

**PROFESSIONAL DEVELOPMENT FOR EDUCATION FOR SUSTAINABLE
DEVELOPMENT: THE CASE OF THE UNIVERSITY IN-SERVICE COURSE "EDUCATION
FOR SUSTAINABLE DEVELOPMENT – INNOVATIONS IN SCHOOL AND TEACHER
EDUCATION (BINE)"**

DESENVOLVIMENTO PROFISSIONAL PARA A EDUCAÇÃO PARA O DESENVOLVIMENTO SUSTENTÁVEL:
O CASO DO CURSO UNIVERSITÁRIO EM SERVIÇO "EDUCAÇÃO PARA O DESENVOLVIMENTO
SUSTENTÁVEL - INOVAÇÕES NA EDUCAÇÃO ESCOLAR E NA FORMAÇÃO DE PROFESSORES (BINE)"
DESARROLLO PROFESIONAL DE LA EDUCACIÓN PARA EL DESARROLLO SOSTENIBLE: EL CASO DEL
CURSO UNIVERSITARIO EN SERVICIO "EDUCACIÓN PARA EL DESARROLLO SOSTENIBLE -
INNOVACIONES EN LA ESCUELA Y LA FORMACIÓN DEL PROFESORADO (BINE)"

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ABSTRACT | The interdisciplinary nature as well as the present and future relevance of the sustainability debate, including climate change with all its inherent dilemmas and uncertainties, may constitute a fertile ground for educational innovation. The goal of BINE is to encourage participants to deal as a community of learners with information on sustainable development (SD) and education for sustainable development (ESD). An important element of the course is the systematic reflection of innovation in one's own practice in the context of an action research study. The overall results of the evaluation of the course have shown that the BINE course offers an adequate instructional and learning strategy for the participants to construct the meaning of the complex issues of SD and ESD by researching, reflecting and exchanging in learning groups focused on concrete examples.

KEYWORDS: Education for Sustainable Development, Professional Development of Teachers, Action Research.

RESUMO | A natureza interdisciplinar, bem como a relevância presente e futura do debate sobre sustentabilidade, incluindo as mudanças climáticas com todos os seus dilemas e incertezas inerentes, podem constituir um terreno fértil para a inovação educacional. O objetivo do BINE é encorajar os participantes a lidar como uma comunidade de aprendizes com informações sobre desenvolvimento sustentável (DS) e educação para o desenvolvimento sustentável (ESD). Um elemento importante do curso é a reflexão sistemática da inovação na própria prática no contexto de um estudo de investigação-ação. Os resultados gerais da avaliação do curso mostraram que o curso BINE oferece uma estratégia instrucional e de aprendizagem adequada para que os participantes construam o significado das questões complexas de SD e EDS por meio da investigação, reflexão e troca em grupos de aprendizagem focados em exemplos concretos.

PALAVRAS-CHAVE: Educação para o Desenvolvimento Sustentável, Desenvolvimento Profissional de Professores, Investigação-Ação.

RESUMEN | El carácter La naturaleza interdisciplinaria, así como la relevancia presente y futura del debate sobre la sostenibilidad, incluido el cambio climático con todos sus dilemas e incertidumbres inherentes, pueden constituir un terreno fértil para la innovación educativa. El objetivo de BINE es alentar a los participantes a tratar como una comunidad de estudiantes con información sobre desarrollo sostenible (DS) y educación para el desarrollo sostenible (EDS). Un elemento importante del curso es el reflejo sistemático de la innovación en la propia práctica en el contexto de un estudio de investigación acción. Los resultados generales de la evaluación del curso han demostrado que el curso BINE ofrece una estrategia de instrucción y aprendizaje adecuada para que los participantes construyan el significado de los temas complejos de DS y EDS mediante la investigación, la reflexión y el intercambio en grupos de aprendizaje centrados en ejemplos concretos.

PALABRAS CLAVE: Educación para el Desarrollo Sostenible, Desarrollo Profesional Docente, Investigación Acción.

1. SUSTAINABLE DEVELOPMENT

As Irina Bokova, former Director-General of UNESCO said “There is no more powerful transformative force than education – to promote human rights and dignity, to eradicate poverty and deepen sustainability, to build a better future for all, founded on equal rights and social justice, respect for cultural diversity, international solidarity and shared responsibility, all of which are fundamental aspects of our common humanity” (UNESCO, 2015).

A sustainable society will only be achieved through a social process of searching, learning and shaping. It is critical to organise this process in a way that allows different conceptions and interests to be contributed in a constructive manner.

The phenomenon of climate change is full of uncertainties in terms of adequate actions and relevant societal developments. In the climate-change debate, “resilience” and “adaptability” are discussed as characteristics of systems and their ability to deal with uncertainties. On the other hand, resilience is also a psychological and pedagogical concept which describes the ability to deal with, adapt to, and critically reflect upon uncertain situations (Berkes & Turner 2006; Nelson 2011). Therefore, one goal of educational processes dealing with climate change is to support people in becoming more resilient so that they can handle uncertain situations in a productive way (Tauritz, 2016, 2019) argues for a pedagogy for uncertain times which includes resilience as a central concept.

Like human rights, sustainable development may be regarded as a “regulative idea”, which inspires social learning and shaping processes. The notion of a regulative idea is derived from the German philosopher Immanuel Kant and may be understood as an epistemological construct. Kant (1787, 1956, p.123) writes: “In this way, the idea is nothing but a heuristic and non-ostensive notion and indicates not how an object is constructed, but how we, guided by it can explore how the objects of our experience are made up and linked to one another”¹. Regulative ideas thus help us to organise our knowledge and to link it systematically with normative elements. Regulative ideas can also be understood as “pre-concepts” (Dewey, 2011; Schütz, 2013) without which no reasonable question can be asked, and no problem identified. Therefore, uncertainty is a constituent element of this regulative idea and allows us to reach consensus in an ongoing process of negotiations (Berger & Luckmann, 2005). In terms of sustainability, this implies that the contradictions, moral dilemmas and conflicting targets inherent in a “regulative idea” need to be constantly re-negotiated in a process of discourse between participants in each and every concrete situation.

The interdisciplinary nature as well as the present and future relevance of the sustainability debate - with all its inherent dilemmas, uncertainties and confusions - may constitute fertile ground for educational innovation. It is of utmost importance to address the challenge of the vast complexity which results from sustainability issues and its related uncertainties, to retain a capacity for action, without lapsing into simplistic dogmas. While, on the one hand, sustainability issues are used as a vehicle for emancipatory education (Hentig, 1985), they are also meant to trigger concrete sustainable social development processes. This implies a great challenge but also has considerable potential to enhance education for sustainable development (Rauch, 2018).

¹ The German quote was translated by the authors of this article.

Sustainable development education means treating questions in concrete fields of action (like climate change) regarding how the future can be organised in a sustainable way. This includes detailed observation, analysis, assessment and organisation of a concrete situation in terms of creative and cooperative processes. Reflected action competences – and not blind action or unreflected patterns of action – is a main objective of learning (Aebli, 1980). Ecological, social, economic and political dimensions can be starting points (Rauch, 2016). A crucial prerequisite for the development of instruction and schools in the sense mentioned above is a teacher training which allows for these principles. For this aim, the course BINE was initiated.

2. ACTION RESEARCH AS RESEARCH-BASED PROFESSIONAL DEVELOPMENT

Competent, professional action in complex situations requires concomitant learning and reflection processes as a *sine qua non* (Bourdieu, 1979). Inversely, professional learning requires the experience of acting in complex practical situations. From this angle, professional action and professional learning coincide in one stream of action. While the emphasis of specific actions may be graduated, they are not different actions per se. As professional learning happens in practical situations, which in turn is seen to require reflection and further development, knowledge and skill development go hand in hand with practical situational development (Dewey, 2011). Another major concern, therefore, is strengthening professional self-awareness among participants, e.g., through a better understanding of their own strengths and development potentials. Such processes take place within a community of practice which is characterised, above all, by the cooperation of its members in developing knowledge, practice and identity (Wenger, 1999) through exchange, critical debate, and negotiation. If research in the context of practice is a core feature of professional competence, then professional in-service training must be built on this ability and contribute to its further development (Feldmann, Altrichter, Posch & Somekh, 2018).

Action research is to empower teachers and teacher groups to cope with the daily problems of classroom work by themselves, to carry out and assess innovations, e.g. to further develop their professional practice on a long-term basis. This is the primary aim which was captured in a succinct definition by John Elliott (1991, p.12) who stated that “action research is the study of a social situation with a view to improving the quality of the action within it”. It aims to feed practical judgement into concrete situations, and the validity of the 'theories' or hypotheses depends not so much on 'scientific' tests of truth as on their usefulness in helping people to act more intelligently and skillfully (Dewey, 2011; Peirce, Apel & Wartenberg, 1991). In action-research, 'theories' are not validated independently and then applied in practice. They are validated through practice. Moreover, it is designed as in-service training for practitioners to further develop their practical theories and their action competence by reflection and action on practice-related issues. Action research has a twofold aim: understanding (as a result of reflection) and development (as a result of action). Experience so far has shown that teachers can engage in action research and may achieve remarkable results. Ultimately, action research is designed to expand the collective knowledge of the profession (Berger & Luckmann, 2005) by formulating individual practice theories and proposing these as hypotheses requiring verification for debate among the peer group and, in a wider sense, to contribute to the further development of education research.

Quality criteria for the research process are not always easy to enforce. Often, the requirements as to data volume and analytical accuracy (required methodological input) for

written products are more exacting than teachers consider necessary for their practice decisions (e.g., subjective assessment of the experience of an action option). Moreover, the experience derived from a research process is deemed to foment an investigative, experimental attitude towards one's own professional practice, beyond the organisation of data and the writing process as tools for systematic reflection on a topic.

The debate, whether this descriptive and analytical activity of teachers qualifies as 'research', has been controversial (Altrichter, 1990). Given the impossibility of drawing a sharp line between scientific and common-sense analysis, the course leaders have adopted a pragmatic stance. The more systematic (e.g., the more based on already existing theoretical and methodological knowledge), self-critical (e.g., the more cautiously judgements are made and the more deviating data and interpretations are considered) and communicative (e.g., the more geared towards disclosing the process and the findings) the analysis, the more it deserves to be called research. In general, however, all results derived from the process of analysis remain provisional, 'hypothetical', and require further investigation by reflection and practical testing as an iterative circle of action research (Feldmann et al., 2018).

3. EDUCATION FOR SUSTAINABLE DEVELOPMENT MEETS ACTION RESEARCH

The authors assume that an educational concept such as Education for Sustainable Development corresponds strongly with the principles of action research. Both concepts define a reflexive shaping of society as a target perspective. Areas where action research has been applied since the 1970s contain participatory approaches to regional and rural development projects (Oehring, 1985). The idea of capacity building in cooperative processes draws on principles of action research, containing a connection of theory and practice, democratic relationships between planners, researchers and local experts and the strengthening of endogenous potentials (Hull 1982; Pretty 1998; Gagel 1994). Knowledge, development and empowerment are three central categories to which both action research and education for sustainable development refer. The central reference category in action research and education for sustainable development can be seen in a concept of learning that unfolds in an autonomous, networked and research reflective confrontation with the world. Learners explore and reflect on their own goals, points of view and strategies for action and are enabled to shape their own living environment in a self-confident and participatory way. Theory and practice are seen as interwoven and interrelated (Radits, Rauch, Soukup-Altrichter & Steiner, 2015).

4. THE BINE COURSE

4.1. History and concept of the BINE course

With the background of studies on the importance of school-based teacher education in the 1970s (Berman, Mc Laughlin, Bass-Golod, Pauly & Zellmann, 1978), a two-year course was developed at the University of Klagenfurt in the early 1980s for teachers of secondary academic schools (pedagogy and subject didactics for teachers - PFL).

The PFL programme anchored action research at the University of Klagenfurt (Altrichter, 1990) and slowly introduced it as a methodological core to the courses in the PFL program. The BINE course builds on the PFL program as well as on the research project UMILE - Environmental

Education in Teacher Education 1997-2000 (Posch, Rauch & Kreis, 2000; Steiner, 2005; Radits, Rauch, Soukup-Altrichter & Steiner, 2015), which was continued a few years later as the UMILE network. The BINE course has in turn developed from the UMILE network, which attempts to combine innovations in teacher education with research.

The BINE course takes up social change processes (globalization, mechanization, rationalization, flexibilization, etc.) and discusses their impact on the organization and design of learning and educational processes. Course participants acquire the know-how to deal with these social challenges, to understand the processes of change, to reflect on them and to integrate them into their daily pedagogical work or to anchor sustainable education in their training and further education concepts.

The ESD course is attended by teachers and teacher educators from primary to secondary level. The reasons for participation are both the interest in qualifying in the field of ESD and in the field of empirical research connected to practice. For some participants, the possibility that BINE offers the participation at a course with a Master's degree is also important.

The course (36 ECTS) is an in-service training for teachers in the form of seminars and working groups comprising five three-to four-day seminars, a seminar on research methods, a writing workshop and five workshops in 'regional groups'. The courses are held as blocks in different places in Austria. In the seminars, the contents are conveyed through presentations and inputs by the seminar leaders or by guest speakers (designated experts from educational, political, social and economic sciences) and then treated and deepened in group work, exercises and workshops. Working groups preferentially serve the exchange of experiences, the work on literature and the support of research work. They are organised as regional working-groups and lead by a member of the leadership team of BINE. In the action research project, the participants develop and investigate a project from their own practice according to the paradigm of action research. The work is supervised by a member of the leadership team.

The concept underlying the BINE course comprises (in line with the general characteristics of the PFL courses) some special characteristics (Rauch & Wallner, 2019; see table 1):

Table 1 - Characteristics of the BINE Course

Manageable size	The course is open to up to 30 teachers.
Long-term format	The course lasts for two years.
The professional institutions of the participants are the locations of learning	Besides more distanced settings as offered by seminars and regional groups, the time in between seminars, i.e., individual teaching practice as a location of learning, is explicitly integrated into the course concept.
Professional challenges as starting point	Current professional challenges connected to education for sustainable development as perceived by the participants are starting points for continuous development work. Practitioners select an issue from their own practice which they consider relevant for their work.
Research and development	It is the participants' core task to design a development project for their own teaching work. They plan, prepare and implement this project in the time between the seminars, scientifically monitor it under peer guidance by the regional groups and process the resultant findings into a case study. The participants acquire methodological and subject-specific know-how from contributions of the members of the course team, from experts who are invited to give input on specific (also subject-didactic) issues through relevant exercises (e.g., data collection and analysis).
Peer workshops	The participating teacher-researchers are encouraged to share the experiences derived from their development projects with their peers in the form of a mini-workshop and to present their findings to fellow participants at the seminars.
Support structure and development of a professional community	Through the seminars and regional groups, the action research carried out by individual teachers is embedded in a support structure. This structure provides scope for discussions on subject-related and methodological research problems, for critical feedback and support. The partners in the support process are researching teacher colleagues ('peer supervision') as well as members of the leading team who support the research process as 'critical friends'.

Based on the concept of the course two core questions might be formulated as follows:

- How can a suitable balance in the course design be found between participatory and self-determined work of the participants on the topics of ESD and yet a sufficient degree of uncertainty and thus a questioning of previous practice be achieved through the confrontation with the wealth of topics, concepts and methods of ESD?
- How can action research support learning between challenging, reflection and action?

4.2. Examples of action research studies by participants of the BINE course

The participants are supported by the course team in the planning and implementation of the action research project. An essential resource also comes from the participants themselves who take on the function of "critical friends" in several feedback loops and thus further develop their project with collegial support. The research process is documented in an action research study. The course and studies of the participants have been published several times (Steiner, Rauch & Felbinger, 2010; Rauch, Steiner & Radits, 2010; Rauch & Steiner, 2015; Radits, Rauch, Soukup-Altrichter & Steiner, 2015; Radits, 2019). Short summaries of three examples of action research studies produced in the latest course illustrate the range of topics investigated by participants.

One participant introduced a project on awareness-building for regional food production that she elaborated together with teachers and pupils from a school in Valle del Guarco, Costa Rica. Drawing upon the theory of inquiry-based learning (Dewey, 1938; Kolb, 2015), the author shaped a learning environment based upon the mapping of regional food producers and their products. This setting formed the groundwork for the question, which transformations in the knowledge on regional food production could be observed with pupils due to mapping activities. The author raised the question if evidence for a change in the participants' behavior regarding alimentary habits could be observed too. These questions were investigated through questionnaires, group interviews and observations before, during and after the project. Results indicated an increased knowledge on production and processing of regional food, as well as improved awareness of the importance of regional food production for the social, economic, ecological and cultural dimensions of sustainable development. However, concerning the pupils' nutrition habits, no considerable changes could be detected. From these findings the author draws the conclusion that changes in habits require long-term involvement in a topic and strong intrinsic motivation. Apart from that, the methodology of self-organised, experience-based research stands out as an example for encouraging and supporting young people in developing their individual power of judgement (Villarreal, 2018).

Another study examined the state of the art of Education for Sustainable Development at Austrian Technical Colleges (Secondary Upper Schools). It outlined the everyday understanding of sustainable development among teachers and students and the gap between international goals and findings and the assessment of the situation at Technical Colleges in Austria. With qualitative and quantitative methods (interviews and questionnaires), the author investigated what teachers and students perceive as the most promising way to implement ESD at Technical Colleges. The results of the study offer concrete measures and necessary structural developments to be able to gain a new perspective on education in the context of the grand challenges (e.g.,

climate change). The author discusses the potential and constraints of different models to implement ESD in the curriculum like single subjects and cross-curricular conceptions. This includes new roles and tasks for the responsible educational authorities, school management, teams of teachers, students, school networks, universities and colleges. A working group lead by the author of the study was established at the Austrian Ministry of Education to discuss these issues and develop a concept to implement ESD at Technical Colleges (Postner, 2019).

The third example refers to a pre-service primary teacher training course on ESD at a University for Teacher Education (Hesse, 2018). Starting from a review of literature on educational objectives regarding ESD in primary schools, the author designed a course concept, which integrates topics, didactic strategies and methodologies in the field of ESD. The course's goals are the elaboration of learning materials and learning settings by the students. The action research focused on self-regulated learning processes and open learning-designs. Therefore, the author as a teacher educator experiments with instruments and tools supporting self-assessment in steering individual work and learning processes. Results underline the assumption that uncertainties with self-regulated and open-ended learning processes not only can be handled better by learners, but also stimulate reflection on individual learning processes due to the provided instruments. Within a broader context, the presented learning design introduces students to an action-research-based approach to teaching, linking project-based learning with systematic reflection of the learning processes. Hence, the project addresses core competences in teachers' training dealing with issues of sustainable development.

5. ACCOMPANYING EVALUATION OF THE BINE COURSE

All five BINE courses conducted so far have been evaluated (internal seminar evaluation and external course evaluation). The internal evaluation was partly formative. The results of the questionnaires and oral feedback after every seminar contributed to the development and redesigning of the subsequent seminars, so the course was and is in constant development and adaptation according to specific interests and needs of the participants. Even during the individual seminars, the leading team gathered feedback from participants to amend the design of the course. The external evaluation at the end of the complete course of study was carried out by researchers from the University of Klagenfurt (Wallner, 2014, 2018).

For the latest course (2016-2018), 11 people were interviewed in total, which means that 50% of the participants of this course were covered. Nine women and two men took part in the interviews. Contact with the course participants was established through the regional group leaders. The people involved volunteered for the interviews which were conducted between June and July 2018. All interviews were recorded electronically and lasted between 35 and 70 minutes. The interviews were structured by a question guideline, which included three groups of questions: (1) questions on the course concept, (2) on learning outcomes and (3) recommendations for further development of the course. The interviews were transcribed literally. The evaluation was carried out descriptively according to category-led content analytical criteria (Mayring, 2015). The quotations follow a letter and number code.

5.1 Selected findings

In the following section, selected findings on the learning processes of the participants in the areas of ESD, Action Research and the structure of the BINE course will be presented.

5.1.1 Education for Sustainable Development

With respect to ESD, the heterogeneity of the participants is also reflected in the learning experiences with ESD in the course. Participants, who came to the course with little previous experience, were surprised by the complexity of the topic. For some participants, this complexity conflicts with the desire for a clear definition or “a solution”: “On the one hand, it was often confusing because you thought there was simply no solution...” (G11), or “...so I think that the term ESD is still very abstract...only a few pick it up. Education for sustainable development is also difficult to explain, and for me there is now a lot of content and somewhere there is a big sack with a lot inside” (G11).

For one participant, the background knowledge imparted helped to develop an appropriate attitude: “...and it is just an attitude. You have a basic feeling about it, but what is behind it is then more difficult to explain, but it has become clearer to me in any case. I like these principles like value-orientation, participatory, critically reflective, topics that simply concern our future in relation to the Sustainable Goals” (G11).

The process-orientation of ESD was also mentioned: “I think basically the whole thing is a process, because you never achieve sustainability as a status once” (E15). Another participant believes that ESD through environmental issues falls too short. One should look more closely at societal, economic, and social framework conditions: “I consider the question of economy and the critical approaches and perspectives to be a key area if you deal with these issues” (E16). It is important, “...if I want to solve the ecological problems, it would be important to me to recognize the global economic framework. How is it with our debt investment model? What kind of dynamics arise from it? What does work mean, what does participation mean? What does nutritional justice or distributional justice mean?” (E16). Another participant argues in the same direction. Using the example of the topic of oil, which was addressed in the input on economy in the last seminar of the course, she stated that she would have liked the three pillars - ecology, economy, social issues - to interact and to clarify more clearly: “What is the impact on the social level if we assume that oil, an economic resource, is becoming scarce. What can it do? What effects does it have at the environmental level? How do the three pillars interact with one another?” (E14).

5.1.2 Benefits of Action Research

The evaluation data provide indications that participants are acquiring know-how for the systematic reflection of their own practice combined with knowledge on how this can be improved. A quote from the interviews: “That's what I took away from the ESD course ... that a research project that is too big will never be finished ... [and] that I am able to handle a research project independently, to know which step to take ... Knowing how to approach things, the beginning is always the most difficult thing (laughs). ... The leading team also really made me want to do research and enjoy it and have fun doing it.” (E16)

A graduate of the BINE (Unterthiner 2015) course vividly summarizes his experiences with action research in the course in a personal reflection. He provides information on the

opportunities for participation and includes a critical view of the past research process in addition to the presentation of the insights gained in the sense of cyclical work. The cyclic character not only links theory and practice, but also provides further learning, action and development. The participant wrote in his study:

“In retrospect, action research was very enriching. In particular, the ongoing keeping of a research diary, in which pupil statements and important observations were regularly noted and recorded, made valuable contributions to my thesis. The written feedback was important in order to record the current status quickly and easily [...]The interviews conducted were also very valuable, and the data obtained from the pupils' statements gave a clear picture of their understanding. The personal conversation via short interviews with my students on their involvement in the discussion of the subject matter especially was very valuable to me. The results of this action research will be passed on to the headmaster after the final thesis has been submitted. I hope that some of the findings will be taken into account for sustainable teaching and learning at our school. For me personally, the results of this action research are very important as I would like to incorporate elements of them into my lessons in the future. My action research also clearly shows that sustainable teaching and learning can only take place by involving pupils so that so-called "bulimia learning" can and will finally be a thing of the past” (Unterthiner 2015, p.13)

5.1.3 Challenges of Action Research

The methodology of action research was largely unknown to many participants. Most of the participants also had little experience with scientific inquiry. However, inquiry is increasingly demanded as a competence in the profession of the participants. As a special experience, one participant stated that she had learned with her own research project how "action research feels" (E14) and the joy to have successfully mastered the research process, even if it was sometimes difficult. Scientific inquiry is a challenge for many participants. As one participant stated: "Research takes time and even regressions are allowed. Research questions and goals and hypotheses can also be overturned and...that not everything is already carved in stone" (E14). It was important to experience "that one can also fail..." (G12). From these statements it becomes clear that the participants perceive themselves as researchers, and that they are on the one hand proud and on the other hand relieved that they can also fulfil this role. "Ultimately, the experience of being able to research successfully strengthens the self- confidence" (G14).

5.1.4 Supporting Structures

From the participants' point of view, the research process was supported not only by the supervision of the course team but also by the regional groups, which were characterized by mutual trust and great openness. Being integrated into a group / community, the participants experienced a new quality in work processes. "I had the feeling of finding like-minded people who are not always there as a matter of course in my environment" (H12). The participants also emphasized the respectful interaction. They perceived positively that "actually all speakers and lecturers show interest to support us and their e-mail addresses have always been given to us, and we actually have the possibility ... to use their knowledge" (G15).

Being integrated into a community and appreciative interaction at eye level, in which not only the participants but also the teachers are involved, are essential process elements in the BINE course. Both are mutually dependent because only a respectful climate enables a

community to emerge in which the quality of exchange and reflection enables learning processes for all participants.

The participants also appreciated that they themselves "got a space in the course and that we also used it" (HI4). They thus address the principle of participation applied in action research. In concrete terms, this means that participants are encouraged / invited to make their own contributions, e.g., in the form of mini workshops. The roles of "teacher and learner become blurred in this setting, so that it is better to speak of a learning system in which a common reality between the course participants and the course leaders might develop.

This principle is also applied in the regional groups. The focus here is on the collaborative process of (further) development of the action research studies. The members of the regional group present their research projects to each other and receive feedback from the "critical friends" in the group. The intervention in such settings consists primarily in providing a learning space in which the described learning processes are stimulated. In addition to conveying content (inputs), the members of the leading team here largely take on an advisory and supervising function. In the evaluation, the participants are very satisfied with the supervision, especially with the appreciation by the course team. They also mention positively that the leading team makes great efforts to take up the participants' questions and to provide further feedback and suggestions for further work.

Participants consider networking as an essential aspect for sustainable learning. They believe that during the two years the course lasts, "really good networking with the participants could develop" (GI1), and contacts have been made throughout Austria. In this context, they also mention the regional groups in which regional networks are created, again through intensive cooperation, which can also be used beyond the course. They would find it exciting if a "BINE network" would emerge that would last beyond the end of the course. The lecturers "have already laid the groundwork for us to network by showing interest in the participants and by passing on their contact details, which enable them to stay in touch" (HI3).

The course was an occasion for the participants to look more closely at their own teaching process: "how I teach, what my focus is, where my topic lies" (HI5). It offered many suggestions for the transfer of what has been learned in the course into the working practice of the participants. The participants find that they have received comprehensive tools (methods, thematic inputs, background theories, argumentation aids) that enable them to carry out these transfers. In the seminars and regional groups, the courses offer opportunities to work on and reflect on practice-relevant topics outside the everyday school context in a protected area. As desideratum for a next course, some participants claimed that in order to establish education for sustainable development in the long run in teaching and schools, the systemic dimension should also be given even greater consideration in the course.

6. SUMMARY AND OUTLOOK

Based on the concept of the course and findings, two core questions might be formulated as follows:

- How can a suitable balance in the course design be found between participatory and self-determined work of the participants on the topics of ESD and yet a sufficient degree of

uncertainty and thus a questioning of previous practice be achieved through the confrontation with the wealth of topics, concepts and methods of ESD?

- How can action research support learning between challenging, reflection and action?

The results of the evaluation according to the first question show that research-based inquiry and learning on the concepts of ESD challenges participants to a certain degree due to the complexity of the ESD discourse. But it seems that the course also offers enough space for more in-depth reflections. The BINE course as a community of learners in a climate of trust and openness might be a fostering context. It seems that a balance of provocation and support on slippery terrain and rescue tools are elements of a dynamic didactical design.

The courses increase self-esteem and self-confidence, thus increasing the willingness and ability to self-criticize and to accept criticism from "critical friends" in participative research processes. Participants can learn in an anxiety-free space how to deal constructively with irritation, criticism, both actively and passively (criticizing and accepting criticism). This is made possible by a confidence-building climate in the courses and supports improvement of action competence and the ability to manoeuvre. Beyond that, to elaborate one's own project seems to contribute to self-assurance.

In relation to the action research element of the courses, it seems that the systematic collection of data (within the framework of action research projects) and the writing of a case study are regarded as strenuous. Finally, to a large extent, they are strongly conducive to learning. However, this insight generally only seems to emerge after some writing experience.

The statements of the participants about the learning gained and the competences acquired in the course are very much in line with the course objectives. They are a valid proof that a training programme based on action research can promote professional development for ESD. All participants interviewed considered the course structure with seminars, working groups and research projects as well as the change of settings between large groups / plenum and phases in smaller groups to be successful and effective.

A high degree of professionalization is achieved through the intensive reflections on one's own role expectations and requirements combined with the mediation of content-related and methodological tools. Development of a "systemic" perspective as well as practical experience in acting within a complex system, such as one's own institution, are further aspects that are addressed within the course setting and that may contribute to comprehensive learning processes. The connection to teaching activities means strong practical relevance. A high transfer potential is ascribed to the courses.

The results show that the systematic collection of data (within the framework of action research projects) and the writing of a study are regarded as strenuous but conducive to learning. Furthermore research-based inquiry and learning on the concepts of ESD provokes participants to a certain degree due to the complexity of the ESD discourse. While provocation raises awareness for the uncertainties and dilemmas that characterize sustainable development and ESD, tools on an intellectual level (e.g. information, methodical inputs) as well as on an emotional level (e.g. support and empowerment by critical friends) provide orientation and direction. Both levels complement each other and form a framework for holistic and integrated learning processes. The BINE course, as a community of learners in a climate of trust and openness, might create a supportive context for deepening understanding. It seems that a balance of provocation

and support as elements of a dynamic didactical design offers space for more in-depth reflections (Rauch, Steiner & Kurz 2021).

At the moment, current international and national developments (like the Sustainable Development Goals, the Global Action Plan, the Climate Crises and Fridays for Future Movement) support the implementation of ESD in schools and in teacher education. The BINE course will be further developed based on the results of the evaluation and will be offered as a joint programme of Universities in Austria.

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