

Teaching migrants – a challenge of the 21st century

PROMISE Team Vienna

Helga Stadler, Clemens Nagel, Susanne Neumann

1. Introduction

Improving the quality of science teaching is an important issue of institutionalized education. This is one of the reasons why international tests like PISA or TIMSS concentrated on science and mathematics. As the results of these tests had been lower than expected, the countries started research and intervention projects in these fields. One major task was to look at teaching and learning processes in science classes. The results were the basis for programs that should promote the professional development of science teachers.

PISA revealed that learning science is strongly connected with competencies connected to the mother language. It is quite obvious that students who do not have a good command of the language the teacher uses in class will face difficulties in learning. Moreover, physics and chemistry are subjects rather disliked by students. Students say that these subjects are dumb, difficult to understand and that they do not see any relevance for their lives (Osborne & Collins 2001, 443–467).

Teachers who teach many students with migration background in their science class know about these challenges and institutions have already started programs on this issue. The EU-project PROMISE (Tajmel and Starl 2005) was the first project of this kind in Austria and provided a basis for further initiatives.

2. Theoretical Framework

As there has been a turn from input to output orientation (Helmke 2003) during the last years, the professional development of teachers became an important issue of discussion. On the basis of educational action research programs, started by Altrichter and Posch already in the late eighties (Altrichter & Posch 1998, Kuehnelt & Stadler 1997, 425-444), Konrad Krainer initiated the program *Innovations in Mathematics, Science and Technology Teaching* (IMST). On the one hand the program aims at supporting the professional development of science teachers, on the other hand it supports innovations in schools. According to Krainer and Altrichter the professional development of teachers should be promoted in terms of networking and reflection (Altrichter & Krainer 1998, 33-51). In order to reach these goals within the project IMST special tools were developed. One tool that proved to be important was the videotaping of science lessons and the guided reflections of these lessons in teacher groups (Stadler 2003, 175 - 193; 2005a, 177-195). The ways how teachers were supported within the framework of IMST – reflecting, networking and supporting innovations – were also used as a basis of the work of the PROMISE-Team of Vienna.

3. Institutional Framework

The PROMISE-Team of Vienna was established at the Faculty of Physics of the University of Vienna. As the physics education group of the Faculty of Physics is involved into teacher in-service programs and responsible for the education of future science teachers, we had close contact to physics and chemistry teachers, who were interested in this project. In Vienna the number of classes with a high percentage of students with migration background and low knowledge of German is high. Today in Vienna about 45 % of the children in elementary classes don't have German as their mother tongue. Teachers are not adequately prepared for this situation and up to now there are no in-service trainings for science teachers on that issue. So teachers were grateful when in October 2005 the PROMISE project gave them the opportunity to work on that topic for the next two years.

From literature and from our own experience we know that groups that support the professional development of teachers in an effective and sustainable way have to be mentored and have to be steady during at least two years. The project PROMISE provided exactly this framework.

4. Activities of the PROMISE-Team at the University of Vienna

When the PROMISE-Team started its work in October 2005, it consisted of 15 persons: Twelve teachers of physics and/or chemistry, four of them also involved into teacher education, two staff members (Susanne Neumann and Clemens Nagel) and the team leader (Helga Stadler), member of the physics education group of the University of Vienna. According to the project guidelines it was the goal of the first year to identify barriers that students with migrant background meet when being taught science. Knowing more about barriers the students face in class when learning science was on the one hand important to make teachers more sensitive for specific difficulties of migrants. On the other hand the outcomes could be a basis for designing new lessons, a task the group had to fulfil in the second year of the project.

As a first step the teachers reported on experiences they had made in class when teaching students with migration background. As the main barriers for students with migration background teachers specified language barriers and problems resulting from the socio-economic background of the students. Furthermore, the general lesson framework was criticized because some structures were regarded as an obstacle for dealing with diversity.

In order to learn more about the barriers students with migration background find in their own science class, the group started to develop a questionnaire. The questionnaire was not intended to give scientifically based information about problems migrants meet in Viennese schools. Its aim was to confirm or also contradict teachers' beliefs and knowledge concerning their own students. The results of the questionnaire were used for discussion within the PROMISE-Team, but it was also used for discussions with colleagues at school or with students. The results were also used in discussions with experts at the PROMISE meetings, where teachers could compare their own results with those of researchers and other experts.

As a third method to find possible barriers we used the documentation and analyses of science lessons using videotaping (Stadler 2005a; 177-195). Video scenes which seemed especially suitable to show barriers of students with migration background were shown at the PROMISE meetings and discussed by the team members. The discussion focussed on gender issues (e.g. the interaction between male and female students) and methodical issues (in particular the question if the narrow dialogue between teacher and students prevents learning processes, especially concerning students with migration background). In lessons where an interrogative teaching style was used, it could be observed that teachers tend to allow insufficient time for the students to give their answers. Especially regarding students with migration background, enough time is required to allow them formulating their ideas and answers in the language of teaching. The most obvious difficulties appeared when students with migration background had to understand and actively use the high level of language used in schools that differs from everyday German. This "academic language" (Gogolin 2006) is especially used in science subjects.

By triangulating these three methods the PROMISE-team could derive the following fields resuming possible barriers for students with migration background. (Neumann, Nagel, Stadler 2007, 475-477):

- Language: Whereas the students considered their language abilities as satisfying, the analysis of the video scenes as well as the reports from teachers showed a lack of passive and especially of active command of academically oriented language. This issue was particularly observed with students who have migration background.
- Motivation problems could be observed particularly with girls. One reason for this might be the lack of carrier perspectives in the field of science and engineering.
- Socio-economic background: Especially students whose parents have a low educational background are not enough supported outside school. In some cases, parents expect their children to enter their job carriers early instead of pursuing their school carriers.

According to the project guidelines a major task of the second project year was the development of science lessons. Each teacher of the group developed one lesson or a lesson sequence (physics and/or chemistry) and tested it in classes with a high percentage of students with migration background. The results were discussed within the PROMISE-Team. Some of the lessons were observed, some of them were videotaped. The teaching resources created by the teachers are published on a DVD (Tajmel and Starl (ed.) 2009) The described outcomes of our research on barriers were about the same Tanja Tajmel had already formulated (Tajmel and Starl 2005, p.9-10, Tajmel 2007). In the beginning these statements had only been of theoretical value for the teachers. The questionnaire and the discussions of the video scenes gave them the feeling that they had learned something about their own students. This was important to motivate the teachers for the task of the

second PROMISE year, the development of science lessons suitable for classes with a high percentage of students with migration background.

5. Some General Remarks about Quality Development in Heterogeneous Classes

During the last years educationalists focussed on criteria of good practice in teaching. Also in science teaching “good practice” and criteria for good practice have become an important issue. Concerning heterogeneous classes we can say that everything that helps to improve the quality of teaching also improves the quality of teaching in heterogeneous classes (Stadler & Jungwirth 2005, 132-138). In that way the criteria mentioned in the literature (amongst others Duit, Wodzinski 2006, 9-11; Helmke 2003) can be seen as criteria of good teaching in heterogeneous classes. As a basic principle of good practice, a framework for multicultural (science) lessons is suggested, not only to address students having migration background by integrating different cultures and languages into the lesson plans, but to make all of the students aware of the fact that cultural differences are a benefit for our society.

The concept of multiculturalism is widely spread and used in science education in the Anglo-American area. In Austria, multicultural education is supported by the department of intercultural education of the federal ministry of education. The education principle of intercultural education is part of the curriculum of Austrian schools.

Following James A. Banks from the University of Washington multiculturalism does not simply mean integrating multicultural content into the curricula but consists of 5 dimensions:

- content integration
- knowledge construction
- equity pedagogy
- prejudice reduction
- empowering school culture and social structure

As these five dimensions also appear in guide lines for teachers concerning gender issues (Stadler 2005b, 206-222; Stadler & Jungwirth 2005, 132-138), these actions can be considered as good practice in heterogeneous classes.

6. Science Lessons in Heterogeneous Classes Developed by the PROMISE-Team (PT) Vienna

When developing science lessons the PT teachers concentrated on methodology and contents, that on the one hand met the general guidelines; on the other hand they had to refer to the prerequisites they found in their class and to contents and methodologies they already knew or had got to know in the PROMISE-Team. In their lesson concepts they had different main issues:

a) Sensitive Use of Language in Science Education

In one of the first PROMISE meetings articles by Josef Leisen (Leisen 2005a, 4-9; Leisen 2005b, 21-25) were discussed and the importance of language in science lessons was emphasized. In subsequent meetings we encouraged the PT teachers to integrate the tools of Josef Leisen in their lessons.

The main focus of Josef Leisen is making teachers aware of the fact that different levels of language and abstraction are used in science education. As students have to ascend from the objective level up to the very abstract symbolic and mathematical level, this can only be reached by communication. Learning the subject and learning the language can not be disconnected from each other. To integrate language learning into science education, Josef Leisen developed various tools (Leisen 2003), especially suitable for students having migration background. These tools can be used for intensifying communication processes in science education.

b) Conducting Hands-On and Demonstration Experiments

Suggestions for hands-on experiments were presented by Werner Rentzsch in the first PROMISE year. These experiments are also described in the text book of Werner Rentzsch (Rentzsch, Pfaffl 2005). The PROMISE teachers emphasized the importance of conducting experiments in small groups because this promotes various competencies, e.g. it intensifies the communication between the students, stimulates the creativity of students and supports sustainable learning. Hands-on experiments are important because students are made aware of the fact that science appears in everyday life and that scientific phenomena can be experienced by using simple material. It also encourages the scientific curiosity of the students by giving them the opportunity to do research autonomously.

c) Multilingual Science Lessons

In several PT meetings the importance of the mother tongue(s) was underlined. The students should develop a positive self-concept referring to multilinguality and should create competencies linked with it. Multilinguality should be appreciated and used in science lessons.

An example for multilingual science lessons was presented in one of the PROMISE meetings by Elisabeth Langer. She has experience in integrating English as a working language as well as the mother tongue(s) of the students (Langer 2006). In addition to that, two other teachers (Werner Rentzsch and Adile Stangl) announced that they would develop and carry out bilingual science lessons (Turkish-German).

d) Awareness of Gender-Related Communication Structures

Resulting from the discussions of several video scenes, teachers should be aware of communication structures that take place in their lessons. This refers for example to the fact that in classrooms, especially in science lessons, boys are called on more often than girls (Kelly 1987, Stadler, Benke, Duit 2001, 283-288). Some video scenes the teacher presented in the meetings proved that gender issues are particularly of importance when working in classes with a high percentage of students with

migration background. Teachers should encourage all students, especially girls, to participate in the lessons and should not promote gender relevant expectations.

e) Multicultural Science Lessons

A main topic is how to integrate multiculturalism in science lessons. Some teachers tried to integrate examples of multicultural science lessons (Lumpkin et al. 1995). The PROMISE Team discussed the approach of the interdisciplinary and multicultural lessons and collected ideas of other topics suitable for integrating multiculturalism.

Teachers of all subjects should search for topics suitable for integrating multiculturalism in their lessons. This is also possible in science, an interdisciplinary approach would be convenient. Some of the suggested topics are: How do people from different parts of the world adjust to climate? What migration background do Nobel Prize winners have? Why do we use Arabic numbers?

f) New Culture of Testing and Grading

This approach was presented by Ilse Bartosch at the PT meeting in June 2006. The idea of this new culture of testing and grading is to offer students several inputs when testing their knowledge. These inputs could be for example newspaper articles, pictures or diagrams. Students should gain the competence to work with this sort of inputs as they encounter it in everyday life. In addition to that, these inputs focus on language issues in science and support students facing language difficulties by providing them visual sources of information. Different ways of testing and grading are important when working with students having different linguistic and cultural backgrounds.

7. Research Questions and Methods

The PROMISE group of the University of Vienna regards the project PROMISE as a basis for further interventions in teacher education that aim at qualifying teachers for teaching in multilingual and multicultural classes. Therefore the evaluation of the project PROMISE was a major task. The main questions were:

- What was the input of the project concerning beliefs?
- In which way did the project influence science teaching?

In order to find answers for these questions

- a questionnaire was given to the teachers (open questions)
- two teachers were interviewed in detail and their answers were categorized

The questionnaire was only answered by those teachers who regularly took part in our meetings and worked actively during the whole period of the project.

For the interviews we chose two teachers who teach in different school types and were different concerning their sex, age and teaching experience. Methodologically we followed Froschauer and Lueger (2003) using the method of topics analysis („Themenanalyse“). This analysis is not used to prove hypotheses, but it is a coding method for defining categories selectively. Before encoding a text reducing method is applied, which makes categorizing easier due to paraphrasing the quotes and arranging them. As a result the categories and sub-categories are defined by representative text quotes, which are analyzed and interpreted referring to latent and manifest contents. The summary and interpretation of these categories is incorporated into the following description of interview results (chapter 9).

8. Results From the Questionnaire

As the answers given in the questionnaire are not yet analyzed scientifically, we can only give some outlines.

The teachers considered it important to get an opportunity to talk with other teachers about questions concerning migrants. They found it important to have an adequate personal environment for the meetings, to have the institutional background of PROMISE and to get professional mentoring. They appreciated learning about the many aspects of multiculturalism and multilingualism coming from experts. Most fruitful they regarded the discussions about teaching sequences and concrete lessons shown on videos. Teachers who took part in the international meetings reported that the exchange with teachers from the partner countries was an important impact for their work.

Concerning the inputs of experts, one teacher reports:

„In the first semester I thought that the investigation of the status-quo and of the socio-cultural background was too time-consuming. But in the course of the following meetings I became aware of the fact how important this background information was because it concerned everyday life in school. The knowledge about these connections helps me to understand my students with migration background better and also adds new aspects to my lesson plans.“

Referring to the question if their views on issues concerning migrants in the context of education changed, teachers reported:

„... that I wonder what my contributions to the construction of „being a migrant“ are.“

„I only got aware of the difficulty in language in the PROMISE meetings. I did not perceive this problem before.“

One of the questions we consider most important is whether and in what ways work in class has changed during the time the teachers worked in the PROMISE team. The answers of the teachers concentrate on three issues: the language problem, issues that deal more with general questions in relation to multicultural classes and issues that focus on questions of quality of learning environments. We think that the last one is very important, as improving the quality of teaching environments mainly supports children who find little support in their home families.

„My science lessons changed considerably during the work with the PROMISE-Team. There was not one flash point, but many small light-bulb-moments that set a process in motion. I am in the middle of a changing process and have many ideas that I want to implement in the next school years. Being aware of the tasks and chances there are in science lessons to help integrate migrants in terms of language and in terms of carriers, I began to get more aware that science lessons have to be changed into „Language and Content Integrated Learning“ and that it is very important to implement communicative situations in science lessons.”

„Yes, I benefited from the awareness that much time should be spent to profit from language and cultural diversity in science lessons. I also became aware of the fact that some problems may be caused by the European-centred view on science. And of course, I particularly benefited from the discussions at the PROMISE meetings.“

„I also became more vigilant for „language pitfalls“, that might occur to students with migration background and I look out for the difference between everyday and science language.”

„I came across many new teaching ideas and tested them in lessons – particularly the strategy of Josef Leisen for reading texts.”

„Yes, I encountered that I wonder much more if students understand certain words that I use. If not, I try to explain them from different views in order to clarify their meaning.“

„The flash point was that I’m a class teacher for a 5th grade this year and therefore I try to be as responsive to these problems as possible (though time is limited).”

„I observe myself and my students more carefully, deal with the time more deliberately, but still: I feel myself happier and much more easy-going.“

„I became more sensitive to gender-stereotype comments.“

„I am more interested into the topic migration now, and I can not only participate in discussions but have better arguments due to PROMISE.“

„I question the reactions of students to different activities in science lessons more often than before.“

„I grade the students’ achievements more with respect to their understanding and not any more to „learning by heart“.

Concerning the future of the PROMISE-Team, teachers reported that more teachers should have the chance to take part in programs like PROMISE.

9. Results From Two Interviews

In this paper we can only summarize the results of the interviews regarding the main issues of the project. In the first part of the interviews we concentrated on personal consequences of the work within the project; in the second part questions focused on consequences regarding science teaching.

a) Personal consequences:

Teacher A teaches science and foreign languages in a lower secondary school in lower Austria. Already before starting with PROMISE one of her goals was to make students understand science better by focusing on language aspect. When starting with PROMISE, she already worked in that way, but still PROMISE gave her important inputs on her further development. The international meetings and the inputs of the experts gave her an idea of the importance issues concerning migration have in our society. But the project was also important for her students:

„Only when they saw the signature with the logo of PROMISE and the different universities this had an impact on the migrants, only with this paper, that's what I assume, that they know there is somebody who is concerned about their issues. In the course of the project, in particular since the students' questionnaire, I have this feeling, and I don't think I'm wrong here, that these children suddenly have a different position in class. They open themselves, they participate in the lessons, so this is really amazing. I can only trace it back to this, the fact that the children are aware that there is somebody who cares about them.“

She emphasizes the exchange with her colleagues in the team and the analyses of the videos.

„The total volume of these videos is so wide, you cannot deal with all of it at once, but what was very, very useful, was the selection of single scenes, and then to discuss what can be seen from these scenes in particular, what can they contribute to what we are doing here – which is supporting migrants – how can this be seen or why was this step taken or not. New questions resulted from these scenes. This was very productive.“

Teacher B teaches science in an upper secondary islamic private school. Like teacher A he highlights the value of discussions and exchange with the colleagues:

„What I really liked was the feedback from colleagues about the work I made during the project. I also encountered some change in my attitudes during the last years. The reason is that I think more about how to deal with it, how we can make science topics more motivating for students with migration background. So this is my first impression.“

Teacher B reveals that the team work of PROMISE motivated him to exchange information on different issues with teacher colleagues at his school and that the discussion made him more confident about his own teaching efforts.

„But in any case I have to say that this is a confirmation of the work that I or we do here, because if you work on your own and think that only we meet certain difficulties and other schools don't, that we are all alone with these problems, well, this is not a good motivation.“

Work in the project made clear to him that he was not alone with the challenge to teach students who have a different language and a different cultural background. The project he said revealed that we have to cooperate in this respect. He suggests a platform.

„... a platform, where we can exchange ideas, and then there are thousands of ways how we can continue our work.“

b) Consequences in respect of teaching science

Teacher A states that she has become more sensitive concerning language issues in science class:

„In any case, I have become more sensitive when preparing my lessons. Which language barriers could there be? Where do I have to activate the previous knowledge of the children? I ask much more if they have really understood it. ... This starts when I prepare my lessons. The first thing I think about is: what is really necessary, where do I want to go into detail, what contributes to a better understanding of science basic knowledge and what do I have to prepare concerning language so that the children can follow me. I really do kind of a keyword table, clarifying terms, activating previous knowledge and I really try to make sure that the children have the chance of expressing themselves in clear words.”

She tries to give children more time to think and reflect:

“More allowances, in a way that I give them more time to think or support them a little bit, more keywords and pattern of thoughts and to write language patterns on the board. So this is where I really support them more now. I did not do this before. And they, they really appreciate it.”

The articles of Josef Leisen from the second PROMISE meeting seem to have intensified the interest for personal, latent existing interests, so that she got active and bought the book of Josef Leisen herself. This fact shows the activating and motivating effect of the PROMISE teamwork outside of the meetings and apart from given issues.

Teacher A describes her understanding of focusing on language, using the following concrete example of her science lessons:

“This appears very often in science lessons. What did we learn today? Mirrors. We learned about concave and convex mirrors. But it showed that it is not self-evident that everybody knows what a curvature is. I did not know this. So I don't take these things as self-evident any more. I let them touch things, mirrors for example so that they understand and feel what flat means, what a curvature is and so on. And only after they have perceived what this term means, I start working at a different level. I do these steps, as Leisen says, from the concrete example to the abstract level. All in all, every meeting has contributed to this. I cannot focus on one meeting. There were so many moments, in everyday teaching, where something I learnt here is introduced in my science lessons.”

„...With optics, there are unbelievable barriers. I did not notice this before. For example, when you're saying: “Das Licht wird gebrochen”. (...) In English you say „light bends“, this sounds different and clearer. So you really have to think about it or the law of reflection. Alpha, Beta, do we really have to measure them from the normal? Well, this is how it is in the text books. But in England, teachers do it without the normal, and still the children get it. So you begin to think as a teacher, do we have to offer the children the hardest way? Yes, I have become more venturous.”

The critical discussion about the challenges in science classes with a high percentage of migrants motivated the teachers to test new learning and teaching approaches:

Teacher B describes the implementation of students' vocabulary books in higher levels of secondary schools, in order to assure the sustainable acquirement of technical terms. He explains the effects of his sensitizing on language and everyday contents in science due to the work in the PROMISE-Team.

„What really changed and how I try to work upon it, is that every time we do a review and one of the students explains something and he tells something in a wrong way, then I repeat it and try to make them aware what he or she just said. So I hope this shows to him or her that he or she put it in a wrong way but – hopefully – meant a different thing.”

By responding to the technical terms, words and sentence structure used by the students, teacher B provides for a continuous feedback on the use of language in science lessons.

Teacher B explains what he learnt from his own video reflection (in the first project year) and what effects it had on his lessons.

„So this is something, where I want to focus in future: since this lesson or actually in the course of the project, I have got aware that, when a student just says a single word, I either ignore it or ask what he exactly means by it, because he has to formulate it for me so that I know what he means.“

With the help of the video teacher B became aware of communication patterns and contents. As a result, teacher B changed his reaction to incomplete sentence structures and so contributed to an active and correct use of language by his students.

Teacher B also describes the input by the video reflections referring to gender aspects.

„A girl in my class for example, she has always told me that in front of boys she is afraid to speak aloud. Well, this is certainly counterproductive to her participation in class. So these are cases where I come to think: what can I do about this?“

The teacher tries to implement group work. In fact: the written tests showed that the achievement of the girls has improved to a great extent. The interview showed that the teacher had encountered new insights into gender aspects by the video reflection. This multitude of thoughts and ideas that resulted from his experiences from the video reflection has influenced the set-up and performance of his science lesson to a great extent.

10. Dissemination

The question what the use of supporting individual teachers in the given way is, is often discussed in context with action research projects that foster the professional development of teachers. Personal coaching needs time and costs money. In our case the dissemination of the project is given in many ways: About half of the teachers of our team work as teacher educators. One teacher is now starting a

project within the nationwide program “Innovations in Mathematics, Science and Technology Teaching (IMST)” that aims at promoting the professional development of teachers in respect of multicultural and multilingual science teaching. One of the teachers starts his work on a project that fosters girls with migration backgrounds in science. Last but not least the work of the PROMISE team will be prolonged, as part of a project of the “Regional Networks Vienna”.

Helga Stadler (helga.stadler@univie.ac.at): scientific researcher for physics education at the University of Vienna, Faculty of Physics; research focus: teaching and learning processes, video analysis of science lessons, gender issues; various activities in pre- and in-service-training for science teachers; author of physics textbooks; head of PROMISE Team at the University of Vienna;

Clemens Nagel (clemens.nagel@univie.ac.at): scientific staff member and PhD-Student at the University of Vienna, Faculty of Physics; organizer of PROMISE-team meetings 2005-2007;

Susanne Neumann (susanne.neumann@univie.ac.at): scientific employee for the PROMISE project at the University of Vienna, Faculty of Physics; in charge of Club LISE and co-organizer of the PROMISE-team meetings 2005-2007; teacher of physics and maths at BRG14, a public high school in Vienna;

Bibliography List

Altrichter, H. & Krainer, K., *Wandel von Lehrerarbeit und Lehrerfortbildung (Changes in teachers' work and inservice training)*, in K. Krainer & P. Posch (Eds.), *Lehrerfortbildung zwischen Prozessen und Produkten*. Bad Heilbrunn: Klinkhardt, 1998

Altrichter, H., Posch, P., Somekh, B., *Teachers investigate their work: an introduction to the methods of action research*. Repr.-London [et al.]. Routledge, 1998

Duit, R., Wodzinski R., *Guten Unterricht planen* in: Naturwissenschaften im Unterricht Physik, Ausgabe 2/06; Friedrich Verlag, 2006

Froschauer, U., Lueger, M., *Das qualitative Interview. Zur Praxis interpretativer Analyse sozialer Systeme*. Wien, WUV-UTB Verlag, 2004

Gogolin, I. (2006). Linguistic diversity in classroom: A challenge across the curriculum. Talk: "Mentoring and cultural diversity", held at the first international PROMISE conference. April 6, 2006, HU Berlin

Helmke, A., *Unterrichtsqualitaet. Erfasse – Bewerten – Verbessern (Improving the Quality of Teaching and Learning)*. Seelze: Kallmeyersche Verlagsbuchhandlung, 2003

Kelly, A. (Ed., 1987), *Science for girls?* Open University Press, Milton Keynes, 1987

- Kuehnelt H., Stadler H., *Combined updating on science and pedagogy for experienced teachers*. Research in Science Education (RISE), 27(3), 1997
- Langer, E. (2006): *Englisch als Arbeitssprache im handlungsorientierten naturwissenschaftlichen Unterricht*, Report MNI-Fonds, 2006; available online at: http://imst3plus.uni-klu.ac.at/materialien/2006/1059_319_Langfassung_Langer.pdf (last checked September 2007)
- Leisen, J., *Methoden-Handbuch DFU*, Varus-Verlag, Bonn 2003
- Leisen, J. (2005a), *Muss ich jetzt auch noch Sprache unterrichten? – Sprache und Physikunterricht* in: Naturwissenschaften im Unterricht Physik, Ausgabe 3/05; Friedrich Verlag, 2005
- Leisen, J. (2005b): *Richtige, reichhaltige und fluessige Sprache entwickeln – Sprachhilfen fuer Schuelerinnen und Schueler mit Migrationshintergrund* in: Naturwissenschaften im Unterricht Physik, Ausgabe 3/05; Friedrich Verlag, 2005
- Lumpkin, B., et al.: *Multicultural Science and Math Connections, Middle School Projects and Activities*. Walch, Portland, Maine, 1995
- Neumann, S., Nagel, C., Stadler, H., *Ansaetze zur Untersuchung von Barrieren von Schueler/innen mit Migrationshintergrund im naturwissenschaftlichen Unterricht* in: Hoettecke, D. (ed.) Naturwissenschaftlicher Unterricht im internationalen Vergleich (Proceedings of the annual GDCP conference 2006), LIT Verlag, Berlin, 2007
- Rentzsch, W., Pfaffl, W. (2005): *Abenteuer Physik, 2. Klasse*, Verlag der Salzburger Druckereien, 2005
- Osborne, J., Collins, S. (2001). *Pupils' views of the role and value of the science curriculum: a focus-group study*, in: International Journal of Science Education (Volume 23, Number 5), Routledge, 2001
- Stadler, H., Benke, G., Duit, R., *How do boys and girls use language in physics classes*, in: Duit, R. (Eds.), *Research in Science Education in Europa*. Dordrecht: Kluwer Publishers, 2001
- Stadler, H. (2003), *Videos als Mittel zur Qualitaetsverbesserung von Unterricht*. In: E.J. Brunner u. a.(Hrsg.). *Diagnose und Intervention in schulischen Handlungsfeldern*. Muenster; New York; Muenchen; Berlin: Waxmann, 2003
- Stadler, H. (2005a). *Intervention by research. How to foster the professional development of teachers by videos. [Intervention durch Forschung. Wege zur Unterstuetzung der Professionalisierung von Lehrkraefte mittels Video.]* In: Welzel, M., Stadler, H. (Eds.), „Nimm doch mal die Kamera!“ *Zur Nutzung von Videos in der Lehrerbildung — Beispiele und Empfehlungen aus den Naturwissenschaften*. Muenster, New York, Muenchen, Berlin, Waxmann, 2005
- Stadler, H. (2005b), *Dualismus und Wissenschaft — Physik als maennliche Domaene*. In: Bidwell-Steiner, M., Wozonig, K. (Ed.) *Die Kategorie Geschlecht im Streit der Disziplinen*. Band 1 der Reihe „Gendered Subjects“. Wien, Innsbruck-Wien-Muenchen-Bozen: Studienverlag 2005
- Stadler, H., Jungwirth, H. (2005), *Was heisst geschlechtssensibler Unterricht?* In: Oesterreichisches Zentrum fuer Begabtenfoerderung und Begabtenforschung (Ed.), *Die Forscher/innen von morgen*.

Kongressbericht des 4. Internationalen Begabtenkongresses in Salzburg. Innsbruck, Wien, Bozen, Studienverlag, 2005

Tajmel, T., Starl, K. (2005), *PROMISE – Promotion of Migrants in Science Education*, European Training and Research Centre for Human Rights and Democracy (ETC Graz), Occasional paper No.18, 2005, available online at: <http://www.etc-graz.at/typo3/index.php?id=74> (last checked: 15 August 2008).

Tajmel, T. (2007), *Das Projekt PROMISE – Ein Ansatz zur Förderung von Chancengleichheit in der naturwissenschaftlichen Bildung von SchülerInnen mit Migrationshintergrund*, in: Hoettecke, D. (Hrsg.), „Naturwissenschaftlicher Unterricht im internationalen Vergleich (Proceedings of the annual GDCP conference 2006)“, LIT Verlag, Berlin, 2007

Tajmel, T., Starl, K. (Eds.) (2009), *Science Education Unlimited. Approaches to Equal Opportunities in Learnin Sciences (Book and DVD)*, Münster, New York, München Berlin, Waxmann, 2009

PROMISE - Promotion of Migrants in Science Education - was a Specific Support Action within the FP6 of the European Commission, Science and Society, Restructuring the European Research Area. The project was a cooperation of 6 partners in Austria, Germany, Bosnia-Herzegovina and Turkey.

PROMISE was developed in 2004/05 by Tanja Tajmel, Humboldt Universität zu Berlin, and Klaus Starl, ETC Graz. From October 2005 until September 2007 the project was implemented by the ETC Graz as the co-ordinating organisation, the Humboldt Universität zu Berlin, Department of Physics Education, as the scientific project leading organisation and University of Vienna, University of Sarajevo, the Yildiz Technical University in Istanbul and the Gesamtverband der deutschen Arbeitgeberverbände der Metall- und Elektroindustrie. PROMISE was funded by the European Commission, DG Research and co-funded by the Humboldt Universität zu Berlin and the Gesamtmetall Arbeitgeberverband Initiative THINK ING.