

## The Norwegian SUN-project

Peter van Marion<sup>1</sup>



In Norway, school-based approaches in teacher professional development are widely used. In particular, such approaches are used when focus is on generic pedagogic principles and methods or on teaching in general, regardless of the subject being taught. However, school-based professional development specifically for science teachers has so far not been widely used in Norway. Most commonly, professional development activities for science teachers focus on teachers' subject knowledge and skills, although teaching aspects (pedagogical subject knowledge, "didaktikk") are usually included in courses for science teachers.

The Resource Centre for Mathematics, Science and Technology Education (Skolelaboratoriet) is a unit at the Norwegian University of Science and Technology whose activities are, as its name suggests, mainly directed at professional development of schoolteachers in mathematics, science and technology. Initially, the activities of the Resource Centre have been more or less concentrated around university campus based courses for teachers and development of teaching materials. More recently, there has been a growing awareness of the need for a wider range of approaches, which meet all the needs of science teachers, including subject knowledge, pedagogical subject knowledge and those forms of knowledge that are grounded in teaching practice and teacher professionalism. In response to this, the Resource Centre for Mathematics, Science and Technology Education at the Norwegian University of Science and Technology developed a school-based professional development programme for science teachers in secondary schools. Initially, the programme was piloted on a small scale (2008-2010), with the aim of exploring how the new model would work within different school contexts. In 2010 the Resource Centre became involved in S-TEAM and in 2011 the Norwegian government provided funding for a three years national pilot project, *School Development in Science* (SUN). The pilot was run in four nodes in Norway: Oslo, Bergen, Trondheim and Tromsø. In the Trondheim node we drew on both the experiences from the pilot we ran from 2008 to 2010 and the impetus from S-TEAM. From

---

<sup>1</sup> Skolelaboratoriet, Norwegian University of Science and Technology, NTNU

2014 there will be no more governmental funding for the project and The Resource Centre now runs SUN in Middle and Northern Norway with funding from regional school owners. In the following section, a presentation of SUN will be given, largely based on the work done in the Trondheim node of SUN.

SUN is premised upon five key principles, based on findings from international research on TPD and on a background of years of experience in working with science teachers.

#### **The SUN key principles**

**The first principle** is that professional growth is more likely to take place if teachers' learning is situated in their own school and their own teaching practice.

**The second principle** is that teachers' learning is more effective if they are challenged to further develop their expertise in teaching, rather than being told by external experts that they need to change their practice.

**The third principle** is that teachers' professional growth is more successful if it is grounded in collaborative inquiry.

**The fourth principle** is that successful TPD must take place over time.

**The fifth principle** is that TPD is more likely to be successful if it is internally generated and externally supported and guided.

The second principle is advocated by Harrison, Hofstein, Eylon & Simon (2008). In their work they also emphasize the importance of an evidence-based approach to teacher professional development. Following this idea, we require from the participating teachers that they provide evidence of innovations in their teaching practice.

The circles in the bottom-up expansion model for professional development of teachers (Figure 1), illustrate different levels in school-based teacher professional development. In SUN we have chosen activities that are located at the teacher level. If development is introduced successfully at teacher level, it will have implications for the learning community (the science department). It enhances collaborative teacher learning and empowers the teachers even further in a positive feedback loop.

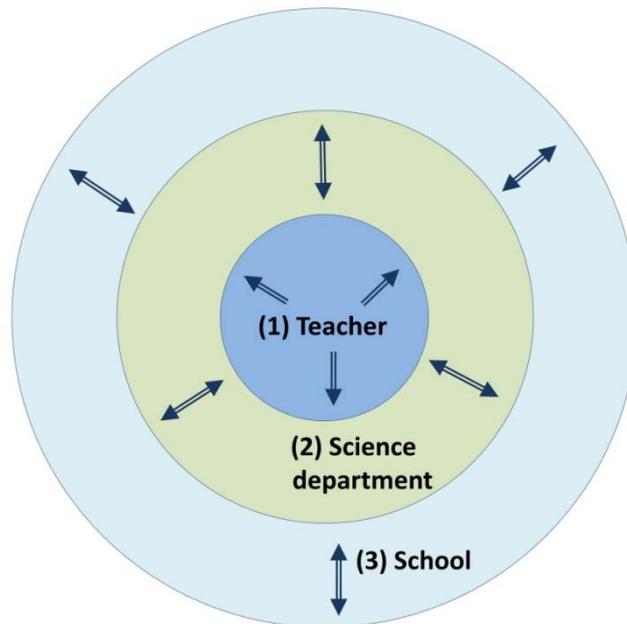


Figure 1: The bottom-up expansion model for professional development of teachers, illustrating different levels in school-based teacher professional development.

When we approach the schools and invite them to participate in the project, we start with a meeting with the school leadership, in order to make sure that they will provide commitment and support. At the next meeting, we inform the science teachers on the SUN-programme how they can benefit and what we will require of them. We clearly frame the focus and the aim of the project from the teachers' perspective: to develop expertise in teaching science.

In most cases the SUN programme runs at a school through one school year, including 5-6 half-day workshops with all the science<sup>2</sup> teachers at the school. The workshops always take place at the school's premises. Between workshops, the teachers work in small groups (2-4 persons), and staff members of the Resource Centre act as "consultants" for the teachers.

During the first workshop, we introduce some ideas about alternative approaches to science teaching, in particular more open-ended approaches. We present the 5E-modell (Bybee et al. 2006), and we ask the teachers to try to identify fields of inquiry in their own teaching practice. The teachers then form small groups with those who have chosen the same fields of inquiry. From there, the teachers are guided into a phase where they focus on plans for an innovation in their teaching. They spend the next months developing, testing and

---

<sup>2</sup> Initially we only worked with science teachers. Currently the SUN-program is meant to include both science teachers and mathematics teachers at a school.

implementing these innovations in their own teaching practice. During each workshop, the teacher groups report on their innovations and the progress they have made, and they receive feedback from members of the other groups and the staff members from the Resource Centre. From the beginning, it is made clear to the teachers that each of the groups will be required to present their innovation at the end of the project. The format we have chosen for this is a poster presentation in the last workshop. The last workshop is common for all the SUN-schools in the region and gives the teachers an opportunity to share the results of their innovations with teachers from other schools.

We based the model of our program on a set of principles, which we chose on the background of years of experiences with work with science teachers and on the results from other TPD-programs, as described and discussed in the international literature on teacher professional development. In particular, our model has many principles in common with the model used in work with science teachers conducted by King's College, UK, and Weizmann Institute of Science, Israel, as described by Harrison et al. (2008) and Hanley, Maringe & Ratcliffe (2008). In these projects there is a similar notion of the goal: to promote expert or accomplished teaching. This is chosen explicitly as the goal of the project, rather than, for example, 'change of practice' or 'improving the way teachers teach'. We do not want to come to the schools and tell the teachers that they need to change their way of teaching. We have noted that the teachers responded positively to this, although they do not seem to consider themselves as experts. This reflects the nature of the needs of science teachers and the relationship between practicing teachers and teacher educators (or others who run the program and guide the teachers). On the one hand, most teachers strongly dislike it when so-called experts from outside the school come and tell them what to do. In fact, many would say that they know what to do and that the real experts on teaching are those who have their daily work in the classroom. But when the teachers were asked to bring examples of innovations in their own classroom practice and to present them in the workshops, we noticed that most of the teachers appreciated receiving support and feedback from experienced teacher educators; they realize that there are new things to learn and in such a setting they do not have to avoid the word expertise when speaking about their own teaching.

## REFERENCES

- Bybee, R., Taylor, J., Gardner, A., Van Scotter, P., Powell, J., Westbrook, A., & Landes, N. (2006). *The BSCS 5E instructional model: Origins, effectiveness, and applications*. Colorado Springs: BSCS.
- Hanley, P., Maringe, F. & Ratcliffe, M. (2008) Evaluation of Professional Development: Deploying a Process-focused Model. *International Journal of Science Education*, 30 (5), pp.711-725.
- Harrison, C., Hofstein, A., Eylon, B-S. & Simon, S. (2008). Evidence-Based Professional Development of Science Teachers in Two Countries, *International Journal of Science Education* 30 (5), pp.577-591.