Sustainability in teacher training courses in a sample of German universities

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Keywords Sustainable development, Higher education, Germany

Abstract This paper presents the main results of a recently completed empirical research project that focused on the concept of a sustainable development dimension in the context of teacher training courses at universities in the state of Northrhine-Westphalia, Germany. In addition, some measures aimed at supporting the implementation and dissemination of the task of a sustainable development in higher education are suggested.

Introduction: the framework of the investigation and its goals
In February 2000 a research project focusing on the subject matter of sustainability in the context of teacher training at a sample of universities was completed at the University of Essen’s Centre for Environmental Education. Particular emphasis was given to teacher training courses which more or less could be subsumed under the principles and goals of Agenda 21. The area of teacher training is significant as, having in mind their role and their future activities in schools in mind, current students should be encouraged to investigate the field of sustainable development already during their initial training.

It is only by introducing training methods and activities that pay due attention to the principles of Agenda 21, that key qualifications necessary for future changes can be conveyed. The investigation, by means of a survey, was financially supported by the North Rhine-Westphalian Ministry of Schools, Education, Science and Research.

Methods
The empirical investigation had a structural stock-taking character. The collection of data concentrated on lectures. Research initiatives and the efforts of individual universities to implement an environmental management system (for example, by initiating and performing an “eco-audit”) were for practical reasons not taken into account in the investigation. The ultimate aim of the exercise was to find out if there are some university courses which are already concerned with themes related to sustainability, and if so, whether they have already been able to create a distinctive profile.

This paper was first presented at the International Cracow Copernicus Conference “Sustainable universities and environment in an integrating Europe” held in Cracow, Poland, July 2000.
The survey was also designed to indicate the factors that either promote or impede the implementation and dissemination of an education for sustainable development in teacher training courses. And, most important, positive examples of “good practice” implemented by individual lecturers which would reflect efforts to pursue sustainable development, were sought.

The research site was the state of Northrhine-Westphalia (Figure 1). This state, with almost 18 million inhabitants, is the most densely populated in Germany. In Northrhine-Westphalia, there are 13 universities providing teacher training in various subjects. Until the end of 1999, seven of these universities signed “The University Charter for Sustainable Development” prepared by the Association of European Universities (CRE Copernicus Secretariat, 1999, p. 12).

The study was based on two data collection approaches. In a first step, based on the winter semester 1998/99, the timetables of lectures which stated “sustainability” in the title and where the relevance to Agenda 21 was apparent, were considered. In cases where there was a doubt as to whether or not emphasis on sustainability was given, the short descriptions on these lectures (usually provided to potential students) were used. Furthermore, lectures that taught key qualifications relevant to sustainable development were included as well. This group includes topics such as orientation towards systems and problem solving, communication and values, participation and...
Innovative forms of teaching and learning (see Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung, 1998, p. 27).

In a second step, interviews with experts – a group of selected university lecturers – were conducted. These interviews concentrated on the themes of special courses, the forms of learning, the organisational/institutional framework, and on the factors that promote or hinder the implementation of an education for sustainable development dimension in teacher training courses at universities. The interviewed university teachers were also requested to comment on the degree of support they receive from their departments and/or university and political organisations.

Results

Courses with relevance/emphasis on sustainable development in various subjects/subject groups

In all the universities considered, lectures relevant to the survey could be identified. However, there were remarkable quantitative differences between both the universities and the various departments. Whereas some subjects could only offer one or two courses, others produced many more. Some titles of lectures of some subjects are listed in Table I, in order to illustrate the range of different contents and themes.

| Geography                                      | Analysis and evaluation of educational contributions to local Agenda 21 |
|                                               | Economic, ecological and social problems of developing countries |
|                                               | International environmental protection |
|                                               | Studies for school practice on the theme of practical environmental education |
| Social studies                                | Woman and the relationship between the sexes in the development of the south |
|                                               | Introduction to development policy |
|                                               | Globalization and the “Third World” |
|                                               | Sustainable Germany |
| Educational sciences                          | School on its way to a multicultural society |
| Psychology                                    | Intercultural projects at school |
| Technology                                    | Environmental psychology |
|                                               | Theories of labour and environmental protection: analysis, evaluation and design of socio-technological systems |
| Chemistry                                     | Environmental management – apparatus for chemistry |
|                                               | Keeping the air clean |
| Physics                                       | Energy and future |
| Biology                                       | From the sustainable use of campus eco-systems to the idea of a sustainable university management |
|                                               | Eco-system “wood” |

Source: Personal data, 2000
There is evidence of marked activity in some social and scientific subject areas. Geography, for example, is of special significance here, but also social and political sciences deal comparatively intensively with Agenda 21. In some faculties of geography, the value placed on sustainability was graded as “enormously high”; as a result of this grading, several teachers participate in the debate of Agenda 21 and offer theme-orientated lectures. Without any doubt, geography is one of the subjects where one can detect an initial implementation on sustainability-related themes. At the University of Duisburg, for example, two geography lecturers have assured that in future this topic will be even more extensively introduced into their lectures. Students are to be made familiar with the idea of sustainable development and encouraged to participate in the environment and social shaping of their world. Thus, existing contacts to schools and an external teaching centre are to be extended and the connection to some suburbs of the town where the university is based, is to be intensified.

In several other subjects tendencies towards Agenda 21-related activities are also discernible. Among others, biology, educational sciences, economics, and psychology. However, in comparison with the subjects previous mentioned, these have less outstanding internal cooperation and the number of university teachers engaged in each institute with Agenda 21-relevant aspects, is lower.

Considerable deficits have been identified in the following subjects or subject areas: languages, the fine arts, music, mathematics, information technology, sports, philosophy, history and chemistry, as well as some professional groupings, for example printing and design technology or production technology.

The data gathered does not allow the evaluation of every single course which makes a contribution to sustainable development, nor the definition of marginal contributions which merely continue existing approaches to environmental education. In order to do this, detailed examination of concrete lessons would be necessary. At the same time, the expert interviews as well as the comments used to describe the contents of many lectures reveal that some teacher training courses only pick out one special aspect of sustainability as a central theme. As far as the educational sciences are concerned, it is often the social dimension as for example questions of an intercultural education, which are considered; in biology, ecology themes are the ones dealt with more intensively. With regard to technologically-oriented subjects, the subject contents can often be identified as a reaction to ecological problems and attitudes. An example are environmental technologies designed to minimise certain harmful elements in the atmosphere. In total, a remarkable amount of the courses offered do not fully consider the demands of an integrative thinking, nor the ecological, economic and social aspects of Agenda 21. The contributions considered enable a rough profile to be built of the approximate range of links – seen from the aspect of content – for training for sustainable development and, simultaneously, sketch the field that future efforts could work into.
There are examples of “good practice” in some places. This includes the efforts of university teachers and subjects that are characterized by a high degree of applicability, which are set up as an example, both within and outside their departments, that inspire other teachers’ work and which – last but not least – encourage people to get involved in training and learning processes related to sustainable development.

Having said this, it is not the aim of the study to consider individual approaches in particular subjects, but to present possibilities that can be used to implement new forms of learning and teaching. The identified examples of “good practice” are characterized by the following didactic principles:

- **Interdisciplinarity.** There are lectures offered which are directed towards the goal of interdisciplinary cooperation which promote the idea and practice of inter-subject and inter-departmental co-operation. Thus, a significant contribution can be made to the building up of an interlocked system of thought. Such a system tries to understand the complex connections and inter-reactions of single phenomena in the total dynamics of a system.

- **Global learning.** This didactic premise is fulfilled by courses which couple local environmental experience and individual problems and problem solutions with possible results in global development. In the subject geography, for example, this can be achieved by the linking of local themes with world themes. The aim here is the training of a readiness to global partnership and international and intercultural cooperation.

- **Connecting education at the university level with schools and communities.** Our data indicates that there are efforts at some universities to link tertiary training to the future professional field of the school. At the University of Duisburg and the University of Bochum, for example, individual departments are actively involved in local agenda processes. In other institutes, individual departments cooperate with schools. In this way, students are made familiar with work in the schools and innovative forms of learning (e.g. projects, work in areas outside the school, learning in a network) in a practical and active way.

- **Development of reflexive, communicative competence.** This criterion focuses explicitly on forward-looking forms of teaching and learning. The interesting question hereby is how students, step by step, can be introduced to forms of participation, to independent and self-organised learning processes, to the development of initiative and responsibility, to critical learning and dialogue. Ultimately, the principle of social self-organisation is evaluated highly within the concept of sustainable development.
**Personal engagement**

The interviews with selected university lecturers indicate clearly that, in many cases, the discussion and integration of Agenda 21-related themes depend on individual convictions. Thereby, the individual interest and engagement of the responsible university lecturers is shown to be a dominant factor in the organisation of the corresponding courses offered. Such personalities were described by the university lecturers questioned as "pioneers" or "loners". The problem of the actual, often intense, but nevertheless isolated engagement of many individual persons was aptly described by one of the university lecturers interviewed: "When these people retire, the whole matter dies. There is nobody to take their places".

The interest and the efforts of individual persons are often impeded by considerable constraints, as, for example, an inadequate or completely missing support from the institution concerned (e.g. university administration) or from colleagues. Thus, many of the university lecturers interviewed expressed the wish to be more recognized within both their own departments and the university in general. A representative from the department of biology of one of the sampled universities stated that in his field, there was no emphasis on Agenda 21 themes, since the scientific tradition there confines ecology to abiotic and biotic factors only. Most of his colleagues did not deal with socially relevant factors, or, if so, to a very small extent.

**Inter-subject co-operation**

In the discourse on sustainable development, inter-subject relationships were revealed as a decisive and essential requirement. An example is the German environmental report by the Council of Environmental Experts (Der Rat von Sachverständigen für Umweltfragen, 1994), where the network principle was emphasized as the central principle of innovative educational processes.

In the context of the data gathered in the present study, there is only a small number of interdisciplinary-oriented lectures. During the research period, only two lectures[1] with contributions by seven (!) subjects, two lectures with contributions by three subjects, and seven lectures with two contributing subjects could be detected. When, at the same time, one of the persons taking part in the conversation remarks that "interdisciplinary co-operation is the most interesting thing (offered) at university level", the result undoubtedly demonstrates that interdisciplinary techniques are not taught in a sufficient way. Thus, it is clear that the concept of interdisciplinary co-operation and participation, not only in the context of sustainable development, but also from the perspective of general trends and expectations (see, among other sources, Fraunhofer Institut für Systemtechnik und Innovationsforschung, 1998), will not work out.

The university lecturers interviewed gave various explanations for cases where interdisciplinary co-operation was either insufficiently developed or missing completely. As far as formalistic terms are concerned, there is difficulty with the evaluation of seminar assignments. Moreover, political...
tendencies to shorten the total time of university studies – as being currently debated in Germany – may cause a reduction in the volume of matter to be studied. Finally, interdisciplinary courses can make it more difficult to calculate the appropriate teaching times of the lecturers as they have to be demonstrated to the administration of their universities.

Impeding factors to inter-subject and interdisciplinary co-operation are also to be found on the subject levels. Symptomatically, a university lecturer stated that a pre-requisite of interdisciplinary co-operation is “the readiness to accept certain things in a somewhat more superficial way”, or that you can have interdisciplinary co-operation only at the price of “scientific precision” as another one declared. Such statements imply that it is not scholarly thoroughness that is requested in interdisciplinary co-operation, but the knowledge of interrelations. This, however, is in massive conflict with the interests of every department to “give (students) a solid basis of knowledge”.

In generalizing the statements concerning the obstacles towards interdisciplinary action, certain concepts of scientific orientation become apparent. Subject-related teaching concepts tend to prevail. Institutes of higher education are still characterized by individual departments and subject-bound institutions, as well as by specific scientific and pedagogical teaching and learning processes. Study guidelines and syllabuses of individual subjects are focused on subject-centred contents and reveal the absolute lack of interdisciplinary connections thus reflecting the determination to include all but the “long-established” knowledge into the courses and to instruct students in this tradition. But as long as “knowledge-oriented” is referred to only as “subject-orientated knowledge”, tertiary education will fail in coping with sustainable development (de Haan and Harenberg, 1999, p. 52).

Further impeding factors to inter-subject and interdisciplinary co-operation are to be found on the level of attitudes. Here, many of those interviewed plainly said that there is little general readiness to accept other worlds of thought and the ideas of other subject areas. Scepticism and fear of contact were also given as reasons for the lack of interdisciplinary exchange. The necessity for the development of a new understanding of language was repeatedly mentioned. One university lecturer said that colleagues of different subjects/disciplines “speak completely different languages” and that they “are normally not aware of this”. Thus it is necessary first to find a new common language in order then to work out a theme in an interdisciplinary way. For another person questioned, the problem of the lack of co-operation lies with the fact that “... we have absolutely no tradition of university cooperation. We are strongly differentiated, even within our own subjects”.

The attitudes recorded in the study indicate the existence of specific scientific cultures with different realms of thought. These are manifested by different forms of expressing, conveying and developing research topics as well as by an unbelievably high specialization within the different subjects. There are still a few bridges connecting the separated disciplines that, more likely, are still hermetically sealed off. In order to remove the existing barriers, a
“pre-scientific confrontation area” seems to be necessary to reduce fear of contact or to enable first contacts. In this context, the anonymity of large universities seems to be a negative factor as it forces scientists to restrict themselves to their own immediate research and teaching areas. In contrast, the position of smaller, more easily manageable institutes seems to be more advantageous. But in any case, an essential prerequisite for the success of interdisciplinary projects is “that there is someone who feels responsible”.

And what is more is that university lecturers are often not adequately qualified. On the one hand, a number of the interviewed lecturers made quite it clear that particularly long-used teaching habits can only be reduced or modified slowly, step by step. To be ready to experiment with new methods and thus to risk losing firm ground is not a matter of course for many scholars. In general, it may be stated that the retention of traditional teaching methods corresponds to a lack of readiness to accept interdisciplinary cooperation and participation. On the other hand, the regular modes of a successful career may impede participatory and interdisciplinary methods of working; for example, dissertations are written individually. One university lecturer remarked that the theme of sustainability has no “academic home”. Another person summarized the individual experience as follows: “As far as one’s career is concerned, it is the worst possible field that one could choose”. Thus sustainability is, up to now, a topic only for scholars who have already made their careers.

Conclusions
The facts presented clearly show that at some Northrhine-Westphalian universities there are interesting courses and engaged lecturers contributing remarkably to the implementation and dissemination of sustainable development perspectives in teacher training. At the same time, there is a clear need to expand and complete syllabuses, methods and teaching staff. But the interviews with experts at many institutes indicated that relevant efforts and processes are, at least partly, being impeded.

As an indispensable starting point for training processes in the context of a sustainable development, is the need for efforts to simplify and unify the contribution of relevant courses. This is the only way to ensure that interdisciplinary cooperation and inter-subject and inter-departmental forms of studies are rated more positively. On the other hand, it seems to be necessary to make sustainability themes compulsory in examinations. However, this ensues the reduction of other compulsory topics in order to use the time at their disposal for interdisciplinary forms of work. In general, the aim should be to include the “environment and its development” as an interdisciplinary area in the syllabuses of those subjects which are closely related to the debate on sustainability. These are not exclusively subjects with an affinity to nature or technology, but also subjects with a cultural, social, political and economic direction.
Many of the interviewed considered that “a gentle nudge . . . would do no damage”. The phrase “exercise of authority” was also used in a metaphorical sense. Corresponding remarks indicate unmistakably that the agenda theme should be declared as compulsory to teacher training by the Ministry and University Administrations. Innovative processes and changes cannot be expected only to be grassrooted.

Among other factors, this calls for a purposeful encouragement of the new generation of scholars. Therefore, measures must be taken to provide professional horizons for young people – horizons which to date have been lacking. One area where this can be done profitably is in new appointments: here the job description must clearly consider sustainable development.

The efforts of single working groups and/or subject groups must, in addition, receive financial support. This can be used as motivation if it is used in the form of purposeful development programmes. Compulsory participation and interdisciplinary co-operation should here always be a central criterion for evaluation and grants, but it also demands a new, radically changed concept of university organisation to include terms like “network”, “co-operation” and “independent and self-directing groups”.

The present study strongly indicates that a lack of interdisciplinary co-operation is a hindrance to a speedy and optimal treatment of the theme of a sustainable development in university studies. To this degree it is indispensable that measures be taken to loosen up inflexible structures and well-worn teaching methods and to demand that efforts be made towards training in modern, innovative forms of teaching and learning. This is all the more important in that current specialist-orientated – and not problem-orientated – forms of today’s university education widely, if not systematically, impede the acquisition of competent professionals to research and work out questions related to sustainability.

Another suitable starting point could be the establishment of either inner-university coordination centres or of one or more centres for sustainable development. Such facilities should be affiliated to either the Dean or the Rector/Vice-Chancellor. In addition to providing purposeful information, their task should be to initiate and co-ordinate inter-faculty co-operation and projects. Beyond this, special didactic courses for student teachers should be developed and conducted. Up to now, such didactic courses are often unjustly dismissed as being of little value.

Co-operation between neighbouring universities is also a matter worth considering. In order to “overcome provincial isolation”, joint ventures in the form of a flexible employment of university lecturers to optimize courses seems to be sensible. Likewise, students could be encouraged to visit courses at neighbouring universities.

Note
1. Note from the editor: the author refers here to courses (also called lectures) on which knowledge is drawn from different subjects.
References
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