaining experience with important aspects of a work mode they can continue developing during their school years. Thus, the work mode itself becomes part of the 'content'; on the other hand, it is adapted precisely to prevent it from becoming the entire content. In that case, it is less important how many key features of project work need to be included and to what extent, before we would *term* it project work. In the cited case, one teacher had to conclude, much to his surprise: *'- that I can very well do project work from 2nd grade', and '- that younger children are able to understand and work with conflicts of interest'.*

The quality of learning processes

The other problem complex was about *sustaining* quality in the learning processes. Obviously, this issue is not peculiar to project work or problem-oriented education as such. But the project work method either involves some particular difficulties, or – perhaps more likely – make them come to the fore. An observer can easily see how a project group is 'losing height' the very moment a teacher has stopped instructing and has proceeded to another group. It is far easier than with conventional whole-class teaching to observe how long students are not concentrating on whatever is the learning topic. It is directly visible when students get fed up with and try to shirk the numerous challenges they are constantly faced with.

We also found an amount of this in the MUVIN projects. At the same time, however, we observed an interesting discrepancy between the students' perception and our own about the students' actual work engagement. In fact, we can have two sets of empirical data dealing with, in a certain sense, the same thing, namely the students' statements about their own work input (in student interviews) and the researcher's classroom observations of the same process. And occasionally, the two data sets convey completely different impressions of the work process!

The combination of considerable student co-influence and the inherently rather autonomous work process of a project increases the risk that introduced subject concepts, theories and perspectives are not adhered to and put to use. And it could be feared that the students' own independent findings will often be at a rather more shallow level of representation.

Not surprisingly, we found that to be the case for several MUVIN projects. It is not easy for students to carry out in-depth, critical interviews – and

especially not when talking to 'nice' and forthcoming individuals. Nor is it easy for them to delve into the more fundamental and theoretically based points of a given text. And nor is it easy for students to connect their (subject-based) knowledge with the reality of the surrounding world. And our children at school are no better at it than adults. So they need in-class training in sticking to the points of the matter.

Then, in turn, teachers must nudge their students to consider whether they actually got the answers they were after. One day, for instance, a project group visited a local company to learn more about green taxes. They came back in high spirits, having heard a lot about the company, and how green and environmentally friendly it was. Only when questioned by their teacher did they realise that they had completely forgotten to enquire into the company's actual view of green taxes. So they had to start out once more with a follow-up telephone interview – which eventually gave them food for thought, since the company actually proved to be strongly opposed to green taxes.

We found in several cases that teachers were perceived as teasers, with their repetitious questions and issue-raising – or as someone 'impossible to please'. Nonetheless, and for obvious reasons, students also seemed utterly dependent on them to keep them on track. Yet, in the best cases, we saw a pronounced shift from the old-school 'did we learn what we needed?' to 'did we learn what we wanted?'.

A general objective of MUVIN was to insist on the perspective of conflicts of interest in relation to the use of natural resources. In the projects, this was most successfully maintained where properly integrated in the problem formulations. This owes to the forte of project work, namely a pivotal issue and a plan for the end product. In principle, these are both useful tools in helping students to sustain the quality of their own learning processes.

The storyline method and its potentials for environmental education

The storyline method used in MUVIN

The storyline method is not traditionally used with environmental education in Denmark. Nor did the general presentations to schools and teachers specifically point to this way of organising MUVIN teaching projects. All the same, a few teachers embarked on a first attempt to use the method, as part of their MUVIN work. With the support of the MUVIN advisor, they were precisely interested in using the method's potentials in relation to the MUVIN focus on

interest conflicts in nature use and in working with environmental issues at a societal level. Some examples are given later in this chapter. A few other teachers with some routine in using the storyline method used it for parts of their MUVIN projects. For more details, see Hedegaard (ed. 1996), namely 'Med Darwin på rejse' ('In Darwin's footsteps') and 'Hvorfor er jorden giftig?' ('Why is the soil poisonous?').

A general overview of the method is given in two more recent Danish books (Falkenberg et al. 1994, Jørgensen and Rasmussen (eds.) 1994). A national conference organised by The Royal Danish School of Educational Studies in 1995 focused on critical aspects of the storyline method, and the conference confirmed an almost skyrocketing interest in the storyline method in Denmark.

'The Scottish method'

The storyline method was first developed in Scotland and hence became known as 'the Scottish method' in Denmark (Meldgaard 1998). In fact, Denmark was one of the first countries abroad to embrace the method. In Scotland, the method was developed as an attempt to overcome problems arising from a merger between education in natural science, geography, history and (in part) maths into 'environmental studies'. The method was referred to as 'topic study', and to our knowledge this is still the case among teachers in Scotland. Interestingly, the method was largely evolved in interplay between 'teacher trainers' and teachers doing in-service training, including co-operation on development work in classes. It is noteworthy that the method was not conceived as 'problem-oriented' in the sense that our MUVIN project focused on societal issues. Above all, it evolved as an attempt to create more coherence between various topical areas, and with a strong student motivational component.

Fred Rendell, of Jordanhill College in Glasgow – one of the 'founding fathers' of the storyline method – says in his introduction to the booklet 'Topic Study, How & Why?' (1989, p.1):

Since the appearance of the Primary Memorandum in 1965, a continuing theme has been a number of attempts to make coherent sense out of the problem area of environmental studies.

After pointing out how broader subjects tend to become a kaleidoscopic pell-mell of non-related subject matter contributions, Fred Rendell arrives at the following profile of an alternative:

What we can look for is a model of procedure which will have the following features:

a. *It should start from the notion that the world around us is complex and many-layered and that the child has some notions of his own already as to how it works.*

b. *It should have a storyline sequence which children can follow:*

    1. *Set the scene in place and time.*

    2. *Introduce people and/or animals.*

    3. *'Figure out' the way of life.*

    4. *Cause incidents to occur which have to be dealt with.*

c. *It should employ the general strategy of enquiry which is naturally carried out by human beings; problem-tackling.*

d. *It should exemplify ways of dealing with the problem of the 'right' answer by incorporating what children know already, or can suggest as possible outcomes.*

e. *It should demonstrate that the child's ideas are negotiable if he can support them with argument; that such a skill is transferable across many situations.*

f. *It should provide opportunities for the child to work as a participant agent in his own learning within the class, within a group, or as an individual. He should be caused to bring what he knows, or can imagine, to the tasks in hand.*

g. *It should present the need for referential skills as a natural outcome of making the child think for himself since such thinking has to be evaluated.* (op.cit. p. 3)

Rendell summarises 'topic study' as based on a 'context', to be included as follows:

1. *Create a context with the active involvement of the child.*

2. *Giving him tasks which arise from that context which he sees as significant and meaningful within it.*

3. *Giving him opportunities to develop his understanding and knowledge of the world with the support of the context.*

Fred Rendell strongly advocates tapping and challenging the children's own conceptions, theories and notions, in order to reinforce student commitment, understanding and the transfer value of new skills and insights. Finally, he points to the following, of major relevance to environmental education as understood in MUVIN:

Even when teachers want to explore something of which the children can gain first-hand experience, in their local area or in field-work, they can still employ the learning strategy implicit within the Topic Study described above.

1. Produce our theories about how we think something might work, might be organised, might be laid out.
2. Produce inhabitants, staff, crew, if necessary, with a description of their backgrounds, duties, physical appearances.
3. Discuss in turn how a sequence of events of a variety of kinds might be tackled and resolved.
4. Test our thinking by paying a visit to gather first-hand evidence.

This strategy gives point to any enquiry about shops, traffic, the park, the zoo, housing, water supplies, bridges, railway stations, offices, and so on. It taps what children know from sources mentioned above and allows their theories and the related concepts to be extracted for inspection. After this activity, they find out what they know and what they do not know. The questions they have to answer arise from the processes they have employ-ed. (op.cit. p. 22)

The storyline approach is mostly used with the junior grades, for which it was first introduced in Scotland; however, according to several Danish teachers, it can be equally suited for senior grades and has also been used in teacher and general adult education and in-service training. During the MUVIN project, storyline was especially used in elementary and intermediary grades.

The storyline approach and the teacher

Further to the above, we should like to specify a few general features of the storyline method, which will then be discussed based on experience from praxis.

In a storyline project, the teacher or teacher team will typically have prepared a coherent 'story' that is to provide the setting for student work during a mostly longer project. See for instance 'På rejse med Darwin' ('On travel with Darwin') (Hedegaard ed. 1996). However, outside the MUVIN context, many teachers start out from pre-existing storyline projects with praxis guidelines.

A story is placed in a geographical and temporal setting, including a number of individuals or other 'creatures' with whom the students can identify, and who are to be recurring protagonists in the plot.

Moreover, when working out the storyline, teachers take into account how the story can provide material for relevant work within the discipline depending on form level, and the primary subject focus. The method is typically used with inter-subject projects combining creative work processes with academic or general knowledge and skills.

When designing a storyline, teachers compose it from a number of sequences, each of which occasioning a shorter coherent project (episodes or chapters of the story). A new sequence is introduced by asking the class a 'key question', which adds to the progress of the story and – quite importantly – puts the students' thinking and notions to the test in new respects. All the same, it is fundamental for the teacher to bring up challenging questions on a regular basis, which helps promote the students' understanding of the subject-matter, and to introduce relevant new concepts and theories.

There is ample opportunity for including functional investigative and experimental activities in the project; but as a general principle, students should first be allowed to develop and work with their own concepts, their own 'model'.

The storyline approach emphasises the importance of encouraging the children to develop their own conceptual model first.
(Steven Bell, oral statement)

The investigative and experimental component of the storyline method, in the form of 'enquiry', has been in focus ever since its first beginnings in Scotland.

Thus, the key questions will reveal little about the subject matter and quality of the project. And a teacher must take care to constantly challenge the students' understanding of the subject-matter; otherwise, the method is prone to 'loose height' in academic terms, and the student outcome will mainly be development of skills and more general concepts. This could be one reason why the method has been particularly popular with junior grades, where such outcome is often considered sufficient.

Storyline examples from MUVIN projects

Though relatively few, the MUVIN storyline projects yielded valuable experience with the method's potentials in environmental education. They clearly provide first indications of how to bring about situations that make concrete starting points for the students to perceive and consider cases of conflicting interests in

the use of nature. Also, there are several angles to working with action potentials vis-à-vis environmental issues, both in 'as-if' situations and in couplings with real-life situations. In particular, the storyline approach offers interesting opportunities for focusing on such action potentials at different levels, that is from the individual to the structural level. It would thus be fair to expect that the storyline method *can* indeed contribute to strengthening the students' action competence in terms of environmental issues. However, we will only hint a few of these aspects below.

It is always difficult to give a brief overview of storyline projects, since these rely extensively on the interplay between imagination on the one hand and reflective and investigative activities on the other. We will therefore have to list a few components of the frame set up for the 'story', allowing the reader to keep track.

During a planning session with the MUVIN advisor the teachers of two parallel 1st grade classes felt it to be quite a relief when, , they came into the storyline approach as a possible solution to working with conflicting interests in nature use with students this young. The real challenge was how to open up to students working independently on societal issues at an age when they cannot stay calm for any longer periods, have only just begun learning group work, and still need considerable room for free play.

The following describes how both parallel 1st grade classes' worked with two storyline projects, the latter of which was clearly understood by the students to be a sequel to former story, and also tapped and elaborated upon the students' learning outcome from the first project. The descriptions will leave out several details, since the main emphasis is on components with built-in 'launch pads' for environmental education. Thus, one should always have in mind that the storyline approach is difficult to tailor so as to target environmental education *only*.

1st grade project 'Nybyggerne i Udbylille' ('The Settlers in Little Outborough')

The teachers had the following objective for their project, launched right after the autumn holidays: '*Using activities around the set-up of model houses and adjoining communal grounds to make the students aware of our consumption and use of natural resources (e.g. for heating, lighting, daily housekeeping, and waste).*'

A story giving the framework for the students' work and identification was

constructed around a fictional story of 'Elvira Gyldenløve', whose only child went to Australia to dig for gold. Her son is killed in a mining accident, leaving her as the sole heiress to the huge fortune he has managed to scrape together. However, she is old and lonely, and her only wish is a family with whom to share her fortune. When she falls seriously ill, she draws up a will with the assistance of 'Stoltenberg, solicitor'.

She bequeaths her fortune to the project 'The Settlers in Little Outborough', to be used for building four houses meant for families in need of adequate housing. The class is introduced to the whole story by 'Elvira Gyldenløve' appearing in-class, in the form of the disguised, though easily recognisable teacher.

Her bequest has a particular string attached, namely that the families must move to Outborough, where Ms. Gyldenløve owns a piece of land, and that three generations must live under one roof. This requirement is added as a stepping-stone for a later development in the story, in which conflicting interests in nature use are enacted between generations. Stoltenberg, solicitor assists Ms. Gyldenløve and helps her point out four families: one from island Bornholm, one from island Anholt, one from Esbjerg (a provincial town), and one from Ishøj (a Copenhagen suburb). This provides an opportunity for working with different Danish regions and the map of Denmark, and with the students' notions and experience with different locations.

Families are organised as four six-student groups, each of which has to decide which students will be which family members across three generations. (Such student groups are quite large and eventually proved *too* big.) Each student makes a doll representing his or her place in the family, including a personal profile.

After working out personal profiles and in-class presentations, a cardboard 'house' with room layout is handed out to each family (group). Each family has to agree on the allocation of rooms for functions and persons, that is, how the house can accommodate the students' dolls. Doors and windows are cut out in the cardboard houses, and rooms are wallpapered and furnished with self-made furniture. The storyline method emphasises the students' own creative and productive work, in part to allow them to 'model' their own notions, and in part to enable them to develop 'ownership' of at least one character and engagement in the story. At the end of this phase, there is a discussion of power and electrical appliances; drawings are made on the blackboard, and the students work out their own power circuit.

The time-consuming task (not least for school starters) of fitting up the cardboard houses is an important part of the general teaching approach in a storyline: Dolls, houses, etc. become throughgoing elements ensuring the

students' anchoring in the story, and hence their engagement in learning topics and issues. In a manner of speaking, they provide the concrete outset of more theoretical talks.

On Day 11, they look at the power consumption of the various domestic appliances, using a list with symbols representing the power consumption of each electrical appliance. Families are then told to cut down their domestic power consumption to 50 units (symbols) and prioritise which energy-consuming appliances they find most important. Here the students have to discuss and consider what the generations in each family need and can concur about. This did not create the major inter-generational conflicts that the teachers had hoped for. The families lay on electric light in their houses, which in itself is a demanding process in terms of decision-making and craftsmanship. As part of the co-operation between the two parallel classes, the students go and visit one another and are shown around the houses and their arrangements.

The four family houses are set to form a square, each surrounded by a garden and with a sizeable central plot for common use: Now comes the difficult part of reconciling different generational interests as to how the communal grounds are organised: First a joint brainstorm session on the blackboard. Then families are split up in groups: grandparents, parents, elder children and younger children, each of which group has to agree on a wants list specifying their needs for shared facilities suitable for their age. Then the shared facilities are constructed with Lego and presented to the other groups.

The students actually proved to be quite flexible, and shared wishes across generations reduced the interest conflicts over land use (= nature utilisation) that the teachers had anticipated. These decision phases involved significant learning processes in terms of clarifying wishes, arguments, decisions and realisation.

When in-class work was concluded, there was a joint walk in the local neighbourhood to study how communal spaces were organised around the students' own homes. Hence, a textbook storyline case, in which students first 'build' their own model before having it confronted with reality.

In conclusion, an opening celebration was held: The two classes paid visits to one another to see the produced models of communal spaces around cardboard houses, etc.

'En ødegård' ('Derelict farmhouse') – project outline
Next spring, both 1st grade classes proceeded with a storyline project integrating their own project with the school's joint feature week on water. The feature week included visits to several enterprises/utilities using or processing water

(sewage treatment plant, water works, pond, Carlsberg breweries, and public swimming baths).

The same four 'families' (in each parallel 1st grade class) from the previous project inherit a derelict farmhouse / large cottage in Sweden. It should be able to accommodate all at the same time; however, the cottage cannot hold them all, so here is a problem to decide about and solve using tents. The house itself has no conveniences in terms of power, water, toilet, sewage, or central/district heating. Moreover, the project involves conflicting interests regarding the use of 'leisure water'. In the river: sailing (canoe/kayak) and rafting. In the lake: swimming, yachting, motorboats, and speedboats including water-skiing. As a run-up to the project, the students refresh their roles from the first project: They practise introducing 'themselves' in the group using rod puppets, after which they perform their play in-class and are videotaped.

Introduction of the 'story' itself, including a definition of 'a derelict farmhouse': How does it differ from a 'normal' weekend cottage of today? For a while, students are busy investigating water and its significance for many aspects of human life.

A very important and central focus point for both classes was their joint construction of a Swedish landscape, complete with mountain, lake and rivulets (with running water), made of papier mâché. Student groups from both classes took turns working on the model.

The students' ideas of the derelict farmhouse were linked to their construction of the Swedish landscape: What do we need at our derelict farmhouse? What about drinking water? Can we have tap water laid on inside the house? Can we have hot water? A mini-experiment was made: A garden hose with water was placed in the sun. Will the water get warm? Can we lay on electricity? Can we use the river to produce water power? Watermill construction work with Lego Didacta. A water pump is fitted into the papier mâché model, enabling water to circulate, and the watermills are tested. 'Now we can have electricity inside the house! So what are we going to use the limited amount of power for? What matters the most?'

This project also ends with a celebration, a 'May Festival' featuring Swedish fiddlers, decorating a Maypole, and with a bonfire feast (trout from 'the river') and Swedish garnishing.

Students' engagement

The students' engagement in the above storylines was strongly linked up with

their possibilities of identifying with actors in the story. To the students, lots of things were perceived as play and phantasy; however, they always reflected relations to the students' own experiences and notions. For instance, a refugee boy's doll ended up having a noteworthy 'exotic' look that made it clearly stick out from the rest, even though many dolls were somewhat clumsily made in terms of handiwork.

Another boy wanted to be a boy of his own age in the group family; when his wish cannot be fulfilled, he opted to be the grandmother instead. Asked why, he referred to 'my own grandmother', whom he appreciated very much, and his doll did in fact radiate the qualities of a really nice, buxom, elderly grandmother. It is obvious that the many practical/creative tasks and options of the storyline projects helped to engage students. Of course, this autonomy can be valuable in its own right; moreover, in a storyline project it also contributes significantly to making it the students' project – their dolls, houses, etc.

The demands made on all product design in the storyline approach are quite rigorous. They must be made 'properly' in order to raise the children's craftsmanship and the quality standards they set for their own work. As a result, they sometimes spend monstrous amounts of time designing model houses etc. Consequently, the final outcome compared to time spent depends very much on whether teachers know how to tap the derived benefits in their subsequent teaching, especially in terms of qualifying the students' conceptions. The same goes for the time-consuming processes of making group work function for all group members.

Gratifyingly, the MUVIN projects clearly demonstrated that time spent on cultivating autonomous/creative work and group work during the first storyline projects is an investment, so subsequent storylines require less time for these purposes. Accordingly several teachers reported back how much faster their students could make their dolls or other props on later occasions.

Thus, it seems to be the case that the storyline activities teachers find to be surprisingly time-intensive the first times around will pay off later – in the form of well-functioning group work, student involvement in decision-making and integration of practical/creative work in other teaching contexts.

We should also keep in mind that prior to the MUVIN project, those teachers were neophytes in using the storyline approach as such, while after three projects, they are actually quite capable of managing the method's potential and pitfalls.

A universe for complex issues

A storyline project allows students to participate in creating a universe for their work with exceedingly complex issues, some of which they would not otherwise pay attention to, and especially not in junior grades.

Given the abstract nature of interest conflicts in nature use, concretisation is all-important. As already mentioned, this is done in MUVIN projects by letting the students meet individuals with clear-cut interests and opinions on a given issue. (See also Chapter 8, on conflicts of interest.) The primary angle of a storyline project is another; all the same, it offers a similar degree of concretisation, and with more possibilities for the teacher to control the 'actors'. Contacts with the outside world are no less necessary, yet are given a less introductory role and a rather more testing function.

During some of the storyline projects, our mid-way interviews with students occasionally indicated disappointing outcomes in terms of acquired concepts that the students could readily express themselves about. Notwithstanding, it later became apparent that the students had developed insights that boosted their benefits from later teaching – here in the form of storylines – and that evidently, as a result of the first projects, they were now able to handle quite complex issues, and what is more: show an interest in them. This seems to be the case in 'Jorden er giftig' ('The soil is poisonous') the third storyline project done by the same two classes, now in the 2nd grade. The project is described in 'Gå videre med miljøundervisning' ('Going on with environmental education) (Hedegaard ed. 1996).

Precisely because storyline projects involve students so much and offer great opportunities for forming mental images, their individual elements make good memory pegs. This makes it easier for the teachers to activate their students' episodic memory in order to let them compare and contrast phenomena and perspectives, and thus contribute to developing their conceptual understanding and semantic memory. Typically, students can remember and recollect a vast number of episodes from a previous storyline.

The pitfalls of the storyline approach are in part associated with time-consumption, in part with the teacher's role in keeping up a consistent quality. As for time, the many hours required for a storyline project can be a problem. Of course, this is completely acceptable so long as there is a reasonable progress in student outcome. Therefore, the teacher must take great care to balance time spent on the top-priority areas of knowledge and skills versus the numerous possible digressions that could also come in naturally for the class to work through.

The other aspect of the teacher role is about teachers taking care to ask students thought-provoking and concept-forming questions as part of the storyline project. This is important as the key questions needed to move on the overall 'story' disclose very little about the subject matter of the project itself.

The MUVIN projects that tried out the storyline approach for environmental education confirmed that the method makes it possible to create a shared, complex and nuanced universe with a shared understanding of terms of decision-making and action.

What are the prospects for storyline as a contribution to environmental education?

We anticipate an increasing interest in using the storyline method, both as a component of environmental education and more generally. However, a lot of fruitful experience is yet to be made. These will help to broaden the praxis of individual teachers; moreover, the general potentials of the storyline approach in environmental education can be further developed; notably in terms of developing in the students, a conceptual apparatus and an understanding of action potentials vis-à-vis environmental issues.

At the same time, we should keep in mind that alternating between different teaching methods over the school year is an independent learning asset – provided that students can clearly identify what method is currently being used. No teaching method will satisfy all learning aspects equally well. Furthermore, different methods can be combined.

Thus, we found a few encouraging cases, in which small-scale storyline projects were imbedded in a larger-scale project, e.g. 'Jorden er giftig' ('The earth is poisonous'), a project mentioned above. Moreover, the teacher's attention to the assets of the storyline approach can lead to another view on learning, thus informing her or his teaching praxis in general. In sum, a defining aspect of this learning concept is that it appreciates the value of allowing students to construct their own conceptual model of the relevant object or aspect, before investigations of the real world are started, or knowledge is imparted, as described in the storyline principles.

11

Evaluation issues in environmental education

It's only when you know where you want to go that you can know if you've arrived – or are at least on the right track.
(Sjøberg 1992, p.171)

The term 'evaluation' has several meanings. This paper can largely be read as the outcome of an evaluation, i.e. of the MUVIN development programme. However, this chapter will look into teaching evaluation. How are students involved in the evaluation process: Is the teacher the person to evaluate learning outcomes? Or are students and teachers to evaluate jointly (currently and pro-actively)? Are third parties to evaluate project outcomes? We need to bring to the fore a few fundamental issues regarding evaluation as such, and to consider which specific evaluation issues attach to environmental education of MUVIN targeting the development of action competence.

Concept clarification

Evaluation is a term often used in current discourse on education and research, in this country and internationally. In Denmark, there has been renewed and intensified attention to the phenomenon further to the most recent Danish education act, which includes the following statement (Act on general education (23/6 1993), section 13, subsection 2):

Teaching should include evaluation of student outcomes on a current basis. Evaluation should form the basis of individual student tutoring and further educational planning.

Precisely the enormous interest in evaluations would make a concept clarification appropriate:

Normally, a distinction is made between internal and external evaluation. An internal evaluation can be described (see. Gregersen 1974, Borgnakke 1996) as the participants' (students/teachers) critical review of a teaching sequence. The evaluation is pedagogically motivated, its aim being to plan and improve education. It is conducted by the involved parties and targets its own goals, plans, and results.

Its opposite is the external evaluation where society will set requirements and evaluate/check learning outcomes. An external evaluation is often combined with some form of rating.

Moreover, for internal evaluation, we can also talk of process and/or product evaluation and of current evaluation (across the school) vs. closing evaluation.

Other terms exist for the same concepts, e.g. informal resp. formal evaluation instead of internal resp. external evaluation (Sjøberg 1992). This terminology may be inappropriate, since an internal evaluation may well be formalised (e.g. using standardised questionnaires). Sjøberg (1992) uses the term diagnostic evaluation for an internal evaluation with the specific purpose of boosting learning outcomes; the result is used in guiding the further progress of individual students. Presumably, that would be the type proposed in the new education act (see above citation).

The above descriptions reflect an ideal notion of who does the evaluating in an internal evaluation. However, several intermediate forms exist: The evaluator can be the student, or the teacher, or students and teacher jointly. The evaluator can even be a third party (advisor, researcher, etc.). All forms were represented in the MUVIN project.

What should be evaluated?

As mentioned repeatedly in this paper, a key objective in environmental education is to develop action competence in students on a democratic basis – including critical reflexion and judgement (see. Chapter 6). How can we evaluate that – and what should we look for? We can use the model in Chapter 6 as a basis for discussion. The model draws up four areas/dimensions, which in combination reflect action competence:

- the cognitive dimension (being knowledgeable on the issue, 'can-do knowledge')
- the value-related dimension (searching for normative arguments)
- the personality dimension (having the courage/sense of responsibility to act, have a mind and inclination to act)
- the social dimension (being aware of the communal opportunities)

The overview of the four areas can in itself give a first idea of why we need to talk about evaluation issues in environmental education. In school curricula, subject objectives are often divided into cognitive, skills-based and affective objectives (e.g. the 1958 and 1975 Danish Education Acts). To some extent, this classification still holds in our most recent Education Act from 1993. However, given the MUVIN intent, the affective field must be extended to also include broader personal capabilities related to socialisation and personal growth. At the same time, environmental education also needs to meet the evaluation requirements of the new educational act.

Generally speaking, evaluations involve a number of well-known problems; still, it is beyond doubt that our widest experience in handling emergent issues has been within the cognitive and skills-based dimension. The bulk of evaluation literature on these fields is huge. Thus, we can use more or less substantiated tests to measure our students' knowledge and skills, whether we want to know if they can recollect what they learned (facts, concepts, explanations), or they can use acquired knowledge on a different problem (transfer).

However, it should be requisite for set questions to be contextual, relevant and meaningful to students (Säljö 1995). In our MUVIN context, this could imply that e.g. knowledge tests would cover *both* their topical (social science and natural science related) understanding of how specific environmental issues emerge, present and develop *and* their knowledge of different potential actions towards solving such issues.

Evaluation becomes more complicated when we wish to evaluate the individual students' attitudes, since these are based on values, personality traits and socialisation, including collective action skills. Methods have been developed to measure attitudes etc.; international reference works tend to favour the so-called preference measurement methods using Likert-type scales. MUVIN's large student questionnaire survey is of this type (see Chapter 13). Here we are dealing with quantifiable measurements, but we still need to discuss what should be their content, and to develop additional methods for qualitative measurement.

A case

A 9th form was working on a project assignment in relation to their work experience programme in farming. The project fell into six phases of work experience, the sixth being *'product assessment and evaluation: How did it go?'* About this, the teacher writes:

> *During their presentations, the students were to expound their topical insights, and how their work process went off. For instance, they should be prepared to answer the following questions:*
> *- What went well in your work?*
> *- What could have gone better?*
> *- How would you have worked then?*
> *Such questions were included because I believe that the more you understand from the process you are involved in, the better your learning outcome, since this will make you better at taking charge of whatever you wish to learn.*
> (Hedegaard ed. 1996, p.211)

The students prepared their own Top Ten list of important evaluation items:

1. Co-operation
2. Subject matter
3. Being prepared to answer questions
4. Personal presentation (not just read aloud)
5. Creative-artistic-manual content
6. That the project assignment sets out from the problem formulation
7. That the group gets to clarify conflicting interests
8. Being able to account for the time sequence of project work (logbook)
9. Overall evaluation of the process (good and bad points in project work)
10. Assessment of own achievements.

The teacher writes further:

> *The list composed by the students gives a qualified guess on some important points regarding the project evaluation. It is vital that students themselves have an influence on how a project will be evaluated. The very fact that guidelines were laid down by the students themselves, instead of the teacher, made their compliance far better than expected.*

This case meets several of our requirements to a reasonable evaluation. Both teachers and student know the target (and the students participate in defining

it). Thus, student co-influence is provided for. It also satisfies the cognitive dimension and in part the personality-related respective social dimension, while the students' values are not included explicitly.

Evaluation types and methods in MUVIN

Data collection is based on:
- The teachers' self-descriptions (e.g. Hedegaard red. 1996, teacher logbooks)
- school reports based on the researchers' classroom observations, student and teacher interviews
- student diaries
- student questionnaire survey (see Chapter 13).

Practically all teacher-described MUVIN teaching sequences undergo some kind of evaluation. Here, the evaluation type used most frequently is closing evaluations, which can be designed in several ways. Our material includes far less process evaluations of the type indicating that the individual project changes track completely. By contrast, another type of process evaluation is more frequent, namely an assessment of the work process and the students' own achievements. Apart from evaluating the work process, such assessments nearly always include subject knowledge.

Biases in evaluations

Purportedly, one of the most significant differences between tests concerning affective (attitudes, values, interests) resp. cognitive aspects is that the latter type often has a 'correct' answer, while the former does not (Hopkins and Stanley 1981, Sjøberg 1992). The answer depends entirely on the person. Consequently, you have to be extra wary of the answers given by students. Possibilities of bias are legion whenever evaluations focus on values, personality traits etc., since various 'situational factors' come into play far more than when specific skills or knowledge are being measured. Hopkins and Stanley (1981) mention 4 types:

1. Untruthfulness. You can only expect honest answers if there are feelings of trust and confidence between respondent and interviewer.
2. Socially acceptable answers. Here, answers may reflect generally accepted social norms – although group norms can also play a considerable role – instead of expressing the respondent's own norms.

3. Self-deception. E.g. judging yourself more favourably than the facts would justify.
4. Semantic problems. No exact quantifications exist for terms such as often', usually', etc., which are typical answer categories in preference measurements (see Chapter 13 on the student questionnaire survey).

Moreover, there are ethical issues to consider. How intrusive questions can you ask a student?

> *Before the project terminated, students were asked about their personal attitudes, motivations for these, any change of attitude. We consider this an important phase, but it requires careful handling. For instance, a student may well have a certain stand on organic food, while practice on the 'home front' is another. That can be hard to get to grips with for a 10 year-old.*
> (Hedegaard ed.1996, p. 78).

In other countries, e.g. USA, people are even more touchy in this regard (Ebel 1981), and some actually find you should refrain completely from probing the students' values, personality traits etc. This also reflects the fear of 'the indoctrinating teacher'. However, Danish curricular guidelines actually include attitudinal targets *(e.g. 'Education should... enable [students] to develop engagement, personal judgement on and a sense of responsibility towards issues concerning the use of the physical environment, resouces...'* (Geography objective, subsection 3, Danish Ministry of Education 1994a). The section can be seen as another way of describing action competence.

Evaluations exemplified

Process and product evaluation

At one school, a class of 8th grade students worked on two projects dealing with environmental themes in their mandatory project assignment (Hedegaard red. 1996, p. 184-193). The teachers used their experience from the first project to specifically allow for evaluation form and content when planning the next project, which was to be based on the students' experiences from a one-week work experience programme.

The first project (lasting a week) was evaluated as follows: '.... *initially, the students evaluated their own achievement, and the individual groups received oral and written evaluations.'*

The teachers gave the following summary of the experiences: *'The evaluation was way too crude, partly because individual achievements were hard to differentiate, and partly because concepts – both general ones and those illustrating the topical substance of the projects – were unclear to students and teache'alike.'*

The next project set out from the students' work experience programme. A fair amount of time was spent on problem formulation (work/environment), and the students were introduced to some evaluation items that the teachers had identified after thorough discussions. These items were

- process: co-operative skills, initiative, concentration
- content: subject knowledge, alignment between problem formulation and content
- presentation: organisation, dissemination
- product: product motivation, workmanship and quality
- evaluation to be individual

A full day was set aside for presentations. The students had put much energy into preparing their presentations, and most featured their products. *'Overall, their products were good, though for some products, too much time had probably been spent on producing the product, rather than on subject immersion.'* (op.cit. p. 190).

'Liaison teachers' prepared written evaluations of the students' work. (The students had been organised in groups of three, with one liaison teacher attached to each). They would be evaluated individually. The teacher collected material for evaluation during the project work and presentations were discussed. (There were always two teachers present during presentations.) The students were quite serious about their individual evaluations, and many wanted explanatory comments, yet did not ask for a rating. *'Eventually, in several respects, our evaluation came to function as a guidance in preparation of the next project phase and was probably felt as such by students and teachers alike'* (op.cit. p. 191).

The above example covers both process and product evaluation (by the teacher) and has a dual function: an educational one (towards changing future education) *and* a diagnostic one (towards tutoring individual students). Thus, what we have is a pro-active evaluation, with potential implications for the teachers' and the students' planning of new learning projects *and* for the students' learning accountability. Quite early during the projects, students know what they will be evaluated on. But, as often with evaluations of project work

and other cross-disciplinary courses, evaluation looks primarily into general qualifications. Consequently, specific project-related subject matter forms a minor part of the overall picture; nor does this evaluation inquire into the students' values and critical judgements.

Terminal evaluation

a. Teachers' subjective assessment
At several schools, evaluation is documented by teachers describing their opinion of their students' learning outcomes:

> *A major effect of this education is that a project featuring such variety of working methods rubbed off on the students' later work on other learning assignments. It is impossible to say precisely in what way, though it is amply demonstrated by their general approach to new topics. It pervades the entire way that students will embark on something new.*
> (Hedegaard red. 1996, p. 157).

Further to the above, we should perhaps point out that according to studies (e.g. Hopkins and Stanley 1981), teachers are not good at assessing students' attitudes to school and learning. This gives food for thought, since most evaluations of non-examination subjects in Danish schools probably reflect the teachers' impressions upon termination of a topic: How students felt about it, that they liked it, that they learnt a lot. Really, we cannot know how correct this is, since only based on teacher statements.

b. Student essay
A 4th grade class (10 years old) in the island Sealand had been working on a 'Blue brook' project. As a conclusion, they contacted another MUVIN project class, a 5th grade class in the island Funen. Each student was to write a letter to the other class, relating their experiences. The teachers wrote (Hedegaard ed. 1996, p. 72-73). *'This made an opportunity for us to go over the entire sequence with our students, which proved a good idea since our project had actually extended close to two months'.*

The students took the assignment quite seriously, partly because this was an unfamiliar class, and partly because the addressees were older.

This type could perhaps be termed evaluation by essay. The description does not say how much the teacher interfered in the students' letter writing, or any impacts of these letters on the organisation of later learning projects.

c. Written terminal evaluations

During a project on conflicts of interest related to fish farming, the students (3rd grade class, 9 years old) made a written evaluation of the week, designed as a shamrock where they were to complete statements in all four leaves:

'I felt...', 'there happened...', 'I thought that...', 'I wish that...'.

The children's replies show how, for the first statement, there was great agreement on positive formulations (they had been very pleased with the project), for the third statement that many had had negative expectations, and for the fourth statement that they would have wished for more time, allowing the project to run for a longer period.

Perspectives

We found indications that evaluating students' capability and inclination to make a judgement, let alone take action is a difficult matter (see also discussion in Chapter 13). Developing action competence is bound to be a subjective matter, so it can only be 'measured' by the respondent's own perception.

Developing new evaluation methods has not been a main objective for MUVIN projects at general education level. All the same, we did gain some experience from e.g. interviews and questionnaire surveys of both teachers and students (see Chapter 12, 13 and 14). This chapter has featured several examples of typical evaluation methods, also referring to the critical reflexion required prior to using the different methods. However, it is beyond doubt that we need to have more methods available for testing.

A parallel project at two senior high schools worked specifically on evolving evaluation methods focusing on judgement making and action capabilities. For a more detailed description, please refer to separate report (Nielsen 1996a and 1996b).

The methods applied in the senior high school experiment are not new. Their novelty lies rather in the type of questions asked and the purpose of asking them. A common feature of the 'tests' was their contextuality i.e. that items referred directly to student projects. The students were always well aware of what was meant by the 'tests'. The senior high school study was inspired by similar reflections in Italy (Mayer 1994), departing from 'the road to change': What makes students change their views *and* act accordingly?

> *To become aware of change and its causes is an equally important part of*
> *change itself. I would like to point out that among the strategies and*
> *instruments proposed so far, certain elements have remained constant:*
> - *first, <u>the growth of awareness</u>, by individual reflection upon one's own*
>   *objectives, concepts and conceptual networks:*
> - *secondly, collective discussion and comparison making the most of one's*
>   *own diversity and <u>accepting the diversity</u> of others;*
> - *finally, <u>self-evaluation</u> in respect to the processes involved, and not only to*
>   *the achieved 'outcomes'.*
>   Mayer 1994, p.100.

The above requirements could also be relevant to Danish students, and besides, they are in good agreement with MUVIN intentions.

If we are to develop methods for evaluating students' capability and willingness to act in ways that *they* also perceive as meaningful, then it is necessary for the project itself to introduce and use the action competence concept in a very deliberate manner. In other words, the students need to fully realise that developing action competence is part of the learning objective, and that the process seeks to make each student embrace this objective as his or her own, see 'the road to change'. The teacher logbook of one MUVIN teacher expresses the same view:

> *The time factor is a serious issue. The students go cold before the teacher –*
> *perhaps students just don't have the long perspective, and are not mature*
> *enough to have it. Right before the goal – that of the teacher – the students*
> *go dead. I talked to the students about this – and one solution is to for-*
> *mulate the goals at an earlier stage, together with the students, so they*
> *can see and feel that things are heading in the right direction. Too many*
> *students did good work, though not sufficiently goal-oriented – I mean,*
> *on the set assignments – maybe because that's how they are used to doing*
> *things? If goals were defined more explicitly, we could use them as a mirror*
> *– to hold up before ourselves and see whether we have actually attained*
> *them.*

12

Data gathering design

Close affinity to school praxis

A key notion of the overall study design was to apply an analytical-theoretical research approach, to be closely linked up with school praxis, including the actors and their educational views.

As previously mentioned, our investigation and definition of key concepts related to MUVIN'S view of environmental education were based on reference studies and discussions within the MUVIN research team. This has helped concentration upon both concept clarification issues/aspects and the more specific empirical focus questions. In Denmark, until the second MUVIN phase, these ideas had not been subject to such attention in terms of empirical research. For instance, it also includes the teachers' views of MUVIN's theoretical background in conflicts of interest associated with nature use, the action aspect in environmental education, environmental education as project work, etc.

Due to the project's affinity with school praxis, key theories and concepts derived from analytical theoretical work combined with praxis experience from the first MUVIN phase became the focus of the praxis study during the second MUVIN phase. As a result, some of these concepts and theories were put in doubt and subsequently came under renewed deliberation. Other concepts and ways of thought entered our research field because teachers used them and demonstrated that it could enrich their teaching.

Qualitative and quantitative research methods in combination

To the minds of this research group, the process of running the MUVIN project proved a unique opportunity for making empirical studies of a contemporary view of environmental education, translated into and developed through school praxis. It is unique, because MUVIN is based on an explicit common concept of environmental education, with integrated mechanisms intended to ensure adherence to this concept, while also providing latitude for considerable variation as to e.g. angle of approach in more concrete terms. Moreover the large number of classes and students enabled us to collect a substantial data material.

The research design tried to consider the fact that some question types is suited for qualitative and others for quantitative methods. For instance, we used semi-structured interviews for questions intended to uncover and illuminate the more profound aspects of how students consider their own influencing opportunities. When we wanted an impression of processes such as decision-making in class, classroom observation was used. In both cases, the strength of the two qualitative methods was their being especially suited for eliciting information on the specific and unique – whether related to emotional and attitudinal aspects at individual level, or to praxis, including implicit expectations in teachers and students, social climate etc. at class level.

On the other hand, the quantitative research methods were appropriate for studying how many students believed they had contributed to solving an environmental problem, or to what extent teachers had previously been engaged in development work in general.

In addition, the overall research design allows for the fact that when used on the same issues, the two methodologies will often supplement one another. The same view is touched upon by Marcinkowski (1993) and Salomonsen (1995), who claim that both methods can be said to be complementary. This complementarity has especially been put to use for several of our focus questions (see Chapter 5). For instance, the quantitative study asked the students whether the MUVIN project had made them more inclined to apply themselves to solving environmental problems. During our qualitative interviews, we discussed the very same question with the students. In this case, the two empirical methods can support and supplement one another.

As for the functionality of the two empirical research methodologies, we consider the quantitative methods to be helpful in investigating representativity and covariance regarding the said study question, while the qualitative methods serve to add depth to the study – assuming that both methods effectively tackle the same aspect and point the same way.

Thus, in an empirical research process, the two research methods are not considered incommensurable. In several contexts, they can be useful in illuminating the 'same' study phenomenon based on different techniques – the approach known as triangulation in empirical studies. We concur with Firestone's emphasis on triangulation as an option (1988, p. 10-20):

...used separately, qualitative and quantitative studies provide differing kinds of information. When focused upon the same issue, qualitative and quantitative studies can triangulate - that is, use differing methods to assess the robustness or stability of finding. Where studies using different methods have similar results, one can be more certain that the results are not influenced by the methodology.

All the same, there is still a brisk debate about them as disparate research paradigms. For instance as cited in international references (e.g. Cantrell 1993; Marcinkowsky 1993; Robottom 1993) and in our national literature (e.g. Fog 1981, Andersen and Christoffersen 1982, Jensen 1988). On the other hand, there have been several indications that this conflict has been overly emphasised. In the words of Brymann (1988, p.93):

Much of the discussion in the literature on these two research traditions has created a somewhat exaggerated picture of their differences. These discussions reflect the tendency to treat quantitative and qualitative research as though they are mutually antagonistic ideal types of the research process.

Such harsh views often reflect disagreement on the mission and nature of environmental education and on research intent, rather than inherently incommensurable characteristics of quantitative vs. qualitative methods.

We are sceptical about the sometimes dogmatic and indiscriminate view, that using quantitative study methods will automatically place a research paradigm within a scientific tradition, just because the quantitative method first evolved as a research methodology in a positivistic and scientific setting. A quantitative empirical research design can very well prove fruitful in examining the development of a critical and socially oriented environmental education, with the object of strengthening action competence in the students. The notion of predefined applications is not implicit in the method proper.

Empirical study methodologies applied

The overall research design comprises general study elements for all 91 projects and specific elements for the 10 selected case study schools. Thus, the empirical section of our MUVIN research reflects the fact that the researchers could effectively follow 10 participant school projects intensively. This, for one thing, enabled us to carry out qualitative interviews with both teachers and students several times in the course of their projects.

The remaining 81 projects were followed by advisors, though over shorter time spans. Data gathering from these schools used both quantitative methods (e.g. the extensive questionnaire to all students from 5th grade and on (see Chapter 13)) and various qualitative methods. In the following, these elements will be dealt with separately.

All school projects

a. Teacher questionnaire

Two questionnaires of 5, resp. 4 pages (see Annexes 3 and 4) were distributed during the project period. The first form was dispatched in the middle of the school year, December 1994, and the second at the close, May 1995. By then, the vast majority of the school projects had terminated, so the teachers could draw on all their experiences in answering the questionnaire items. Teachers were requested to complete one questionnaire for each participant class. Each form focused on specific topics. The first form centred especially on the following aspects:

- Teachers' previous experience with environmental education in particular and with development work as such
- Teachers' intentions of achieving changes in teaching methods and learning environment via the project
- Teachers' notions of learning outcome
- Teachers' notions of student participation in decision-making processes
- Community involvement in projects
- Work with ethics and aesthetics aspects
- How teachers generally evaluated the benefits of working with the MUVIN-type of environmental education – for themselves and for their students.

The second form had special focus on:
  · How teachers evaluated the major pedagogical concepts of the MUVIN
    project
  · Experiences from the class's first project that proved useful in the next
    project
  · Any assets of MUVIN education compared to ordinary education
  · The work on conflicts of interest related to the use of natural resources
  · Issues related to getting all students involved in the projects
  · The importance of adjunct advisors
  · Suggestions for improvement of the advisor function
  · Summary evaluation of development work in relation to fundamental
    MUVIN concepts.

b. Student questionnaire

In May 1995, a 7-page questionnaire was sent to all students from 5th to 10th grade inclusive (see Annex 6). Moreover, the same form was sent to participant senior high school students. The study covered approx. 1800 students. With the questionnaire, each teacher received a letter with practical hints on how to tackle the questionnaire in class.

    The questionnaire intended to clarify key aspects of the three empirical focus questions (see Ch. 5). Specifics on questionnaire and results are given in Chapter 13.

Case study schools only

a. Teacher-logs

Teachers at the ten case study schools were required to keep logs, which was not mandatory for other MUVIN teachers. However, all teachers received printed ancillary material, with inspiration and hints on how to keep a teacher's log. Ideas, examples and exercises were inspired by Altrichter et al. (1993).

    As a background for research work, teacher logs provided valuable material by preserving information and teacher experience gained en route. In addition, teacher diaries often stimulated the teachers' reflections. Although the researchers came quite close to the teachers and teaching processes at the ten case study schools, where they made a large volume of observations, such logs are still useful in preserving thoughts and reflections that otherwise would not be communicated to a researcher. What is more, thrilling and unexpected items of research interest may well occur at times when he or she is not present. In such cases, the teacher log also makes a valuable data source.

b. Classroom observations

In the main, classroom observations took place at the ten case study schools. In a few cases, we also made observations at some of the remaining schools. At each case study school, observations were typically made 5 times, each covering 2-6 lessons. During these observations, the researcher would not just act as a silent observer or 'fly on the wall'; instead, he or she would be introduced as an interested visitor who was there to listen, yet would also like to talk with individual students and groups to understand the learning processes. As a result, classroom observations helped the observer obtain an overall picture of how the class worked on a specific project – with particular focus on the research questions relating to the fundamental MUVIN concepts.

There was a particular interest in observing students during crucial phases of the project, especially in terms of their participation in concrete activities, and their responses to these. Also important was gaining insight into in-class decision-making, including the students' statements on their own influence on the process. During observations, trying to record single 'events' at individual student level was more important than accounting for the general work of a class.

Moreover, classroom observations gave food for discussions with teachers, in part about the proceeding of the teaching in part about research-related issues. Finally, our observations provided background material for research interviews with students and teachers.

c. Student interviews

Interviews were carried out at all ten case study schools, covering grades 1 to 10 (96 interviews in total). Selected students were interviewed twice and individually during their MUVIN project. These interviews would last some 30 minutes. A few interviews were conducted as slightly longer group interviews.

During interviews, a semistructured interview guide served as a support, the design of which reflected the three focus questions. Moreover, whenever possible, items were modified so as to refer to the actual class project.

The interviews intended to clarify the students' views of and evolving understanding of how environmental problems emerge and can be solved, and of their own scopes of action, including how the projects had impacted the students' confidence in their own influence.

All interviews were taped. In most cases, with a view to analysis, only particularly interesting parts were transcribed in their authentic wording. However, a few interviews were transcribed in full.

d. Teacher interviews

Teachers at the case study schools were typically interviewed at the termination of their MUVIN project. These interviews were all conducted as group interviews. A semistructured interview guide was prepared beforehand, to serve as a communication support.

The interviews intended to gather information on teachers' general experiences with MUVIN work, and more specifically to discuss issues related to the three empirical focus questions. In the process, we tried to unearth any strategies the teacher had embedded in the project in order to boost the students' confidence in their own influence regarding environmental issues.

e. Conversations with teachers

The main purpose of the recurring conversations with the teachers after the lessons was to provide a setting for discussing the specific projects with the teachers. In this situation, the advisor (researcher) had the role of 'the friendly critic', asking questions meant to debate, adjust and insist on the MUVIN ideas of the projects.

Another significant purpose of the conversations with teachers was to input into a shared development process, enabling both teachers and researchers to understand more of the MUVIN ideas during the process.

f. Student produced material

During the different MUVIN projects, students in many classes produced drawings, student logs, posters with text and tables, or other kinds of exhibitions or objects illustrating aspects of their environmental projects. A number of these were collected.

g. Advisor experience

Experience gained from advisory work was recorded, and from both project teacher and advisor perspectives. This was done via questionnaires to advisors/teachers, and by conversations. The experience gathered can be made useful in a teacher in-service education perspective with a view to further developing the advisory function, and also in a more general research perspective.

h. Research reports

For each of the ten intensively followed MUVIN projects, the researchers prepared a written report. Before starting writing, they jointly prepared a contents template in order to align these reports in terms of structure.

The perspective of the report targets a description of class and project, of

project evaluation by students and teacher, of researcher observations of major sequences of events, of material of a more anecdotal nature, and of sequences selected from both student and teacher interviews – all considered and discussed with special reference to the empirical focus questions.

Upon completion of the research report, a copy was sent to the involved teachers for review and for discussion of any descriptions the teachers could not accept or could not 'recognise' as themselves, their students or activities. All school reports were approved by the teachers.

Overview of empirical research methods

	Brief description	Scope/ number	Research purpose	Time phase During project	Data type
Questionnaire (teachers)	Two open questionnaires with 11, resp. 19 items	75 and 73 responses	Teachers' experience with MUVIN key concepts	December 1994 and May 1995	Quantitative
Questionnaire (students)	A 7-page Likert-like questionnaire with 37 items	1721 responses, students from 5th grade to sen. high	The three focus questions	Autumn 1995	Quantitative
Teacher logs	The teachers' own reflections on / experiences from the projects	10 from the case study schools	Teachers' experience with MUVIN key concepts	School year 94/95	Quantitative and qualitative
Classroom observations	Researcher observations in classroom	Approx. 50 two-to six hour obs. at 10 case study schools	Teaching dynamics and class response to MUVIN ideas	School year 94/95	Qualitative
Interviews (students)	Semi structured interviews of selected students, twice	96 student interviews, grades 1 to 10	The three focus questions, student perceptions and concept formation	School year 94/95	Qualitative
Interviews (teachers)	Semi structured interviews of teacher groups	25 teachers from 10 case study schools	Teachers' experience with MUVIN key concepts & three focus questions	Spring 95	Qualitative
Teacher talks	Talks with teachers during projects	Approx. 10 talks at each case study school	Advisor support for project & discussion of MUVIN key concepts	School year 94/95	Qualitative
Student-produced material	Posters, drawings, reports, etc.	Large volume	Students' grasp of MUVIN key concepts	School year 94/95	Qualitative
Advisor experiences	Experiences from non-researchers & questionnaire	Oral response & 10 replies	Advisor function in general, and in relation to MUVIN	Spring 95	Qualitative

13

Quantitative analysis of action competence

Purpose of the analysis

The extensive student questionnaire survey enabled us to look into various attitudes, concepts and issues among students, including to extract data enabling correlation analyses. This was possible because, in principle, our survey included all students in the MUVIN project from grade 5 to grade 10 (12 to 17 years old). Hence, the present chapter regards both the general concept of MUVIN education and its concrete design, analysed using quantitative data.

Practical analysis of questionnaires was undertaken with respect to two fields:

1) How students' responses were distributed across the aspects of the three focus questions – including an analysis of education potentials for developing action competence in students.
2) Correlations between their responses to the different key aspects listed under each focus question. By analysing those correlations, we would get a clearer understanding of the internal interrelations between elements of action competence, which would deepen our understanding of the action competence concept applied to practice.

Thus, the chapter forms a quantitative supplement to the other chapters of this book, with the purpose of analysing the conceptual basis and discussing our research findings based mainly on the qualitative empirical material.

The chapter is organised with a brief introduction summarising a few major findings of our questionnaire survey. Next, a more exhaustive description is given of our intended use of the applied method, an analysis of answers returned, and a presentation of research data, findings and conclusions, including a brief discussion of study methods and results.

A few major findings

Our analysis of quantitative data extracted from the student questionnaire confirms that MUVIN education has contributed towards developing action competence in students: I.e., students found that since their projects, they have felt more inclined to apply themselves to solving environmental problems, and that they learnt something that improved their skills in influencing the solving of environmental problems.

Thus, there is empirical evidence that some of our fundamental assumptions concerning the MUVIN concept hold true. Or – in more general terms – that we can uphold the notion that environmental education is a possible way to develop students' engagement in solving environmental problems.

Nearly half the students answering the relevant items indicated that they were confident about their own influence on solving environmental problems.

Our study indicates that some 38% of the students possess a concept of conflicts of interest related to the use of natural resources. Among these, their understanding mostly relates to interpersonal conflicts, while exceedingly few respondents associate conflicts of interest with structural conflicts. A majority of students think that environmental problems exist because people cannot reach agreement on how best to utilise nature. There is a tendency for students to have negative feelings about the fact that people cannot agree on solving environmental issues. Students seem to have a realistic understanding that conflicts of interest related to the environment will hardly disappear in the future.

Around half the students indicated that they took part in solving an environmental problem in class, and the vast majority of these students believed they themselves had their say in deciding what should be done about it.

Nearly ¾ of the students feel that students should experience to take action related to concrete environmental problems. This is a striking finding of our study, not least linked up with the remaining aspects. This is further highlighted by a persuasive correlation between confidence in one's own influence, knowing about action possibilities, and an inclination to take action.

The strong correlation between these three components of action competence in students indicates how essential we should consider these whenever we are looking at the action competence concept in connection with ideas of teaching-learning.

Analytical categories

In Chapter 6, we grouped the components of action competence as follows:

- · inclination, will, and courage to act
- · confidence in one's own influence
- · knowing something about the issue – including:
  - understanding the conflict-of-interest concept as a tool towards a more profound understanding of the issue
- · taking on a responsibility for one's own and others' lives
- · search for normative arguments
- · knowing about possible solutions and actions, including:
  - awareness of community potentials
  - understanding the conflict-of-interest concept as a tool to target a given action.

The above items should be considered in combination with the empirical focus questions cited in Chapter 5, including the explanatory text for each question, since important components of action competence have been formulated into a context to be probed via these questions. However, it should be underscored that our questionnaire did not encompass all components of action competence.

The key aspects of the three focus questions are specified below, and these largely formed the basis of our empirical analysis.

For purposes of planning the questionnaire, we subdivided each focus question into 4 key aspects, meaning that altogether we are operating with 12 aspects:

Focus question 1:

'In which ways do the MUVIN projects influence students' confidence in their own influence?'

Aspects involved:

1.1.   The student believes that he/she – alone or with others – can influence the solving of environmental problems.

1.2.   The student believes that he/she learnt something from the projects that improved his/her skills in influencing the solving of some environmental problems.

1.3.   The student believes that education made him/her more inclined to apply him-/herself to solving environmental problems.

1.4.   The student can specify what was significant to him/her in that Projects.

Focus question 2:

'The student's acquisition of the conflict-of-interest concept and application of the concept in understanding environmental issues and action potentials.'

Aspects involved:

2.1.   The student is able to explain a conflict of interest related to an environmental issue.

2.2.   The student is able to relate concrete action possibilities in a conflict of interest to the stakeholders that promote, resp. obstruct the cause supported by the student.

2.3.   The student expresses negative feelings about applying a conflict-of-interest perspective to environmental issues.

2.4.   The student believes that conflicts of interest will continue to exist in relation to environmental issues.

Focus question 3:

'The significance of different types of action experience acquired in environmental education'.

Aspects involved:

3.1.   The student indicates that the action concept implies acting at a both structural and individual level.

3.2.   The student indicates that, he/she has experienced to act related to an environmental problem as part of MUVIN.

3.3.   The student believes that he/she had a say in deciding such actions.

3.4.   The student believes that students should experience to take action in school related to concrete environmental problems.

Questionnaire design

Out of the above 12 aspects, nine (1.1-1.3, 2.1-2.4, 3.1, 3.4) were examined through 31 statements (items) in the questionnaire (Annex 6), organised as a Likert-type matrix (Likert 1932); see summary in Annex 5. The remaining aspects (1.4, 3.2, 3.3) and some of the aforementioned (2.1, 3.1) were examined in other ways (see below). The Likert method was developed primarily to examine people's attitudes. The questionnaire asked the students to relate to a number of statements (items) by indicating their extent of agreement/disagreement with each statement.

Since respondents tend to prefer agreeing rather than disagreeing with such statements, a Likert design tries to make up for this bias by formulating paired statements (items) concerning 'the same', in the following symmetrical fashion:

Tick off one item (per line)	agree completely	agree some-what	disagree some-what	disagree completely	no opinion
I can actually help solve some of the problems with the environment (1)					
There is so little I can decide to help the environment that I might just as well leave it out (18)					

Figures in parentheses refer to the location of these items in the total questionnaire (Annex 6).

The respondent needs to give 'opposite' answers to the two statements above in order to indicate the same view, unless he/she does not have an opinion about the question. If the respondents indicate agreement with the first state-ment *and* disagreement with the second, both statements combined will yield a higher degree of reliability than if the respondent had agreed with both statements.

By formulating no less than four items for each aspect paired and symmetrically – i.e. phrased negatively resp. positively – our questionnaire opened up to further enhancing the study reliability, while uncertainty in respondents' indications can be used as analysis parameters.

In this way, the questionnaire intends to probe the students' views of 6 individual aspects (1.1-1.3, 2.2-2.4) with four items for each aspect, according to the above system. Each item was formulated concisely and one-dimensionally, as a statement. This means that out of the said 31 items, 24 were included in this part of the study. Questionnaire items were sequenced so each of the four items referring to the same aspect was dispersed between other items.

In addition to these 24 items, the questionnaire included 7 other items in the Likert-type design described above. These 7 items were linked with other questionnaire items, namely the two items from aspect 2.1 clarifying the conflict-of-interest concept, three items from aspect 3.1 clarifying the action concept, and finally two items from aspect 3.4 clarifying the action dimension of education – see overview in Annex 5.

Moreover, other types of items were included. Nos. 32 and 37 were formulated as open questions. For these, replies were post-categorised. Two other items were designed as a list from which the student was to select one or two statements (33 and 36).

Finally two aspects (3.2 and 3.3) concerned non-attitudinal issues: Whether students had tried taking part in action addressing an environmental issue, and if so, whether they had participated in deciding on these actions. Each of these aspects was clarified with two items.

A first draft of the questionnaire was tested by four geographically dispersed classes between grades 5 and 7. Here, especially the wording of the different items was examined: whether they were comprehensible and were perceived as one-dimensional. Moreover, we tested if students understood them as intended – with a view to achieving a high degree of validity, i.e. good agreement between the intentionality of applied questions and how students understood them. These tests resulted in a few amendments, related in part to the questionnaire design as such and in part to the wording of individual items.

Questionnaire completion

Questionnaires were dispatched to all classes in MUVIN of grades 5-10 (12-17 years old) during May through June 1995, when nearly all classes had terminated their MUVIN projects. Questionnaires were handed out to students by one of their MUVIN teachers. An accompanying letter to the teacher gave 'How to...' instructions on completion of the questionnaire, and stressed that it was vital for the teacher to not influence the students' answers, or let students influence one another's answers. Out of the questionnaires returned, 1,722 were completed in a manner so they could be included in our further analysis.

Analysis of completed questionnaires

The 1,722 returned and usable questionnaires were keyed in and analysed using

SPSS software (Statistical Package in Social Sciences). Data consisted in part of background variables (see questionnaire in Annex 6), and in part of tick-offs for items 1 to 31 and 33 to 36, and finally after categorisation and pre-scoring of items 32 and 37.

Based on answers given to items 1-31, students were categorised into four groups reflecting their views of a given key aspect. We chose to call these four groups 'the four student profiles' in relation to the relevant key aspect. We may say that they reflect varying degrees of conviction (consistency) in the student's reply to the relevant four items, and the tendency of the student's opinion. - *What* is the student's opinion? and *How marked* is this opinion? In other words, student profiles provide indications as to whether the student has stuck to the same opinion throughout his/her completion of all related items, what is this opinion, and how marked is it:

· Student profile 1.
  With a consistent and marked view of a key aspect that the student agrees with. It is defined by an 'agree completely' reply to the two items and a 'disagree completely' to the corresponding items regarding the key aspect.

· Student profile 2.
  With a consistent view of a key aspect that the student agrees with. It is defined by a combination of 'agree completely' / 'agree', resp. 'disagree completely' / disagree somewhat, so answers to the four related items reflect the same opinion.

· Student profile 3.
  With an inconsistent view regarding a key aspect. It is defined by a combination of varying degrees of agreement/disagreement on the four items, meaning that they do *not* reflect the same opinion.

· Student profile 4.
  With a consistently negative view on a key aspect, which the student thus does *not* agree with. It is defined by a combination of varying degrees of disagreement with the relevant opinion.

We could have subdivided profile 4 in the same way as student profiles 1 and 2, since profile 4 holds the opposite answers of profiles 1 and 2 in combination. However, for parts of our analysis, that would have rendered the number of students in these categories too small, so we chose to combine them into a single student profile.

The open questions (items 32 and 37), in which students could formulate and comment their answers using their own words, were categorised based on a perusal of all answers given (see below). During this post-categorisation, respondent answers were grouped into a number of categories that, based on an estimate, would together cover the contents of answers given. Such treatment of study data enabled statistical processing similar to the closed questions items.

The reliability of symmetrical items has been estimated by the use of Chronbach's alpha-value (Chronbach 1951). Chronbach's alpha is a coefficient of consistency and measures how well a set of items measures a single, uni-dimensional latent construct. For the sets of items that generated a Chronbach's alpha value <0.5 the responses from the questionnaire haven't been used for the further statistics.

Findings (I)

MUVIN education and confidence in one's own influence, the conflict-of-interest concept, and the action perspective

The overall distribution of answers is given in Annex 7. Our review of findings first follows the aspects listed under each empirical focus question, already introduced in this chapter.

The first empirical focus question, *'In which ways do projects influence students' confidence in their own influence?'* is a more general one, since encompassing the second focus question (on the acquisition and use of the conflict-of-interest concept; in the same way, the third focus question (on the significance of different types of action experience in environmental education) is also partly covered by the first question. Hence, focus questions 2 and 3 can be seen to qualify part aspects of the first focus question.

Initially, subdivisions are maintained; however, findings are later combined.

Below, for most correlations, we give a percentage value based on answers from students who considered all relevant items within the aspect. As a result, the figures given do not contain answers from all the 1,722 valid questionnaires, since students failing to answer one or more items under each aspect or giving a 'no opinion' answer were left out of the analysis. As a result, the following analyses will mostly include somewhere between 1,274 and 1,422 answers, meaning that the percentage value has to be adjusted accordingly.

1. Empirical focus questions:

'In which ways do the projects influence students' confidence in their own influence?'

a. The aspect: 'The student believes that he/she – alone or with others – can influence the solving of environmental problems.'

This aspect has been examined through four items, 1, 29, 18, and 6. Answers received from 1,305 students, amounting to 75.8%. Answers for the four items are distributed as follows; see student profiles specified above (with Chronbach's alpha: 0.6319):

Fig. 13.1. *Student distribution on profiles based on how they viewed their own influence on solving environmental problems.*

The available figures indicate that 47% of these students express a consistently positive view that they can influence the solving of environmental problems, while 2% have a consistently negative view hereof. Approx. half the students have an uncertain opinion of their own influence.

b. The aspect: 'The student believes that he/she learnt something from the projects that improves his/her skills in influencing the solving of environmental problems.'

The questionnaire used items nos. 2, 13, 22, and 26. Answers received from 1,422 students, amounting to 82,6%. Answers for the four items are distributed as follows; see student profiles specified above (with Chronbach's alpha: 0.7304):
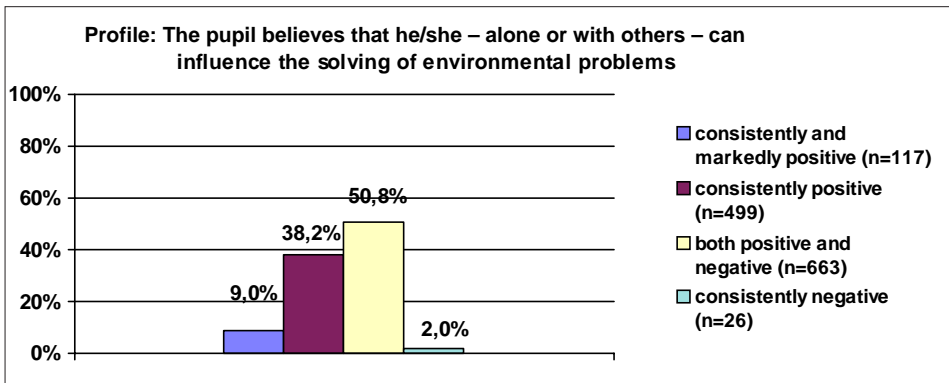
Profile: The pupil believes that he/she learnt something from the projects that improved his/her skills in influencing the solving of environmental problems

- consistently and markedly positive (n=155)
- consistently positive (n=613)
- both positive and negative (n=597)
- consistently negative (n=57)

43,1%   42,0%   10,9%   4,0%
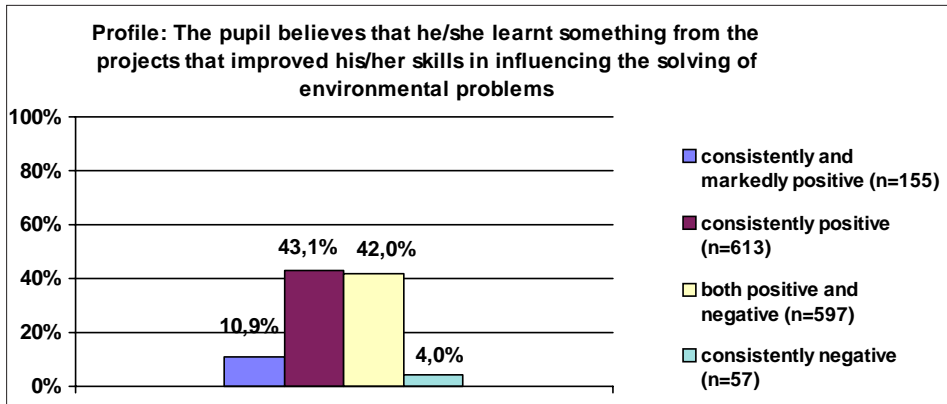
Fig. 13.2. *Student distribution on profiles according to the extent to which they felt that the projects improved their skills in influencing the solving of environmental problems.*

Our available figures show that among these students, 54% indicate a consistently positive view that the projects taught them how to have more influence on the solving of environmental problems, while 4% have a consistently negative view hereof.

c. The aspect: 'The student finds that after the projects he/she feels more inclined to apply him-/herself to solving environmental problems'.

The questionnaire used items 5, 7, 24, and 31 to examine this aspect. Answers received from 1,274 students, amounting to 74.0% of all answers received. The four student profiles are distributed as follows (with Chronbach's alpha: 0.7621):

Profile: The pupil finds that after the projects, he/she feels more inclined to apply him-/herself to solving environmental problems

- consistently and markedly positive (n=142)
- consistently positive (n=428)
- both positive and negative (n=614)
- consistently negative (n=90)

48,6%   33,6%   11,1%   7,1%

Fig. 13.3. *Student distribution on profiles based on their view as to whether the projects made them more inclined to apply themselves to solving environmental problems.*

As shown in the table, nearly 45% (11.1% + 33.6%) indicate a consistently positive view, that they have become more inclined to apply themselves to solving environmental problems, while 7% express a consistently negative view hereof.

d. The aspect: 'The student can specify what was important to him/her during the projects'.

This aspect was examined via the open question (item 37), 'What meant the most to me in MUVIN was... (complete the sentence yourself)', and the students responded as follows:

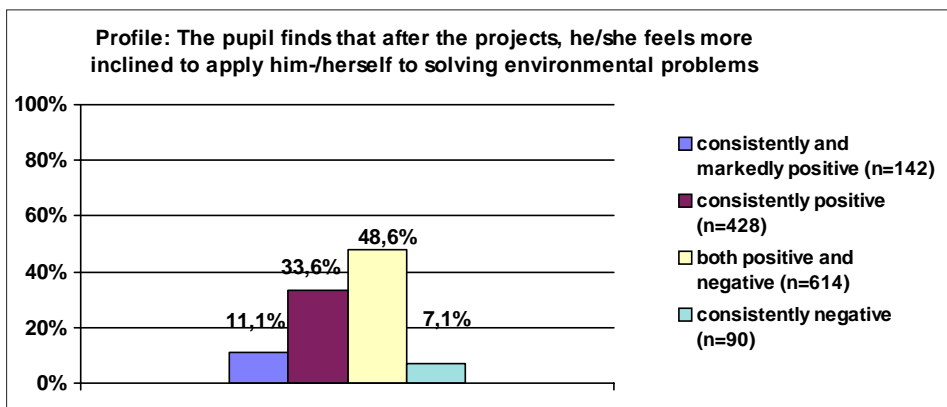| Answer (N = 1722)		
No answer	365	(21,2%)
Answer	1298	(75,4%)
Do not know	59	(3,4%)

A review of the answer distribution shows (see Annex 7) that 64% of all students taking part in the questionnaire survey (or 75.7% of those answering the question) indicated what they found to be positive about participating in MUVIN.

As expressed by many teachers (see Chapter 14), one aspect that students found important was experiential aspects of the teaching, with extensive contacts with the surrounding community, in the form of excursions and meetings with various resource persons. We thus found that different aspects of 'contacts with the surrounding community' were the single most frequent aspect indicated by the students (38%, n= 493).

Two other important aspects appear to have been weighted almost equally among students. Thus, nearly 1/3 of the students (28%, n=364) indicate that MUVIN education was important because they acquired new knowledge or more insight, and a similar number of students (27,5%, n=357) indicates that they have become able to take action.

To a lesser extent, students indicate that co-influence (7%, n=88) and working method (6%, n=79) played a major role in which aspects they considered important.

2. Empirical focus questions:

'The student's acquisition of the conflict-of-interest concept and application of the concept in understanding environmental issues and action possibilities'.

a. The aspect: 'The student is able to explain a conflict of interest related to an environmental problem.'

This aspect was examined via the open question (no. 32) to the illustration and the text, 'Why can't the people in this picture reach agreement on how to use the water?' Answers given to the illustration were categorised based on our wish to find out about the extent to which students understood the picture spontaneously, based on a concept of conflicting interests in the use of natural resources:

Answer
No answer:	302	(17,6%)
Answer:	1299	(75,6%)
Do not know:	117	(6,8%)

Conflict awareness (n=1125)
1. Water is used for different purposes	17	(1,5%)
2. Water is used by different people (for different things)	276	(24,5%)
3. Water cannot meet everyone's requirements equally well at the same time	418	(37,2%)
4. The reply includes a reasonably meaningful use of the terms 'interests', 'conflicts', 'controversies', 'conflicts of interest', or 'conflicting interests'	128	(11,4%)
5. Diffuse	286	(25,4%)

Conflict types indicated by the students were pre-scored, whenever these could be deduced from their answers. Conflict types were defined based on the categories/levels specified in Chapter 8.

Conflict types, etc. (n=204)
1. Selfishness	42	(20,6%)
2. Personal conflicts	9	(4,4%)
3. Interpersonal conflicts	134	(65,7%)
4. Structural conflicts	12	(5,9%)
5. Diffuse	7	(3,4%)

Fig. 13.4. *The students' interpretations of why the people in the picture cannot agree on how to use the water, distributed on categories based on features in the answers indicating conflict-of-interest views on the use of water (as a natural resource).*

75.6% of the students answered. Among *these* answers, approx. 3/4 can be categorised in terms of conflict awareness. Only a minor part of the answers can be categorised in terms of conflict type. The latter is a logical consequence of the former distribution.

Answers are evaluated, so those belonging in categories 3 and 4 under categories of conflict awareness represent the conflict-of-interest concept applied to man's use of a natural resource (exemplified by water). Answers categorised under 1 and 2 *may* represent such an understanding; however, their interpretation is so uncertain that they cannot be credited to a conflict concept.

Among the 75.6% students answering this questionnaire item, some 49% explain the disagreement (in the picture) with answers implying that not everyone in the picture can have all their needs/wishes met at the same time or to the same extent; or they use the expressions 'interests', 'conflicts of interest', or 'conflicting interests' in their answers. Both types of answers are taken to imply that the relevant students can perceive and express a conflict concept in how they understand the use of natural resources.

A few examples from the students' replies:

Because there are so many people who all have different opinions about how best to use the water. For instance, the farmer would prefer using the water for his field, while little Ole would rather drink it. (Conflict understanding without using actual concepts).

Because people have different interests in how the water should be utilised. For instance, the people in the house want clean drinking water. While the farmer and his irrigation plant don't care about the water being clean or not. (Conflict understanding with partial use of conceptual term).

Most of the remaining respondents do not indicate a specific conflict perspective on the utilisation, but answer diffusely (25%) or with a hazy description along these lines: *'Because there's such a lot of ways it can be used'.*

This way of clarifying the students' notion of the conflict-of-interest concept suggests that students have a fairly realistic though somewhat incomplete picture of the forces at play in society, and which (among other things) influence the condition of the environment.

b. The aspect: The student is able to relate concrete action possibilities to the stakeholders in a conflict of interest who promote, resp. obstruct the cause supported by the student.

Our analysis of this aspect is based on items 6, 11, and 16 (Chronbach's alpha: 0,5135). The following analysis covers 1,373 students' replies, equalling 79.8% of all answers received.
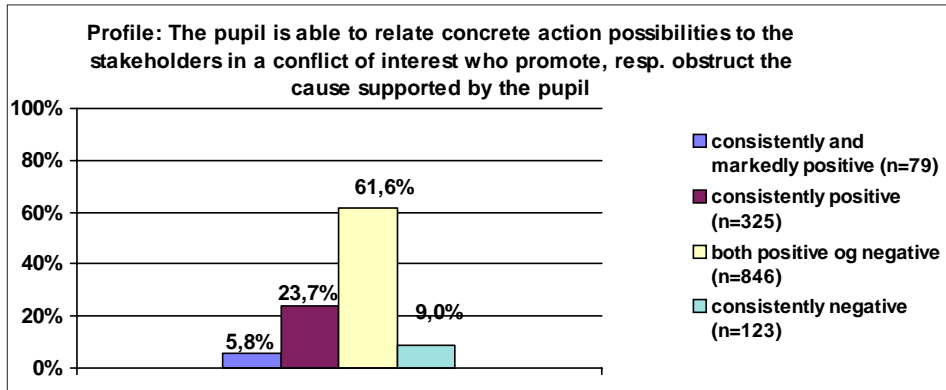
Fig. 13.5. *Distribution of students' replies when asked if they believe their action possibilities depend on the views of others.*

The students' replies suggest some uncertainty in the students' views, as to whether they have a possibility for being active in solving environmental problems if people disagree on the solution. On the other hand, the students' replies to item 11 show that they do not find they are left on their own looking after the environment: (82.2% choose 'disagree somewhat' or 'disagree completely' when asked: 'There's nobody who can help me look after the environment'). Nonetheless, they apparently find it hard to realise that knowing who is for and against a solution to an environmental problem can be an advantage.

c. The aspect: 'The student expresses negative feelings about applying a conflict-of-interest perspective to environmental issues.'

This aspect was examined through four items: 3, 17, 21, and 30. We received 1,198 students' replies, equalling 69.6%. Chronbach's alpha value for the aspect is 0.6113.
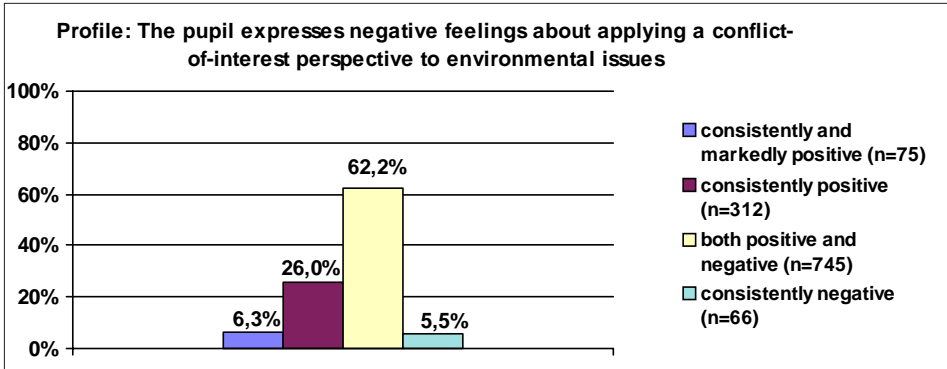
Fig. 13.6. *Distribution of students' replies when asked how they feel about applying a conflict-of-interest perspective to environmental issues.*

Answer distribution shows that nearly a third of the students have consistently negative feelings about understanding environmental problems in a conflict-of-interest frame of understanding, i.e. that people cannot reach agreement on how to solve the problems. A fair number of students are uncertain about this emotional dimension. Only few students (5.5%) consistently indicate being unaffected.

d. The aspect: 'The student believes that conflicts of interests will continue to exist in relation to environmental issues.'

This aspect was examined through four items, 3, 17, 21, and 30. We received 1,198 students' replies, equalling 69.6%. Computed Chronbach's alpha value is 0.5259.
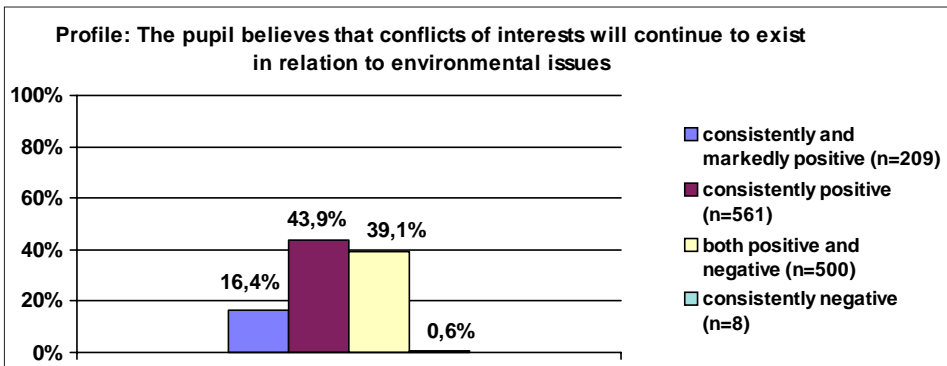

Fig. 13.7 *Students' views as to whether conflicts of interest will continue to exist in relation to environmental problems.*

The distribution in Fig. 13.7 shows a marked tendency for students to consistently affirm the view that conflicts of interest will continue to exist in relation to environmental problems. This is indicated by about 60% of the students. Moreover, it is noteworthy that an exceedingly small number of students consistently indicate the opposite view.

3. Empirical focus questions:
'The significance of different types of action experience in environmental education'

a. The aspect: 'The student indicates that the action concept implies acting at both structural and individual levels'.

This aspect was examined by combining three items (nos. 15, 20, and 23) with item 36, in which two ticks were required.

Replies distributed themselves in a manner producing a too low Chronbach's alpha value. Therefore our further analysis did not rely on this aspect.

b. The aspect: 'The student indicates that, as part of a project, he/she took part in addressing an environmental issue'.

This aspect was examined using 2 answer options in item 34a.

Put a ring round a or b as appropriate (n=1192)

a. My class took part in addressing an environmental issue. 893 (74,7%)

b.   I have never tried taking part in addressing an environmental issue together with my teacher and classmates   299 (25,0%)

Fig. 13.8. *Students' views as to whether they took part in actions addressing environmental issues during their projects.*

The relatively low number of students answering this item (69.2%) suggests some uncertainty as to the implications of 'taking part in addressing an environmental issue'. Possibly, the design of the item, using two wordings that are mutually exclusive yet would basically capture all potentialities, may not have been understood by all students.

Allowing for this uncertainty, more than half the students (52%) appear to consider that they took part in addressing an environmental issue in their class,

implying that more than half the participant classes must have worked with the action aspect as part of environmental education.

c. The aspect: 'The student believes that he/she had a say in deciding such actions'.

In continuation of the previous question, the item had a second part (no. 34b) with the following answer distribution:

If – and **only if** – you placed a ring round a right above:
Again place a ring round a or b as appropriate: (n = 933)

a. I took part in deciding what our class should
   do about that environmental problem   806 (86.%)
b. It was always the teacher or someone else
   in my class who decided what we would do to
   help the environment   127 (13.%)

Fig. 13.9. *Students' views as to whether they took part in decision-making if their class tried to take action addressing environmental issues.*

More than 6/7 of those answering the above question hold that they personally took part in deciding the class' actions to address the relevant environmental issue. However, the number of answers given is higher than should be expected from the number of answers to the previous question (34a), namely 936 in 34b and 893 in 34a (Fig. 13.8).

Anyhow, it is striking that so very few students (approx. 14% of the relevant students) feel that they did *not* take part in deciding what the class would do about the environmental problem in question.

d. The aspect: 'The student believes that school children should take action to address concrete environmental problems as part of their education'.

This aspect was examined by a combination of two symmetrical items (14 and 28) and 4 tick-off answer options (item 33). Unfortunately, our statistical analysis yielded a too low Chronbach's alpha value for this combination. By leaving out item 33, thus only including answers for items 14 and 28, we produced a satisfactory Chronbach's alpha value: 0,5319. The total number of answers comprised by the analysis is 1,422.

Profile: The pupil believes that school children should take action to address concrete environmental problems as part of their education
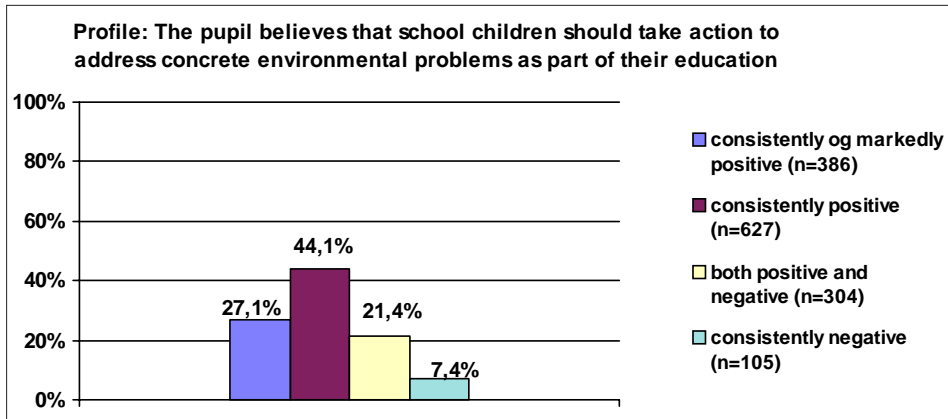
Fig. 13.10. *Students distributed on profiles according to their views on whether school students should try to take action addressing environmental issues as part of their education.*

Here we find a large majority of students who believe the action aspect should form part of environmental education, since 71% of the students indicate a consistently positive view of this aspect, with 7% indicating a consistently negative view hereof. When interpreting the ratio of consistent answers vs. both negative and positive answers, we should keep in mind that for mere statistical reasons, the number of consistent responses is bound to be higher for an answer only including two items.

Findings (II)

How students' viewed their own action competence after MUVIN education

In the beginning of this chapter, we subdivided action competence into 6 component aspects.

However, we can form a general impression of how MUVIN education influenced the students' views of their own action competence by merely looking into two of those aspects:

· 'The student believes that he/she learnt something from the projects that improves his/her skills in influencing the solving of environmental issues'.
· 'The student believes that the projects made him/her more inclined to apply him-/herself to solving environmental problems.'

In combination, these aspects cover – in a more general manner – the student's

view of how his/her action competence has developed as a result of MUVIN education (and any concurrent education).

The analysis was made by preparing profiles for students who both indicated that education increased their influencing possibilities and their inclination to apply themselves to solving environmental problems. The resulting four profiles represent the students' responses to 8 items (1, 5, 6, 7, 18, 24, 29, and 31).
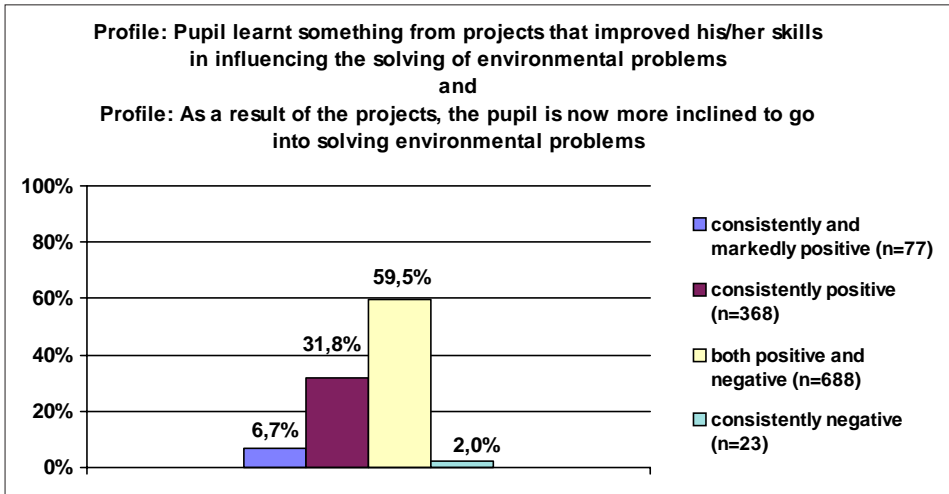
Fig. 13.11 *Students distributed on aggregate profiles encompassing both views, 1) the student considers him-/herself to have learnt something in the projects that improved his/her skills in influencing the solving of environmental problems, and 2) the student thinks that as a result of the projects he/she feels more inclined to go into solving environmental problems. N = 1156.*

According to this analysis, nearly 39% of the students indicate that MUVIN education made them more inclined to influence the solving of environmental problems *and* improved their skills in that regard. This amounts to ¼ of all students. A mere 2% consistently indicate that they did not achieve this, equalling 1% of all students.

Findings (III)

Correlations between separate aspects of action competence

Our data material was obtained with a view to examining covariance between the components of the action competence concept. The correlation analysis carried out to illuminate this included the following components:

- · confidence in one's own influence on solving environmental problems
- · an inclination to take action in order to solve environmental problems
- · knowing about action possibilities vis-à-vis environmental issues

'Confidence in one's own influence on solving environmental problems' is identical with Aspect 1 under focus question 1 (F1, Chronbach's alpha 0.6319). In our analysis, 'Inclination to take action in order to solve environmental problems' was based on both Aspect 3 (F3, Chronbach's alpha 0.7621) under focus question 1 *and* Aspect 4 (F4, Chronbach's alpha 0.5488) under focus question 3. 'Knowing about action possibilities vis-à-vis environmental issues' was analysed by crediting Aspect 2 under focus question 1 with this component (F2, Chronbach's alpha 0.7304).

We used the analysis to examine to which extent a mutual covariance could be demonstrated between two components/aspects (in the following presentation, the term 'aspect' denotes how our empirical data are used to illuminate an action competence component). The analysis was carried out between all three aforementioned aspects mutually, correlating each aspect with the two others.

For the present context, the use of correlation analyses should not be taken to reflect a wish to quantify the number of students who answered individual items in a manner allowing us to categorise them as 'action competent' or not. Instead, our data material intends to help an evaluation of whether – based on the students' answers to the questionnaire – there appears to be an interconnection between some of the action competence components already identified theoretically.

Correlation analysis between two aspects is carried out in two steps:

1. The first step implies examining a student profile for a given aspect in terms of its agreement with another aspect. Student profiles are categorised on the four groups used previously a) consistent and markedly positive, b) consistently positive, c) both positive and negative, and d) consistently negative for the relevant aspect. This approach enabled us to obtain information e.g. on how a student group with the said four different views (a-d) of

their own influencing possibilities express agreement in terms of their inclination to take action.

2. Next, the opposite analysis is carried out – meaning that the same four different indications (a-d) regarding the latter aspect are examined for their agreement with the first aspect. In the example given, students' views of their own inclination to take action are correlated to how they view their own influencing possibilities.

We applied a chi-square test for significance testing in the correlation analysis. According to usual practice, we accepted a significance level of $p < 0.05$.

The first correlation analysis concerns the two action competence components 'confidence in one's own influence on solving environmental problems' and 'knowing about action possibilities regarding environmental issues' (F2). The first analysis (F1 vs. F2) indicates that the more consistent and markedly positive a student's confidence in his/her own influence on solving environmental problems, the more does that student agree on knowing about action possibilities vis-à-vis environmental issues based on his/her education. We found this correlation to be quite significant ($p < 0,0001$). Similarly, and with the same level of significance, the opposite analysis (F2 vs. F1) shows that the more consistently and markedly a student indicates having learnt something during the projects that improved his/her skills in terms of influencing environmental issues, the more did the student indicate confidence in his/her influence on solving environmental problems.

The next analysis series deals with the two action competence components 'confidence in one's own influence' and 'inclination to take action'. Regardless whether the analysis is carried out for F1 vs. F3 or F4, our figures show the same pronounced tendency. Given the high significance level in both cases ($p < 0,0001$), we find that the more consistent and markedly students indicate confidence in their own influence on solving environmental problems, the higher the proportion of those indicating an inclination to apply themselves to solving environmental problems (taken to express action preparedness).

Moreover, not a single student among those who were consistently negative in terms of their own influence indicated agreement with the 'inclination to take action'. Even though this category only comprises 16 students, this is a remarkable finding. At the same time, the opposite correlation analysis based on both F1 vs. F3 or F4 shows that students who markedly and consistently indicate an inclination to take action, also indicate a more pronounced confidence in their own influencing possibilities than those who did not indicate a similar inclination.

The third and last analysis series correlates the two action competence components 'inclination to take action' and 'knowing about action possibilities'. Regardless whether correlation with F2 is based on F3 or F4, the same pattern results. Thus it is found that the more students indicate a consistent and markedly positive view of their inclination to take action, the greater the percentage indicating that they learnt something during the projects that improved their skills in solving certain environmental problems (knowing about action possibilities), as opposed to student groups who did not indicate such an inclination. Again, we find a high significance level ($p < 0.0001$) for all cases. Also the opposite correlation points out with great significance that students indicating a consistent and markedly positive view of having acquired knowledge of their own action possibilities through MUVIN projects, express a more pronounced inclination to take action than students who do not consider themselves to have such knowledge of action possibilities.

Thus, the overall conclusion on correlation analyses based on the students' answers demonstrates that the three action competence components, 'confidence in one's own influence', 'inclination to take action' and 'knowing about action possibilities' all display positive covariance; see figure below.
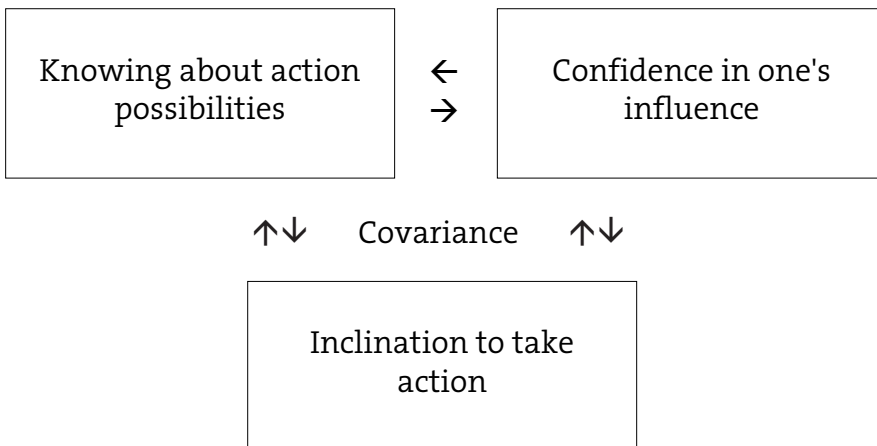

Fig. 13.12. *Covariance between three elements of action competence*

The significance of the covariance expressed in Fig. 13.12 is interpreted and elaborated in more detail in the section below discussing our findings.
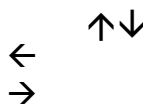
Discussion of methodology

En route, this chapter has frequently referred to methodology issues and considerations. For the time being, we will confine ourselves to discussing a few more general methodological aspects involved.

Representativity

Since completing the questionnaire basically included all participant students from grades 5 to and including upper senior, our material wasn't samples of our experimental population. It would have been desirable to obtain answers from students in grades 1-4; however, that would have precluded using the same questionnaire as a study tool. When preparing the questionnaire, we did test a preliminary version on a 4th grade class, which however presented too many problems in terms of wording.

We were unable to compute a response rate, since no data were collected on the number of students taking part in MUVIN projects at different grades. However, given the fact that students were to complete their questionnaires in the presence of their teachers during lessons, and judged by the number of questionnaires received from each class, it is our impression that response rates were high and did not add any major bias to the data obtained.

Agreement between examined aspects and items

Operationalising aspects into formulated items (statements) is invariably a crucial procedure with a Likert-type questionnaire. No attempts were made – through interviews etc. – to control or match the students' questionnaire responses with the views they would have given if asked more in depth about the aspects under study. Chronbach's alpha test is useful in determining the internal homogeneity of responses from connected items; however, when it comes to establishing whether – taken together – these do in fact adequately reflect the students' views on the given aspect, we have to resort to semantic analysis and conceptual notions.

Formulation of items

Negations or double negations were present in a few items, which is considered methodologically unfavourable. Such wordings make more demands on the respondent's skills in terms of reading and keeping track of the content, so presumably risks of misunderstandings are particularly imminent with samples of young and less skilled readers.

These negations appeared in certain items, in an attempt to make all four

formulations under the relevant aspect resemble one another as closely as possible. Apparently, poorly worded items tended to cause more 'no opinion' responses.

The applied methodology using 'symmetrically' paired items largely neutralised an expected tendency for students to prefer expressions of 'agreement' to 'disagreement'. Thus, we only found 6.3% less tick-offs of 'disagreement' (aggregate of 'disagree completely' and 'disagree somewhat') compared to tick-offs of 'agreement' (aggregate of 'agree completely' and 'agree partly').

Categorisation of students' responses

The questions in items 32 and 37 were open, so we post-categorised these responses. These categorisations always involve interpretation, and hence a potential for misinterpretation and introduction of systematic errors. Categories for both items were designed based on an evaluation of the actual responses given. As for item 37, categorising responses was a fairly straightforward task.

In contrast, the answers for item 32 involved more interpretative issues. Since the responses were meant to evaluate how students used the conflict-of-interest concept in matters of nature use, a single or a few phrases were to provide a basis for evaluating their understanding of a complicated concept. In practical terms, and in order to enable consistent categorisation, we compiled the majority of responses given using the applied categorisation.

When in doubt, we used a conservative categorisation principle, in view of keeping responses in the lower of the two relevant categories, and thus help to ensure a high likelihood that any response categorised as group 3 and 4 would represent an understanding of conflicts of interest.

As will be seen, our evaluation of enhanced action competence – which appears to be empirically justified for a considerable number of students – was not based on practice records, since the students' feedbacks were of the 'pen-and-paper' type. This type of recording has often been challenged in literature; see e.g. Stokols & Altman (eds.) 1987, in terms of whether good intentions are always translated into practice. Given the fact that these are young students, whose actual action competence as grown-up citizens will only be put to the test later, we will have to accept this as an inherent limitation of any type of environmental education proposing to develop long-term action competence in students, rather than immediate behavioural change.

Discussion of findings

The above presentation did not focus on age group and gender distribution. In our estimate, the propounded issues could be analysed for the entire respondent pool, from the assumption that aspects influenced by the students' age or gender would become apparent during analysis of their distribution and correlation, without any need for relating them to two parameters in particular.

Our correlation analysis established with a high degree of probability a correlation between three aspects directly related to the components of the action competence concept, namely confidence in one's own influence on solving environmental problems, inclination to take action to solve environmental problems, and knowing about action possibilities. The third component was not studied separately; however, the aspect of 'students considering themselves to have learnt something in the education that improved their skills in influencing the solving of environmental problems,' points in that direction. These students belong in the category that is knowledgeable about action possibilities; however, this fails to capture those students who – regardless of education - consider themselves knowledgeable in terms of taking action to solve environmental problems.

However, our analysis made it plausible that *if* we can demonstrate that a student has a marked inclination to take action towards solving environmental problems, or has great confidence in his/her own influence in this regard, or believes he/she learnt something that enhanced his/her influencing skills – *then* this student will probably have both the other notions as well. An explanation for this covariance can either be sought in causalities, or between the three components, or between one or more factors beyond the three components, or in a combination hereof.

The following interpretation of the covariance appears plausible, assuming that it is not caused primarily by a shared, external factor:

If the student feels the education taught him/her something that improved his/her skills in influencing the solving of environmental problems, *then* it stands to reason that this also made the student more confident about his/her own influence, and hence more inclined to apply him-/herself to solving environmental problems.

If – regardless of source – the student believes that he/she can influence the solving of environmental problems, *then* we would also expect to find a higher level of inclination to engage in solving environmental problems.

If searching for non-classroom causes of covariance, students' varying engagement in environmental issues might well be a significant parameter. That is,

the greater a student's prior interest in environmental issues, and his/her engagement in doing something about them, the more would such a student engage in an education project, and also believe that he/she had an obligation to do something towards solving environmental problems. However, when analysing the profiles for 'The student believes that he/she – alone or with others – can influence the solving of environmental problems' together with 'The student believes that he/she learnt something from the projects that improved his/her skills in influencing the solving of some issues', we find that the more confident the student is about his/her own influence on the solving of environmental issues, the more does the same student also indicate having learnt this from the projects. This suggests a relation with the education.

If this type of correlation is found to be most plausible, then this finding should prompt us to devote more attention to students' experience with concrete action possibilities in an educational setting, when planning future development projects and research.

14

Teachers' views on environmental education

Before the 1994 vacation, we mailed a MUVIN background booklet (Breiting and Janniche 1994) to all participant teachers, introducing the programme. In this, the MUVIN structure and conceptual basis were outlined. In August of 1994, The Royal Danish School of Educational Studies held nine seminars at their Copenhagen and regional departments. These seminars, attended by some 300 teachers, were used to introduce and clarify the aforementioned aspects of MUVIN; in addition, they offered ample opportunity for inquiring about and discussing the forthcoming work. Thus, we had made a fairly considered effort to familiarise participants with the programme and its intentions.

This chapter will present the teachers' views of some of these principles, based on two questionnaires mailed to our liaison teachers during the programme. The first dispatch took place around New Year 1994/95, the second right before the 1995 summer vacation, when the school projects had been terminated. Both times, we dispatched 89 forms, including a request for teachers to copy them for any involved colleagues, and to return all forms. The forms are enclosed as Annexes 3 and 4. We received 75 replies to the first form, while 73 returned the form in the second round. Some forms represented a single teacher's experience and attitude, while others held replies given by a whole group of teachers at the relevant school.

Conflicts of interest in the use of natural resources

As mentioned previously, a key perspective of the MUVIN programme was that environmental issues should be viewed as societal issues. Consequently, our proposition to participant teachers was that, whenever taking up environmental issues in-class, they should attach considerable importance to letting their students work with conflicts of interest in the use of natural resources.

Our preliminary regional seminars had already given clear indications that such an approach to environmental education was new to the vast majority of the teachers. Precisely this part of MUVIN gave rise to considerable debate. Some of the concerns indicated most frequently were: *'If we are to attach such weight to that aspect -won't that make our teaching very indoctrinating?' 'How will parents respond to this content?' 'Will students in junior grades understand any of this?'* Altogether questions clearly reflecting scepticism towards this approach to environmental education. All the same, the general feeling was that this had to be tried out in practice, since there was agreement at the theoretical level. Thus, teachers were predominantly positive, albeit slightly sceptical towards the fundamental concept.

Some of the aforementioned doubts may have arisen from a previous, quite heated debate on indoctrination in schools, during which teachers were accused of forcing their own attitudes upon students precisely by taking up controversial issues in education.

All the same, replies to our questionnaires show that the vast majority of the teachers had already actually worked with conflicts of interest in their teaching (approx. ¾ of replies received). 12 forms indicate that the teachers had not previously worked with this part of the MUVIN concept. Only a single teacher indicates as his motive that the students should not work with 'conflicts of interest in nature use' at their present age level:

> *We have not focused on this, our attitude being that this is too abstract for pre-school education/this age group and would not produce action competence.*

Among the replies indicating that work has been done in this field, about 1/4 (13 teachers total) have immediately favourable views of that work. Asked how they felt their work with conflicts of interest went, one teacher gave the following answer:

> *Before we ever got started planning, I was quite sceptical. I didn't believe it was possible to work on conflicts of interest with children this young. But*

after my conversations with Søren and you, I mustered up the courage to do it. After all, there was nothing lost in trying... - And I have to admit that it can actually be done. And then I'd add that the conflicting interests around the cormorants make an incredibly apt showcase, which I feel all the students understood.

17 teachers – that is, around 1/3 of those who worked with the conflicts – replied that it had been a positive experience, though difficult to handle. One teacher wrote:

In the first phase, we had serious doubts whether the children could use them. Being a teacher, it was hard not to spoon-feed that knowledge to them. But gradually, things started moving. It goes for most of the children that, by Phase 2, they would focus on it 'automatically'. Our parent evaluation includes examples showing that this leaves its mark on the children in other contexts. We had wanted this to materialise in all types of work done in Phase 2, but not all were able to manage that step. But we still consider the attempt successful, since we find that this perspective has become 'part of their mindsets' both in and out of school.

15 replied that by working with conflicts of interest, students are sensitised to environmental issues – that they recognise a conflict perspective – can form an opinion, etc.

The students are awakened to the conflicts – e.g. fishermen vs. cormorants, farmer vs. drinking water contamination, farmer vs. animal life in the stream, etc. – and do not think of conflicts as black-and-white – this is how far they have come at this point.

Our material does not make it clear whether these statements reflect the teacher's own view of typical conflicts of interest as being man vs. nature, or man vs. environment, or whether a way of summing up.

Another teacher wrote:

Great. All the students are really clever at identifying conflicts. Whenever a personal point of view is called for, practically all students can do it. A few students deliberately refuse to do so. This should probably be seen as positive, since those students have seriously considered the pros and cons,

but still feel badly about having to take a definite stand on this conflict.
Very human. After all, this is how the rest of us sometimes feel in other
venues of life.

A third teacher answered:

The students found this quite difficult, but they have become a lot more
aware of these things during this past school year. They have a fairly clear
understanding of where the conflicts lie, where they stand themselves, and
what they can do to try to improve things.

The general conclusion is that a large part of the teachers consider the conflict-of-interest perspective as positive and believe that it adds something new to their teaching. Thus the emphasis of environmental education is shifted, so it does not focus on nature to the degree it did before, but rather on man's cultural and societal relationship with nature.

At the same time, we have to take note that working with it appears to have been difficult. Apparently, this owes in part to the fact that many teachers themselves find it difficult to handle a conflict approach, and may be reluctant to involve in conflicts. Add to this the pedagogical problems of creating coherency between conflicts at the individual, interpersonal, resp. structural levels (see Chapter 8). To all appearances, projects mostly dealt with the interpersonal level. It turned out that teachers find it easiest to choose conflicts that are open to direct description via a limited number of persons or groups involved – anglers vs. fishpond owners, the ornithologist vs. the fisherman (in the case of cormorants), or individuals for and against e.g. a new motorway.

General remarks on focus in MUVIN projects

Feedbacks received from questionnaires prompted us to categorise answers based on 'fundamental MUVIN concepts'. For instance, when asked which aspects of their educational praxis they gave high priority to, the following numbers of teachers answered:

Activity-type education: 22
Conflicts of interest: 13
Project-/problem-oriented education: 13
Student co-influence   12

Action competence, broadly understood: 6
Miscellaneous (group work, storyline, etc.):   13
No answer: 5

Asked about the relative benefits of this approach, compared to conventional education, the teachers replied: (only categories with more than one reply given)

Activity-/adventure-type education: 15
Student co-influence/responsibility/engagement/independence: 11
Opportunities for immersion and contextuality: 9
Focus on conflicts of interest: 6
Cross-disciplinarity: 5
Focus on forming an independent opinion: 3
Project-oriented education: 3
Focus on action competence: 2
Keeping logbooks: 2
Miscellaneous (None, advisor assistance,
   teacher co-operation, 'more fun', flexibility, popular with parents, etc.):   14
No answer: 8

As a result of the programme, teachers attached more weight to activity- and adventure-type education, and both students (see Chapter 15) and teachers also felt this to be a major asset of environmental education. This may be for a number of reasons. We will just mention a few. Environmental education, more than conventional education, invites 'going out to have a look at the situation'. By participating in the projects, teachers had the necessary occasion for doing something about their normal praxis that might have been under consideration for quite a while. As a final remark, this aspect of MUVIN was felt to be fairly straightforward, compared to the other 'basic concepts' of the project.

   Student co-influence/responsibility/engagement/independence is another essential element that teachers gave priority, and one that was felt to be an asset compared to ordinary education. This is in direct continuation of some of the programme intentions. Developing action competence in the students implies, among other things, an education that will help students take a participatory role in democratic processes. This will hardly happen, unless they are given a participatory role in education.

   No doubt, many teachers would willingly give more weight to student co-influence than is the case in day-to-day teaching. On the other hand, teachers undoubtedly find it difficult for this to be fully implemented in practice.

> *They had co-influence on both form and content. Admittedly, this is*
> *perhaps just in a small way now, but those things can develop, and I believe*
> *we can benefit immensely from it. And that's the kind of thing a teacher*
> *knows perfectly well – of course there is more commitment to something*
> *you have taken part in creating – but we sometimes relegate it to the back*
> *seat – after all, we have to get something ready.*

As for student co-influence, it was obviously important for teachers to carefully consider which decisions they wish to delegate to the students. They may have influence at several levels, and what really matters here is for teachers to indicate in no uncertain terms the extent of this co-influence. Several projects did not achieve the subject content planned at the outset (see e.g. Hedegaard ed. 1996, p. 12). This could reflect a failure to articulate who (teachers and students alike) will be in charge of what during the project. Many teachers felt a considerable decline in the qualitative level of subject matter when students were left to decide on large parts of the project – and some actually adduced this as an argument for not involving students very much in decisions concerning education.

All the same, many teachers held co-influence to be important and therefore worked deliberately on this aspect of the project. This may be for a number of reasons: Generally, the new Danish education act features an added focus on student involvement. Moreover, many teachers feel this to be an important part of the general formative task to be provided by school, and last not least: It is among the project elements, to which the project management attached the most importance, e.g. at the aforementioned seminars.

MUVIN as a development project

Looking at teachers' attitudes to MUVIN as a development project, we found feedbacks to be quite unambiguous. The vast majority mentioned this in positive terms. Out of the questionnaires received, only two indicated that the project was generally not found to be successful. We will quote a few positive remarks on the project as such:

> *It has been absolutely tops and almost left us euphoric. The students were*
> *given far more co-influence than before, and as teachers, we broke barriers*
> *in terms of leaving things to the students and 'letting be chaos before*
> *cosmos'.*

This has been an incredibly positive process, in which we made a host of experience, which made for an exciting year that will leave its mark on our school in the future. This goes for, among other things, students co-influence, awareness of conflicts of interest, the participation/interest of parents and local residents, the impact of having taken action and achieved a splendid result (restoration of a stream), followed by an opening ceremony with lots of locals attending, our MONS co-operation.

Those extremely positive feedbacks are of course interspersed with a few more critical ones – like the following, in which a teacher – as a rare exception – takes issue with the tone used for several items that include a number of fundamental MUVIN concepts:

To me, a lot of the above attitudes is a '70s trip. This will all change. Good and inspiring education has to build on professional authority. The teacher has to know his/her trade – as we know, children of the 90s are confused and rootless, and normally, they are not very much into nature. Children and adolescents: 'I consume, therefore I am'. Of course, if a teacher succeeds in engaging them in the environment, that's just fine.

The next citation is taken from a teacher logbook:

This is probably one of the best things I have ever been part of. The whole project set-up was practically ideal. Visits to the society. Visiting teachers to the school. The consumer enquête and statistics. Post-processing of various experiences. Building a hen house and chicken run at the school. The children came along to pick out animals. Tending agreement with parents and children. Co-operation with our excellent woodwork master. Co-operation with the 9th grade class teacher. The children's final conclusion on taking action. During our in-class conclusion and evaluation of the topic, it was a veritable Christmas gift that the students had gained so much from the topic and now wanted to put knowledge into action.

I've especially been feeling that afterwards. They cannot really be bothered to use our Danish textbook system. They have become a lot more discriminating as to what we should actually do.

Teacher evaluation of the process

Many teacher feedbacks deal with concrete aspects related to in-class education. They may refer to an individual project or to the progress from one project to the next over the school year. We will quote a couple of examples; however, see also Hedegaard ed. 1996 and Breiting 1997.

Opinions differ considerably when it comes to organising projects: Should they be deployed as a few weekly lessons over a long period of time, or rather as concentrated educational projects with several lessons over a short time span (down to one week). The following quotation is from an interview at a case study school:

Teacher 1: I really think the students did a good piece of work.
Teacher 2: So do I. And they are a wee bit proud of being in – that's for sure.
T1: If you want to ask, 'What did they get out of it?' - That can't just be measured by asking them specific questions and then say, 'You answered so-and-so many items correctly, so you've learnt this much.' You can't do that. But anyhow, they've been through a process that has matured them.
T: after a while: But then, that's also one of the things we mentioned at the Vordingborg MUVIN session last April – that we would like to relate how students benefit from the process itself – because there, we met some who had launched the whole thing during one week, meaning that as teachers, they had been busy preparing a lot of things, in order to make sure the students got to experience something very special for a single week. Here, it's some lessons each week, but then for a longer period of time.

One teacher logbook relates several circumstances that made the second MUVIN project better than the first one:

After a good week of working with fish farming and fishery, I am left with a feeling that this has been a good and rewarding week for students and teachers alike. I feel the children acquired some solid knowledge, and have awakened to the conflicts of interest.

Comparing this project with our first, I find the latter one seems far more successful. How come? Of course, that is hard to explain; but I believe the following circumstances played in:
1. *The children were divided across forms, into groups of 12students (grades 1-3). Probably, the elder students dominated; but I believe they made the younger ones listen – 1st grade has something to live up to.*
2. *Keeping the same group throughout the week was a good thing.*

3. *Period length – we've been working during all lessons for a week. Our first project stretched over 1-2 months, which tended to make students lose interest.*

4. *We made trips out from school. The children need to use all their senses – see, hear, taste, feel, smell – they experienced.*

5. *They were inspired by visiting teachers.*

6. *Finally, the topic itself was more concrete. It was fairly easy for the children to see the conflicts of interest.*

7. *I imagine that children will always find water, small animals and fish interesting.*

Several of the above 7 items recur in several teachers' project evaluations. For instance, several schools tried working across age groups. However, as it turns out, experiences on this item are quite inconsistent. Basically, we have to take note that working across age groups requires many preliminary in-depth discussions within the teacher team, in order to clarify the concepts to be worked with. This can capsize a project, even with an extremely functional teacher team.

Unlike many other teacher statements, the last passage reflects the view that the very limited project duration was a positive aspect. There may be a number of reasons for such differences, and we should point out that this field does not lend itself to generalisations.

More than one MUVIN project in a school year

As already mentioned, participant teachers were required to organise more than one project in a school year based on MUVIN ideas. The feedbacks from our advisors were unambiguously positive on this count. To ensure that schools would develop a fair amount of environmental education, it was vital that participant teachers were prepared to accept that this was a development project, and would thus have to include more than one project. This allowed us to discuss and test several sub-aspects of the project that would risk being dropped in a single large-scale project.

From a teacher logbook:

The process has been quite good so far. Students were interested and active (apart from Day 1, during the fish farmer's introduction). I rose to the occasion far more than during the first project. Why?

1. *From their first projects, the students have some experiences and impressions to build on, even though, at that point, I could hardly see any results.*
2. *The topic is easier to grasp when it comes to conflicts of interest. The angler – the fish farmer. Farming, factories, etc. were only mentioned on rare occasions.*
3. *We had more help from the outside: two visits to fish farms, two visiting teachers, an angler and a biologist from Vejle county authority.*
4. *Smaller group (12); last time 20.*
5. *The teacher has reaped 'experience'.*

Several such remarks recur in teacher feedbacks regarding running one, resp. two MUVIN projects. Actually, it is not surprising that continuing to develop ideas across repeated projects is perceived as rewarding and enhances their educational quality.

The fact that participant teachers were not to organise one big project (e.g. a feature week) also took quite a load off many a shoulder. As a result, they dared try their hand on approaches that they were not patently sure would work the first time around. In addition, successive projects will allow the teachers' reflections to translate into new praxis, also as a result of their discussions with advisor and colleagues.

15

What do students appreciate about environmental education?

Intentions and background

This chapter will sum up our profile of how students view environmental education. As in previous chapters, we will base our judgements primarily on MUVIN experiences, though with particular emphasis on features considered to be generic to modern environmental education.

To uncover what students appreciate about environmental education, we applied our empirical material as follows:

In-class observation

During in-class observation, we paid special attention to the situations in which students appeared to concentrate fully on what was going on. If students appeared to be absorbed in whatever they or others were doing as part of the education, we took this as a positive sign relative to the relevant aspect of environmental education. Conversely, we also took note of situations with many apparently inattentive students. In addition, we tried to note any differences between groups during group work, or between students in the same group.

Obviously, such external indications of attentiveness need to be taken with a pinch of salt. Any teacher has had to concede that apparently inattentive

students may eventually turn out to have 'listened', or whatever the relevant criterion for not being inattentive. Conversely, we are all too familiar with students' attitudes simulating presence and attendance, and where you later find that their minds were wandering along quite different paths.

Since students participating in MUVIN projects typically spent a great many lessons doing group work, the above limitations to observing students' attentiveness outwardly – as reflecting their engagement in education – probably tend to be less important, although simulating may also occur during group work. When observing typical in-class group work, it is mostly obvious to what extent individual members participate.

Teachers' impressions

When trying to provide an impression of how students view environmental education, teacher evaluations make another important source, which has been available to the respective researcher and advisor on a current basis, further to guidance and discussions. This source provides, albeit indirectly, a slightly more general and extremely important empirical material.

Students' own statements

The two previous measures of how students' view environmental education only become truly credible, when combined with the students' own statements on how they feel about environmental education.

Our MUVIN research includes interviews with approx. 50 students, typically made individually, and interview rounds with each student, at some months' interval.

Furthermore, it includes 1,722 questionnaires, completed by students from grades 5 and up. In these questionnaires, students were also to express:

· How the student feels about the relevance of environmental education in school.
· How the student considers his/her outcome of having participated in MUVIN as regards his/her possibilities for doing something about environmental problems in the future.
· What, in the student's opinion, should be the preferred approach to work on environmental problems?
· What in the MUVIN project meant the most to the student?

EE teaching mentioned favourably

When giving a positive opinion on teaching situations, students would typically mention rather different types of teaching.

There is the type we could characterise as *entertaining teaching*. The teacher is an entertainer, telling good stories, or the class is allowed to play or see an amusing cartoon film – just to draw up the extremes.

Another type of teaching with student-appeal is the (for the students) *laid-back education*. This is the type of teaching that minimises the students' sense of being at school, and of a teacher setting bounds to their exploits. To the students, the attractive part is that the situation offers ample opportunity for contacting mates for fun and talk, and to escape the teacher's control.

Finally, there is the type of teaching that we might term *the challenging teaching*. Relative to the mission of the school, this is by far the most important. Students experience this type of teaching as involving tasks of a challenging nature, and – no less importantly – it holds opportunities for the students to have experience in overcoming challenges, that is, to prevail.

During an interview, it may not be easy to interpret the students' favourable statements on elements of teaching and subsequently separate and group them according to the three categories below: Was the statement positive, because education was entertaining, laid-back or challenging? Moreover, the three categories are not quite mutually exclusive. However, we need to realise their possible existence, and it is equally important to keep in mind that the same external education situation may mean challenging education to one student while, to a classmate, it may offer an opportunity to lay back and evade the actual educational target.

If we chose to ignore students' statements that can readily be referred to categories 1 and 2, our empirical material allows the following conclusions:

What do students appreciate about environmental education?
· Working with real problems that engage people outside the school.
· Taking part in a learning project that also creates interest among people outside the school.
· Being respected for their work, both by the school and by outsiders.
· Working in groups, with a free hand to organise their work and have ideas for studies, etc.
· Co-influencing the actual in-class education in terms of target, content, or ganisation, and concrete design.
· Obtaining 'quasi-professionalism' at some of the things they are able to accomplish.

- · That people from outside the school have expectations for the work and outcome of the class.
- · Having their self-esteem in class boosted.
- · Learning something from education that gives them greater confidence in their own power of influence.
- · Working on issues that engage them existentially, and which appear to carry weight for their future.
- · Meeting adults outside the school.
- · Experiencing institutions and milieus outside the school.
- · Getting an opportunity to do something towards solving or counteracting environmental problems.
- · Doing cross-disciplinary work that implicates methods, approaches, perspectives, general knowledge and 'real-life studies' in a productive manner.
- · Acquiring new knowledge and insights that strike them as being useful and meaningful.
- · Having opportunities for processing their impressions both intellectually and emotionally.
- · Getting to meet thought-provoking people and viewpoints.

Students tend to appreciate the characteristic features of environmental education that we also consider the most important, unless projects drag out endlessly, or groups 'idle' too much.

Seen as a whole, the listing also profiles a very specific type of education. These educational aspects fit end-to-end with MUVIN notions of contemporary environmental education. Moreover, they combine the hallmarks of any education that is able to challenging a majority of students.

16

Focal points in the further development of environmental education

Feedbacks to the research group show that altogether, the MUVIN work has been beneficial for all parties involved. Expectations for the MUVIN project, in terms of making a robustly school-anchored development work and a rewarding research object, appear to have been met.

    Still, as is typically the case, new knowledge gives rise to new questions, and hence new challenges. This also applies to the outcome of our MUVIN research, and very much so, when it comes to the further development of environmental education. Thus, based on experience reaped from MUVIN, the following conclusive remarks will highlight a few focal points already in sight for the future work in this area. They concern teacher qualification, environmental education as a contribution to general school development, and future research efforts regarding environmental education.

The teacher

Many teachers wrongly assume that environmental education is reserved for particularly 'environmentalist' teachers. However, development work done within the MUVIN programme has shown that precisely the teachers who indicated they had benefited the most were *not* particularly environment-savvy or environmentalist. It stands to reason that a teacher may capitalise on being

personally involved in and well informed on environmental issues. But that apart, it appears that the optimal teacher background in terms of developing one's environmental education to benefit both students and one's own professional teaching life boils down to the word *openness*.

When it comes to openness in terms of environmental education, this involves – among other things:

- Being empathetic to whatever causes students to wonder or worry.
- Getting the feel of how students think about man's dependency on the environment.
- Being open to leaving more influence and responsibilities for education to the students.
- Being open to a changed teacher role, in which a teacher's authority no longer hinges primarily on being the one who can answer any question and always knows how to solve problems.
- Having the guts to face an education that may temporarily become too chaotic for one's liking, in order to make room for the students' engagement and scope of action.
- A keen eye to using every occasion for drawing upon resource persons, e.g. from the local community, in education.
- Being prepared to take the class outside school.
- Being ready to enter into new, mutually binding co-operations with colleagues at school.

The MUVIN project has several examples of teachers who, by taking part in MUVIN work, developed their professional skills and self-esteem, which in turn rubbed off on what their surroundings expected from them. Obviously, all examples known from MUVIN work cannot be described based on the same template however, the most significant personal growth was often seen in teachers who overcame some thresholds to what they would immediately consider their own capabilities. This may result from a change in teacher role, new co-operative set-ups at school, teachers relations to the school management, organising interscandinavian trips, or giving presentations in English to foreign visitors. Examples in point are the speeches given by primary/lower secondary school teachers at the international environmental education conference, 'The Northern Call for the Environment', in Savonlinna, Finland. These examples serve to underscore how vital conditions and challenges promoting personal growth are to teachers.

The perspective of personal growth in teachers involves some psychological mechanisms of a fundamental nature, which our MUVIN development work has exposed time and time again, and which have sometimes been made explicit to our researcher or advisor. It can be extremely stimulating for a teacher to realise that he/she is moving and developing. If a teacher decides to develop his or her environmental education, this can also reinvigorate this person's entire teaching persona.

School

The further development of environmental education also needs to be considered as a part of more general developments in education. This owes to the fact that environmental education is not a separate educational matter, in terms of requiring a methodology of its own and a learning concept that stands apart from education as such.

Our advisors often noted how much work teachers would put into changes to their teaching that were not reserved to or motivated by their interest in environmental education as such. This is reflected by key words such as project work, students' co-influence and –responsibility, cross-disciplinarity, teacher co-operation, connecting theory and praxis, active involvement of the surrounding community, working with conflicts of interest, information retrieval, critical discussions, participation, and action competence.

On the one hand, this shows that working on developing environmental education at their school can give participant teachers new competencies that also make useful tools in their remaining teaching time. On the other hand, it is of course also true that the teachers' pre-existing experience and competencies from other professional contexts helped to raise many a MUVIN project to a higher level.

Thus, our point is that environmental education and other developmental elements in education can underpin one another. So really, the important thing is to see this potential as a united strength and to provide generous frameworks enabling its continued utilisation in a school's development. In other words, here lies a mission for future environmental education, in terms of making its experience available and capitalising on some of the other developmental components found at a school, while also making oneself known as a potential catalyst in the school's overall development.

Research

The MUVIN project yielded valuable insights especially important to the development of environmental education. This goes for the general pedagogy as well as the more specific environmental-oriented curriculum level. It also applies at the more concrete and practical level, regarding teacher and student experiences from e.g. specific ways of drawing on the local community, and the interplay between the practical and the more overall pedagogical levels. The present publication describes several such aspects, and descriptions of a number of concrete praxis-related possibilities can be found in other MUVIN publications, including Danish and Nordic MUVIN newsletters, and in Hedegaard ed. 1996 and Breiting 1997.

Further to these results, we should point to the following areas of considerable interest to future research. These focal points should all be seen as a contribution to an environmental education targeting long-term action competence in the students. With reference to the previous section, we should note that among those areas, several would also be of interest to a school's general curricular development.

· Using the conflict-of-interest concept in relation to man's use of natural resources has proved a valuable tool in helping students perceive the complexity of environmental issues and reflect on the consequences of their own actions. All the same, this still remains a difficult concept for teachers to master in education. More specifically, limitations are seen in terms of interlinking the conflict-of-interest concept between the three levels: personal dilemma, interpersonal conflicts of interest, and structural conflicts. We are yet to find out how this concept can be made an integral part of teachers' deliberations on their day-to-day teaching. There is a need for more research and more development work on how the particular features of project-oriented education (student co-influence, problem-orientation, etc.) can be connected with work on conflicts of interest.

· As for areas of teaching, environmental education should both implicate and develop general and academic concepts and theories. This should be done because precisely such concepts and theories, combined with other learning aspects, can help children construct comprehensive and contextualised understandings when exploring their environmental milieu. There is a need for a continuing research effort to search for and deal with issues related to the conceptual development in children in terms of environmental issues, including the significance of common conceptual terminologies.

· In the present work, the aesthetics dimension in education involves both a sensuous-receptive and a creative-expressive way of relating to the learning matter in point. In the many MUVIN projects, we found that many such aesthetics elements in education would unfold as motivational and attention-building activities (fantasy travels, etc.), investigative and acquisitional activities (practical studies, role-plays, theatrical plays, etc.), and communicative activities (panel debates, exhibitions, etc.). A research effort should therefore look into the benefits of enabling students to draw upon such active and sensuous ways of forming both analytical and non-analytical perceptual categories for understanding real aspects of everyday life. This would also involve studies to clarify how students can evolve their capabilities to connect such concrete points of departure with a wider field of theoretical insights – e.g. benefits of including storyline projects in environmental education.

· As a boost to enhancing the aesthetics dimension in environmental education, practical work should be done to overcome the following problem: There is a tendency for arts and artistic activity in education to be related only to the quality criteria peculiar to aesthetics/arts, which is counterproductive to connecting them with learning matter such as environmental education.

· The action concept is a key concept in developing environmental education pedagogy. However, working on actual environmental action of sufficient perspective reach, as part of an education, presents difficulties. A future research effort should therefore probe the preconditions and benefits of a teaching approach allowing students to make more concrete action experience in solving environmental problems. Further to this, it would be desirable to evaluate student outcomes of 'as-if' situations (e.g. through role-plays and storyline) compared to their understanding of real-life situations and action potentials.

· Finally, there remains an issue that is urgent and fundamental to all education: the circumstances influencing students' possibilities for connecting concrete cases with theoretical insight, and how to utilise such insight in new, concrete contexts. Since environmental education is a suitable vehicle for clarifying this point, it should be made the focus of a renewed research effort.

A look in the crystal ball regarding future environmental education

Today, we see the outlines of school development indicating that schools and the quality of education will be judged by their academic quality, and by whether, in their school years, students evolve the competencies required for life in a dynamic society that places high demands on the independence and flexibility of individual citizens, and engagement and a sense of responsibility towards societal development and their own well-being.

We may safely assume that our students will be living their futures in a world profoundly different from the one they were born into. The summary presents a guess as to what – among other things – will foreseeably be of essence.

Future bearings

A well-functioning citizen in an industrialised democracy will have practically infinite possibilities for information retrieval and for in-the-flesh experience.

Individual lives will be increasingly influenced by global conditions.

Global change happens at a faster and faster pace – and possibly even more unpredictably than before.

Most people will perceive the world and 'development' as increasingly complicated, which will place heavy demands on democracy.

Decisions bearing upon societal development will be further removed from traditional political decision-making bodies, which will render more obscure to citizens, and possibly more difficult to take part in.

On the other hand, 'the political consumer' may become more visible.

Issues concerning man's use of natural resources will become increasingly urgent.

Cont. ...

... cont.

Relations between environment and health (quality of life) will become increasingly obvious, though no less complex than today.

The global population will grow.

Resources will be more limited.

Pollution will increase globally.

Locally, pollution will develop quite asymmetrically and will glaringly reflect inequities in the living conditions of various population groups.

There will be large-scale migrations of population groups, resulting in localised cultural encounters and value clashes.

A person's basic training will only be a first step towards life-long learning.

IT will increasingly become the link connecting individuals, events, and new information.

Several of these aspects already inform current decisions on the actual content of environmental education, while the general educational theory on environmental education tries to heed some of the remaining aspects.

Future environmental education at all levels will be faced with a continuing challenge: how – under conditions of change – to reflect the general educative and formative requirements posed by concepts of action competence in a democratic perspective.

Annex 1

Participating schools

The figures in brackets refer to the map of Denmark (opposite page).
The schools 1-85 are primary and lower secondary schools.
The schools 86-88 are gymnasiums, upper secondary schools.

The schools marked with * are the schools selected for dialogue research.

JYLLAND:

Fladstrand Skole (1)
Frederikshavn
Grade 9.

Sæby Kommuneskole (2)
Sæby
Grade 7 and 8.

Kærvejskolen (3)
Aabybro
Grade 3 and 4.

Sulsted Skole (4)
Vestbjerg
Grade 5, two classes.

Sønderbroskolen (5)
Aalborg
Grade 0 - 7.

Tornhøjskolen (6)
Aalborg Ø
Grade 10.

Vadum Skole (7)
Vadum
Grade 3 and 7.

Nørhalne Skole (8)
Vadum
Grade 3 - 5.

Sdr.Kongerslev Skole (9)
Kongerslev
Grade 6.

Terndrup Skole (10)
Terndrup
Grade 2, 3 and 5.

Virupskolen (11)
Hjortshøj
Grade 2 - 4 and 6 - 7.

Allingåbroskolen (12)
Allingåbro
Grade 7.

JYLLAND *continued:*

Haldum-Hinnerup Skole (13)
Hinnerup
Grade 7.

Rønbækskolen (14)
Hinnerup
Grade 4, 5 and 7.

Fårvang Skole (15)
Fårvang
Grade 6. and 7.

Midtbyskolen (16)
Horsens
Grade 7.

Voerladegård Skole (17)
Skanderborg
Grade 0 - 4.

Tim Skole (18)
Tim
Grade 10.

Bøvling Skole (19)
Bøvlingbjerg
Grade 8, two classes.

Linå Skole (20)
Silkeborg
Grade 0 - 6.

Voel Skole (21)
Silkeborg
Grade 6 and 7.

* Mønsted Skole (22)
Viborg
Grade 3 and 9.

Vesløs Skole (23)
Vesløs
Grade 8, two classes.

Tømmerby/Lild Skole (24)
Frøstrup
Grade 5 - 7.

Bjerget Efterskole (25)
Frøstrup
Grade 9.

Dueholmskolen (26)
Nykøbing Mors
Grade 8, three classes.

* Parkvejens Skole (27)
Odder
Grade 5, two classes.

* Øster Nykirke Skole (28)
Vonge
Grade 1 - 3.

* Balleskolen (29)
Silkeborg
Grade 5, 8 and 9.

Bækgårdsskolen (30)
Skjern
Several grades.

Lønborgskolen (31)
Tarm
Grade 0 - 10.

Stauning Centralskole (32)
Skjern
Grade 3 and 5 - 7.

Tjæreborg Skole (33)
Tjæreborg
Grade 7 and 8.

Hestkær Friskole (34)
Grindsted
Grade 0 - 3.

Nordvangskolen (35)
Esbjerg V
Grade 4 and 5.

Hjerting Skole (36)
Esbjerg V
Grade 8, four classes.

JYLLAND *continued:*

Vestervangskolen (37)
Esbjerg
Grade 6, four classes.

Skovbakkeskole (38)
Odder
Grade 7.

Hørup Centralskole (39)
Sydals
Grade 4 and 5.

Nordborg Skole (40)
Nordborg
Grade 4.

Bakkeskolen (41)
Kolding
Grade 0 - 10.

Hældagerskolen (42)
Vejle
Grade 10.

FYN OG LANGELAND:

Rudkøbing Skole (43)
Rudkøbing
Grade 5.

Skrøbelev Skole (44)
Rudkøbing
Grade 5.

Agedrup Skole (45)
Agedrup
Grade 6 - 10.

* Nordvestskolen (46)
Otterup
Grade 3 - 5.

Abildgårdsskolen (47)
Odense
Grade 1 - 9.

Glamsbjergskolen (48)
Glamsbjerg
Grade 8, three classes.

Ejbyskolen (49)
Odense
Grade 8, two classes.

Munkebjergskole (50)
Odense
Grade 2 and 4.

SJÆLLAND, LOLLAND, FALSTER OG BORNHOLM:

Nøddeskovskolen (51)
Næstved
Grade 7 and 8.

Fanefjordskolen (52)
Askeby
Grade 5 - 7.

Karrebæk Skole (53)
Karrebæksminde
Grade 9.

* Sandby Skole (54)
Harpelunde
Grade 5 - 7.

Ravnsborgskolen (55)
Horslunde
Grade 8, four classes.

Kundby Skole (56)
Svinninge
Grade 0 - 2.

Allindelille Skole (57)
St. Merløse
Grade 0 - 7.

Nørrevangsskolen (58)
Slagelse
Grade 6.

Dagmarskolen (59)
Ringsted
Grade 2.

Valdemarskolen (60)
Ringsted
Grade 6, two classes.

* Klostermarksskolen (61)
Roskilde
Grade 5, two classes.

Kirstinedalskole (62)
Køge
Grade 5 and 8.

Ølby Skole (63)
Køge
Grade 2, 3 and 5.

Allerslev Skole (64)
Lejre
Grade 7.

Ellemarkskolen (65)
Køge
Grade 6 - 8.

Lynge Skole (66)
Lynge
Grade 7 and 9, two classes each.

Hedegårdsskolen (67)
Ballerup
Grade 4 - 6 and 8.

Nordvangskolen (68)
Glostrup
Grade 5.

* Nivå Centralskole (69)
Nivå
Grade 9, two classes.

* Søndergård Skole (70)
Bagsværd
Grade 4.

Enghavegård Skole (71)
Søborg
Grade 6, 8 and 9.

* Skovvangsskolen (72)
Glostrup
Grade 1, two classes.

Mørkhøj Skole (73)
Herlev
Grade 2 and 3.

Gladsaxe Skole (74)
Søborg
Grade 4.

SJÆLLAND, LOLLAND, FALSTER OG BORNHOLM *continued***:**

Tingbakkeskolen (75)
Græsted
Grade 2, 7 and 8.

Nr. Herlev Skole (76)
Hillerød
Grade 4.

Ravnsholtskolen (77)
Allerød
Grade 8, two classes.

Vridsløselille Skole (78)
Albertslund
Grade 10.

Skolen på Islands Brygge, (79)
København
Grade 0 - 5.

Søndermarksskolen (80)
Rønne
Grade 0 - 2.

Gasværksvejens Skole (81)
København
Grade 0 - 10.

Tingbjerg Skole (82)
Brønshøj
Grade 0 - 2, 6 and 7.

Dueodde Efterskole (83)
Nexø
The whole school (15 - 20 year old students)

Sandneskolen (84)
Jægerspris
Grade 3 and 7.

Islev Skole (85)
Rødovre
Grade 6 and 7.

PARTICIPATING GYMNASIUMS:

Helsinge Gymnasium (86)
Helsinge
Grade 1.g mat.

Hadsten Gymnasium (87)
Hadsten
Grade 1.g mat. and highlevel bio.

Grenå Gymnasium (88)
Grenå
Grade 1. hf

CONSULTANTS:

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Fåborg

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København

Per Møller Janniche,
Roskilde

Hans Jantzen,
Munkebo

Frank Jensen,
Fredericia

Hans Peter Johansen
Vrå

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Borup

Karsten Schnack, DLH,
København

Søren Vinding,
Fanø

Annex 2

Not included in the English translation

Annex 3

The first questionnaire to the teachers

Own description of the MUVIN class projects

To be filled in by the participating teachers with one questionnaire for each class. (Questionnaires will be treated as CONFIDENTIAL MATERIAL).

School
Contact teacher

1. Have you in the teachers' group earlier been involved in developmental work about environmental education – or had any special interest in environmental education?

2. Have you earlier in the teachers' group participated in other kinds of developmental work?

3. Which environmental projects have you already accomplished with the class since the summer holyday when you write this? Please inform about the duration in weeks / days and the amount of used lessons for each project?

4. Which environmental projects do you plan for the remaining part of the school year as part of MUVIN?

5. Which aspects of your pedagogical praxis have you especially been focussed on to change as part of the work in MUVIN?

6. In which ways do you yourself see it as developmental work compared to normal teaching?

7. What do you think at the moment that the students have gained from MUVIN?

8. How much has the class been outside school?

9. How much has the class been on visit or had visitors in class of resource persons and others?

10. In which phases of the environmental projects have the students' involvement in decision making worked out?

11. What have been difficult concerning the students' involvement in decision making?

12. Have the projects had special focus on the esthetical aspects and if so what is the experience from that?

13. How have you been working with the ethical aspects?

14. Which problems have you encountered concerning getting all students involved in each project?

15. What has been well functioning in your environmental education in general?

16. What has been less-well functioning in your environmental education in general?

17. Do you have any 'documentation' that could be used later if we want more information about your work in class, like
    A. Teachers' diaries
    B. Students' diaries / reports / essays etc.

C. Tape records, video records or the like
D. Posters and exhibition material etc.
E. Newspaper material and the like.
PLEASE, REMEMBER TO KEEP EVERYTHING WITH THE DATES, THANKS.

18. What have you done until now to generate interest at the school or in the local community about your MUVIN projects?

19. Remarks (critical / positive) to be a part of MUVIN or to work with environmental education in general.

Please send the completed questionnaire BEFORE CHRISTMAS to Kristian Hedegaard, MUVIN-DK; DLH, Emdrupvej 101, 2400 København NV.

Thank you very much for your help!

Best regards

Annex 4

The second questionnaire to the teachers

Final description of the MUVIN class projects in 1994-95

To be filled in by the participating teachers with <u>one questionnaire for each class</u>. (Questionnaires will be treated as CONFIDENTIAL MATERIAL).

School   Date
Contact teacher   Class

1. Which environmental projects have you had in the class since the questionnaire 'Own description of the MUVIN class projects' was completed in winter?

2. Which aspects – if any – of your pedagogical praxis have you especially focussed on during the MUVIN projects in spring?

3. How do you feel that the total MUVIN project in your class has been as developmental work?

4. Which experience from your first MUVIN project have you made use of in the following projects?

5. Which qualities, if any, do you think the MUVIN teaching has had compared to the normal teaching?

6. What is your experience with the focus of MUVIN on <u>conflicting interests in the use of natural resources</u>?

7. Which problems have you experienced concerning engaging all students in the environmental projects in the last term?

8. How has it been to work with MUVIN in a time when a new school law is being implemented?

9. Which advantage and drawbacks have you experienced by having a MUVIN advisor attached to the school / project?

10. Which proposals for the improvement of the consultancy function in such a development project do you have?

11. What is your overall experience with your work compared to the basic thoughts of MUVIN? (Please continue on the back side).

   (Students' participation in decision making, students' experience with acting related to environmental problems, the ethical aspects of environmental education, the esthetical aspects of environmental education, more relevant education, the teacher as an advisor and not an authority, inclusion of the surrounding community, to work with real problems, to involve people outside school, etc. ?????)

Please send the completed questionnaire to Kristian Hedegaard, MUVIN-DK; DLH, Emdrupvej 101, 2400 København NV **not later than 1. June**, or when the last MUVIN project is finished.

Thank you very much for your help!

Best regards

Annex 5

Overview of the operationalization of important aspects of items in the student questionnaire

Aspects concerning focus question 1:
'In which ways do the MUVIN projects influence students' confidence in their own influence?'

a. The student believes that he/she – alone or with others – can influence the solving of environmental problems.

> 1a+ I believe that I can partici-pate in the solving of some of the en-viron-men-tal problems (1)
>
> 1a+ When there are to be taken decisions about the environment then I have say in the matter (29)
>
> 1a- I can decide so little in order to help the environment that I just as well had better not (18)
>
> 1a- It has no importance what I think about the environment (6)

b. The student believes that he/she learnt something from the projects that improved his/her skills in influencing the solving of some environmental problems.

> 1b+ I can better do something for the environment because we have worked with it in class (22)
>
> 1b+ I have learned something in school which makes me better in solving some of the environmental problems (13)

1b-   I can make no use of what I have learned in class to help the environment (26)

1b-   It's waste of school hours to deal with how one can take part in helping the environ-ment (2)

c. The student believes that the projects made him/her more inclined to apply him-/herself to solving environmental problems.

1c+   I do more feel like dealing with en-vironmental questions because we have worked with it in class hours (31)

1c+   Since we have worked with MU-VIN I have got more courage to help the environment (7)

1c-   I'm bored of all that talk about the environment after we have worked with it in class (24)

1c-   The MUVIN project have removed my want to deal with the environment (5)

d. The student can specify what was significant to him/her in that project.

1d   That thing which has mattered most to me in MUVIN has been.....(continue the sentence yourself) (37)

Aspects concerning focus question 2:

'The student's acquisition of the conflict-of-interest concept and application of the concept in understanding environmental issues and action potentials?'

a. The student is able to explain a conflict of interest related to an environmental issue

2a   The Case-example: Why can't people agree in using the water on this picture (32)

2a-   If a factory pollutes it does not do it on purpose (27)

2a+   We have got the environmen-tal problems because people cannot agree about how to make use of the nature (10)

b. The student is able to relate concrete action possibilities to the stakeholders in a conflict of interest: Which stakeholders promote, resp. obstruct the cause supported by the student.

2b+   When I realise who is for and aga-inst the solving of an environmental problem then I can better do something to solve it (25)

2b-   I can only do something to help the environment if people agree on the right solution (8)

2b-   I cannot do anything for the environment if people disagree in the solving of environmental problems (16)

2b-   There is nobody who can help me in taking care of the environment (11)

c. The student expresses negative feelings about applying a conflict-of-interest perspective to environmental issues.

2c+   I don't like that people disagree in the solving of the environmental problems (30)

2c+   It is depressing that people argue about the environment (3)

2c-   I don't get sad when people disagree in the solving of environmental problems (21)

2c-   It doesn't bother me that people disagree on the environmental problems (17)

d. The student believes that conflicts of interest will continue to exist in relation to environmental issues

2d+   Also in the future people will go on arguing about the environment (12)

2d+   People will always disagree how best to take care of the environment (4)

2d-   Sometimes people will get that wise that they no more argue about the environment (19)

2d-   When I grow up there will be nobody who argue about how the environmental problem must be solved (9)

Aspects concerning focus question 3:

'The significance of different types of action experience acquired in environmental education'

a. The student indicates that the action concept implies acting at a both structural and individual level

3a   In what way can you best contribute in the solution of the environmental problems: (just put **2** crosses) (36)
   a. Get knowledge about the environmental problems
   b. Be active in a club which work for the environment
   c. Use environmental friendly products myself
   d. Sort my own waste
   e. Save electricity and water at home
   f. Support organisations which want to conserve the environment
   g. (if I was old enough) Vote political parties which are occupied with environmental questions

3a-   Environmental problem can only be solved if each of us change our way of living e.g. buy environmental correct go-ods (15)

3a-   It's the society which must see to the solving of the environmental problems. I cannot do anything my self (23)

3a+   If the environmental problems are to be solved one must do something in ones everyday life - and demand that the local authorities and the govern-ment do something as well (20)

b. The student indicates that, he/she has experienced to act related to an environmental problem as part of the teaching.

3b+   We have in the class tried to participate in the solving of an environmental problem (34a)

3b-   I have never together with my teacher and school friend tried to participate in the solving of an environmental problem (34b)
   c.   The student believes that he/she had a say in deciding such actions

3c+   I have taken part in deciding what we in class should do about the environmental problem (35a)

3c-   It has always been the teacher or the other students in class who have decided what to do in order to help the environment (35b)

d. The student believes that students should experience to take action in school related to concrete environmental problems.

3d   When we in school work with environmental problems I think especially that we shall (just place **one** circle) (33)
   a.   listen and hear about them in class
   b.   work with actual problems and with the class, the teacher and perhaps others try to participate in the solving of them

      c.   work in the class with how to solve an environmental problem - but leave the decision to the students whether they want to do somet-hing about it or not

      d.   examine how bad the environment are outside the school

3d+ I believe that you with the class directly shall try out how you can obtain influence in the solving of an environ-mental problem (14)

3d- I don't think we shall use scho-ol hours in doing something concrete to the environmental problems (28)

Annex 6

QUESTIONNAIRE

Dear pupil

Thanks for participating in this questionnaire

Your answer is anonymous therefor you shall not write you name on it. But it is of importance that you put a cross below which indicates whether you are a boy or a girl and that you write what class you are in.

Boy _____

Girl _____

Class _____

Below are written some sentences. Read each of them carefully and write whether you:

strongly agree   (= you have no doubt that you agree with the sentence)
almost agree   (= you may have some doubt about the accuracy - you almost agree with it)
almost disagree   (= in most ways you disagree with the sentence but you don't refuse quite)
strongly disagree (= you are quite convinced that you cannot support the sentence)
no opinion   (= you don't think you have any opinion about the sentence)

Just put one cross against each sentence

		strongly agree	almost agree	almost disagree	strongly disagree	no opinion
1.	I believe that I can participate in the solving of some of the environmental problems					
2.	It's waste of school hours to deal with how one can take part in helping the environment					
3.	It's depressing that people argue about the environment					
4.	People will always disagree how best to take care of the environment					
5.	The MUVIN project have removed my want to deal with the environment					
6.	It has no importance what I think about the environment					
7.	Since we have worked with MUVIN I have got more courage to help the environment					
8.	I can only do something to help the environment if people agree on the right solution					
9.	When I grow up there will be nobody who argue about how the environmental problem must be solved					
10.	We have got the environmental problems because people cannot agree about how to make use of the nature					

		strongly agree	almost agree	almost disagree	strongly disagree	no oppinion
11.	There are nobody who can help me in taking care of the environment					
12.	Also in the future people will go on arguing about the environment					
13.	I have learned something in school which makes me better in solving some of the environmental problems					
14.	I believe that you with the class directly shall try out how you can obtain influence in the solving of an environmental problem					
15.	Environmental problem can only be solved if each of us change our way of living e.g. buy environmental correct goods					
16.	I cannot do anything for the environment if people disagree in the solving of environmental problems					
17.	It doesn't bother me that people disagree on the environmental problems					
18.	I can decide so little in order to help the environment that I just as well had better not					
19.	Sometimes people will get that wise that they no more argue about the environment					
20.	If the environmental problems are to be solved one must do something in ones everyday life - and demand that the local authorities and the government do something as well					

		strongly agree	almost agree	almost disagree	strongly disagree		no oppinion
21.	I don't get sad when people disagree in the solving of environmental problems						
22.	I can better do something for the environment because we have worked with it in class						
23.	It's the society which must see to the solving of the environmental problems. I cannot do anything my self						
24.	I'm bored of all that talk about the environment after we have worked with it in class						
25.	When I realise who are for and against the solving of an environmental problem then I can better do something to solve it						
26.	I can make no use of what I have learned in class to help the environment						
27.	If a factory pollutes it does not do it on purpose						
28.	I don't think we shall use school hours in doing something concrete to the environmental problems						
29.	When there are to be taken decisions about the environment then I have say in the matter						
30.	I don't like that people disagree in the solving of the environmental problems						
31.	I do more feel like dealing with environmental questions because we have worked with it in class hours						

32.

Why can't people agree in using the water on this picture

_____

_____

_____

_____

_____

_____

33.

When we in school work with environmental problems I think especially that we shall (just place **one** circle)

a.   listen and hear about them in class

b.   work with actual problems and with the class, the teacher and perhaps others try to participate in the solving of them

c.   work in the class with how to solve an environmental problem - but leave the decision to the pupils whether they want to do something about it or not

d.   examine how bad the environment are outside the school

34.   Place a circle round a or b, so that it's correct to you

            a.   We have in the class tried to participate in the solving of an
                        environmental problem

            b.   I have never together with my teacher and school friend tried to
                        participate in the solving of an environmental problem

35.
            Just if you have placed a circle round **a** right above you shall place a circle round
            a or b so that it's correct to you

            a.   I have taken part in deciding what we in class should do about the
                        environmental problem

            b.   It has always been the teacher or the other pupils in class who have
                        decided what to do in order to help the environment

36.
            In what way can you best contribute in the solution of the environmental
            problems: (just put **2** crosses)

            a.   Get knowledge about the environmental problems

            b.   Be active in a club which work for the environment

            c.   Use environmental friendly products myself

            d.   Sort my own waste

            e.   Save electricity and water at home

            f.   Support organisations which want to conserve the environment

            g.   (if I was old enough) Vote political parties which are occupied with
                        enviromental questions

37.

The thing which has mattered most to me in MUVIN has been.....(continue the
sentence yourself)

_____

_____

_____

_____

_____

_____

Annex 7

The student questionnaire: All answers summing up

Dear pupil

Thanks for participating in this questionnaire

> Your answer is anonymous therefore you shall not write you name on it. But it is of importance that you put a cross below which indicates whether you are a boy or a girl and that you write what class you are in.
>
> **Boys 818 (47,5 %)**
> **Girls 897 (52,1 %)**
> **Total 1721 (6 missing)**

Below are written some sentences. Read each of them carefully and write whether you:

Agree completely	(= you have no doubt that you agree with the sentence)
agree somewhat - you	(= you may have some doubt about the accuracy almost agree with it)
disagree somewhat but	(= in most ways you disagree with the sentence you don't refuse quite)
disagree completely port the	(= you are quite convinced that you cannot sup- sentence)
no opinion the	(= you don't think you have any opinion about the sentence)

Just put one cross against each sentence

		Agree completely	Agree somewhat	disagree somewhat	Disagree comepletely	no opinion
1.	I believe that I can participate in the solving of some of the environmental problems	791 42,1 %	719 46,3 %	115 6.7 %	23 1,3 %	60 3,5 %
2.	It's waste of school hours to deal with how one can take part in helping the environment	73 4,3 %	178 10,4 %	453 26,4 %	952 55,5 %	59 3,4 %
3.	It's depressing that people argue about the environment	750 43,9 %	461 27,0 %	201 11,8 %	136 8,0 %	162 9,5 %
4.	People will always disagree how best to take care of the environment	757 44,3 %	670 39,2 %	137 8,0 %	61 3,6 %	83 4,9 %
5.	The MUVIN project have removed my want to deal with the environment	124 7,2 %	185 10,8 %	462 27,0 %	768 44,9 %	172 10,1 %
6.	It has no importance what I think about the environment	125 7,3 %	239 14,0 %	564 33,1 %	617 36,3 %	157 9,2 %
7.	Since we have worked with MUVIN I have got more courage to help the environment	475 27,7 %	624 36,4 %	295 17,2 %	135 7,9 %	183 10,7 %
8.	I can only do something to help the environment if people agree on the right solution	435 25,4 %	524 30,6 %	379 22,2 %	251 14,7 %	122 7,1 %
9.	When I grow up there will be nobody who argue about how the environmental problem must be solved	61 3,6 %	83 4,9 %	445 26,0 %	907 53,1 %	213 12,5 %
10.	We have got the environmental problems because people cannot agree about how to make use of the nature	866 50,5 %	554 32,3 %	129 7,5 %	75 4,4 %	90 5,3 %

2

		Agree complet ely	Agree some what	disagree somewh at	Disagree comeple tely	no opinion
11.	There are nobody who can help me in taking care of the environment	106 6,2 %	166 9,7 %	545 31,9 %	736 43,1 %	155 9,1 %
12.	Also in the future people will go on arguing about the environment	802 46,9 %	641 37,5%	105 6,1 %	36 2,1 %	127 7,4 %
13.	I have learned something in school which makes me better in solving some of the environmental problems	424 24,8 %	768 44,8%	274 16,0 %	141 8,2 %	106 6,2 %
14.	I believe that you with the class directly shall try out how you can obtain influence in the solving of an environmental problem	604 35,3 %	593 34,7%	204 11,9 %	110 6,4 %	198 11,6 %
15.	Environmental problem can only be solved if each of us change our way of living e.g. buy environmental correct goods	670 39,2 %	588 34,4%	251 14,7 %	117 6,8 %	84 4,9 %
16.	I cannot do anything for the environ-ment if people disagree in the solving of environmental problems	258 15,2 %	407 23,9%	546 32,1 %	359 21,2 %	132 7,8 %
17.	It doesn't bother me that people disagree on the environmental pro-blems	205 12,1 %	291 17,1%	525 30,9 %	552 23,5 %	127 7,5 %
18.	I can decide so little in order to help the environment that I just as well had better not	216 12,7 %	327 19,7%	525 30,8 %	535 31,4 %	103 6,0 %
19.	Sometimes people will get that wise that they no more argue about the environment	153 9,0 %	288 16,9%	512 30,0 %	520 30,5 %	232 13,6 %
20.	If the environmental problems are to be solved one must do something in ones everyday life - and demand that the local authorities and the govern-ment do something as well	1109 65,0 %	428 25,1%	48 2,8 %	26 1,5 %	96 5,6 %

3

		Agree complet ely	Agree some what	disagree somewh at	Disagree comeple tely	no opinion
21.	I don't get sad when people disagree in the solving of environmental problems	348 20,4 %	440 25,8%	469 27,5 %	226 13,2 %	225 13,2 %
22.	I can better do something for the environment because we have worked with it in class	401 23,5 %	672 39,3%	342 20,0 %	188 11.0 %	106 6,2 %
23.	It's the society which must see to the solving of the environmental pro-blems. I cannot do anything my self	185 10,8 %	256 15,0%	584 34,2 %	611 35,8 %	73 4,3 %
24.	I'm bored of all that talk about the environment after we have worked with it in class	203 11,9 %	260 15,3%	563 33,0 %	556 32,6 %	122 7,2 %
25.	When I realise who are for and against the solving of an environmental problem then I can better do some-thing to solve it	225 13,3 %	521 30,7%	348 20,5 %	221 13,9 %	383 22,6 %
26.	I can make no use of what I have learned in class to help the environ-ment	132 7,7 %	177 10,4%	588 34,4 %	706 41,3 %	105 6,1 %
27.	If a factory pollutes it does not do it on purpose	119 7,0 %	195 11,5%	488 28,8 %	698 41,1 %	197 11,6 %
28.	I don't think we shall use school hours in doing something concrete to the environmental problems	106 6,2 %	161 9,5 %	543 32,0 %	768 45,3 %	119 7,0 %
29.	When there are to be taken decisions about the environment then I have say in the matter	483 28,4 %	573 33,7%	286 16,8 %	186 10,9 %	171 10,1 %
30.	I don't like that people disagree in the solving of the environmental problems	507 29,8 %	587 34,5%	238 14,0 %	133 7,8 %	235 13,8 %
31.	I do more feel like dealing with en-vironmental questions because we have worked with it in class hours	356 20,9 %	515 30,2%	384 22,5 %	269 15,8 %	179 10,5 %

4

32.

Why can't people agree in using the water on this picture		
Answers	numbers	percent
No answer	302	17,6%
Answer	1299	75,6%
Don't know	117	6,8%
Conflict awareness (n=1125 corresponding to 86,6% of answers)		
The water is used to different things	17	1,3%
The water is used by different people (to different things)	276	21,2%
The water can't fulfil all claims at the same time in a good way	418	32,2%
The answer content word as 'interests, contrasts, conflicts, conflicts of interest or clash of interests in a acceptable way	128	9,9%
diffuse	286	22,0%
Types of conflicts		
Egoism	42	3,2%
Personal conflicts	9	0,7%
Interpersonal conflicts	134	10,3%
Structural conflicts	12	0,9%
Diffuse	7	0,5%

33.

When we in school work with environmental problems I think especially that we shall (just place **one** circle)

a. listen and hear about them in class	104	6,2 %
b. work with actual problems and with the class, the teacher and perhaps others try to participate in the solving of them	424	25,2 %
c. work in the class with how to solve an environmental problem - but leave the decision to the pupils whether they want to do something about it or not	372	22.1 %
d. examine how bad the environment are outside the school	782	46,5 %

5

34.

Place a circle round a or b, so that it's correct to you		
a. We have in the class tried to participate in the solving of an environmental problem	893	74,9 %
b. I have never together with my teacher and school friend tried to participate in the solving of an environmental problem	299	25,1 %

35.

Just if you have placed a circle round **a** right above you shall place a circle round a or b so that it's correct to you

a. I have taken part in deciding what we in class should do about the environmental problem	806	86,4 %
b. It has always been the teacher or the other pupils in class who have decided what to do in order to help the environment	127	13,6 %

36.

In what way can you best contribute in the solution of the environmental problems: (just put **2** crosses)

a. Get knowledge about the environmental problems	349	20,8 %
b. Be active in a club which work for the environment	352	21,0 %
c. Use environmental friendly products myself	809	48,3 %
d. Sort my own waste	425	25,4 %
e. Save electricity and water at home	774	46,2 %
f. Support organisations which want to conserve the environment	314	18,7 %
g. (if I was old enough) Vote political parties which are occupied with environmental questions	285	17,0 %

.

37.

The thing which has mattered most to me in MUVIN has been.....(continue the sentence yourself)

Answers		
No answer	357	21,2%
Answer	1298	75,4%
Don't know	59	3,4%
The contact to the local society (n= 493 (38,0% of all the answers))	92	7,1%
Good to leave the school area	46	3,5%
Good to meet other people	160	12,3%
Good to look at/experience nature/ firms	44	3,4%
Good to investigate environmental issues	1	0,1%
Something bad conc. the contact	167	12.7%
Diffuse		
Knowledge (n =364 (28,0 % of all the answers))		
Now knowing something new	295	22,7%
Not knowing anything new	8	0,6%
Diffuse	61	4,7%
Students confidence in their own influence (n=357 (25,7% of all answers))	258	19,9%
Been able to act	8	0,6%
The work in MUVIN projects don't have effect	93	7,2%
diffuse		
Experience/entertaining (n=116 (8,9% of all answers))		
Exiting/funny/interesting		
Boring	79	6,1%
Diffuse	34	2,6%
	6	0,5%
Student' influence (n=88 (6,8% of all answers))		
Influence is a good thing	24	1,8%
Good with independent work	61	4,7%
Diffuse	4	0,1%
The work form (n=79 (6,1% of all answers))		
Good with group work	19	1,5%
Good to work with projects	8	0,6%
Good to work together with all in the class	10	0,8%
An alternative to work with books	15	1,2%
Bad experiences conc. the work form	3	0,2%
Diffuse	26	2,0%
The relevance of MUVIN/the theme/the teaching (n=20 (1,5% of all answers)		
Relevant	11	0,8%
Not relevant	3	0,2%
Diffuse	6	0,5%

7

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Bagsidetekst

Students' development of action competence is a central goal for education in the Danish folkeskole and gymnasium (primary school and secondary school). This book 'Action competence, conflicting interests and environmental education' contributes to a deeper understanding of the concept of action competence and its practice through research in concrete school projects.

Environmental education discussed in the book is a form of 'a new generation of environmental education' that expands the relevance of environmental education to other teachers than science teachers. It is shown how many different approaches from different subject areas can work together to make environmental problems relevant and concrete for students and develop their ability to become influential in the future on the solution of one of our time's biggest challenges.

At the same time the work with environmental issues becomes an example about how education can be organized to support the students' understanding of complex societal issues. All kinds of issues in a community will involve conflicting interests. By investigating conflicting interests the students will have a potential for a deeper understanding of why environmental problems aren't disappearing by themselves – but demand democratic participation and responsibility.

The book is based on the largest effort to promote and develop the 'green aspects' of education as the Danish Ministry of Education is calling it. Around 100 schools, 300 teachers and many thousands of students have participated in this so-called MUVIN programme.

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