EDITORIAL
CURRICULUM REFORM AND NEW PRACTICES IN CLASSROOMS AND TEACHER COURSES*

A new wave of science and mathematics curriculum reform is going on in many countries. Various reasons for this development can be identified, for instance, dissatisfaction with traditional and mainly facts-oriented curriculum content, the call for more 'scientific and numerical literacy for all citizens,' and, last but not least, the wish to improve the negative image of mathematics, science and technology. As a consequence, new subject matter is systematically being incorporated in the curricula, for instance, science/mathematics-technology-society topics, and elements of the nature of science and mathematics, like scientific inquiry and the issue of models and modelling. The curriculum reform is often accompanied by new perspectives on teaching, for instance, teaching strategies related to (social) constructivist views on knowledge acquisition, computer-assisted instruction, and the use of Internet websites. For many teachers, the implementation of all of these innovations usually requires important changes in their teaching practice. They are expected to acquire sufficient knowledge of new curriculum topics and to develop appropriate competence to teach in other ways than the conventional ones. This underlines the need for new approaches in the field of pre-service and in-service teacher education. For instance, for pre-service teacher education, De Jong, Korthagen & Wubbels (1998) addressed the importance to develop a strong relationship between course activities and teaching practices at school, in addition to which courses should create a safe learning climate and acknowledge that the changing of conceptions and beliefs is a slow process. For in-service courses, other approaches are also meaningful. For instance, Putman and Borko (2000) advocated discourse communities for experienced teachers in which university teams take part and 'joint productions' are developed for promoting the understanding of all participants.

In this issue of IJSME, all articles deal with curriculum reform and accompanying teaching practices; most of them elaborate on this topic by focusing on teacher education.

The first two articles addresses *new instructional modules and the professional development of teachers*. Firstly, Guo and Chang report on a

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3-years Taiwanese project in which science educators/researchers, graduate assistants, and experienced science teachers worked together in small communities. Each team was involved in designing, implementing, and evaluating instructional modules on a new curriculum issue, viz. integrated science and technology education. The authors conclude that the professional development opportunities provided in the project were found to help teachers in gaining increased interdisciplinary knowledge and skills, and a better understanding of the new curriculum issue. Secondly, Wang presents a study of the professional development of Taiwanese science teachers who were also involved in teaching a new instructional module, although this study was smaller-scaled and the module was about another issue, viz. teaching scientific inquiry. Moreover, a five-stages model for the professional development of teachers is presented. The author claims that this model provided a useful strategy to help teachers to link a new curriculum issue to their teaching practice.

The third article focuses on *the role of teachers as researchers of their own practice*, especially as a means to promote a better understanding of students' learning in order to make adequate instructional decisions. For instance, 'listening to students' and examining their statements are often recommended in recent curriculum reform. De Jong and Van Driel report the effects of a Dutch program offering opportunities for pre-service chemistry teachers to examine their own teaching in real classroom settings. Their findings show the development on pre-service teachers' knowledge of specific difficulties in teaching as well as in student-learning for the issue of the multiple meanings of chemistry concepts. The authors also indicate that pre-service teachers' learning from own teaching motivated them to look for adequate responses to the difficulties they have encountered or observed.

The last two articles deal with the *use of information technology in classroom teaching and teacher education*, more specifically regarding the use of computer-mediated communication (CMC) networks. Firstly, Van Rens, Pilot, and Van Dijk describe a Dutch project focused on the enhancement of quality in chemical inquiry by pre-university students. At several schools, students conducted a guide experiment, analysed a scientific article, did an inquiry-based experiment, and wrote a report. A special website was designed to provide an Internet symposium enabling students to have discussions with peers at the other schools. The authors indicate that the majority of the students achieved the intended level of quality in the inquiry component. The results also show that the students considered the web-based discussions as being of 'learning value to them.' Secondly, Wu and Lee examine the use of a CMC system in a Taiwanese course

for pre-service computer science teachers. The findings indicate that the participants considered the system as helpful for developing their teaching skills. The results also show that some initiating/follow-up discussion styles of mentors are more effective than others. The authors also found that incorporating teaching-videos in the CMC system improved the quality of mentoring and stimulated the pre-service teachers to reflect on their teaching experience.

The reader of this editorial will have noticed that all articles refer to projects in two countries only, viz. Taiwan and The Netherlands. The reason for this is quite simple: this issue contains a selection of (rewritten) papers that have been presented at a 2003 Autumn seminar at Utrecht University, The Netherlands, of which the participants came from Taiwan and The Netherlands. Although the educational system, the science and mathematics curriculum, and teacher education show a number of similarities for both countries, there are also several important differences. For instance, contrary to Taiwan, teaching science at primary school level is lacking to a large extent in The Netherlands, but, in the latter country, in general, the teacher–student oral communication in classrooms is much more intensive, partly because of smaller classes than in Taiwan. However, one of the most remarkable differences regards the availability of qualified science and mathematics teachers. In The Netherlands, as in many other countries, schools encounter big difficulties in finding an adequate supply of teachers for their science and mathematics classrooms, while Taiwanese schools do not have this recruitment problem. Wang (2004) has indicated that this difference can be traced to differences in cultural beliefs about teaching and political beliefs about the socio-economic importance of science and mathematics. For instance, the Taiwanese government has adopted a favourable educational policy for teachers, especially for science and mathematics teachers, because of their crucial role in fulfilling the growing need for well-educated people at work in national high-tech industries.

Despite cultural and political differences between Taiwan and The Netherlands, the seminar participants from both countries acknowledged a strong common (research) interest in teaching and learning science and mathematics, and related teacher education. The articles in this issue of IJSME not only reflect this interest, but will also be of importance to readers in many other countries, in the East as well as in the West.

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