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Project PROFILES and Development of In-service Teachers' "Stages of Concerns" Regarding IBSE in the Context of the Implementation of PROFILES Modules in Georgia

Vincent Schneider², Marika Kapanadze¹, Claus Bolte², Ekaterine Slovinsky¹

¹Ilia State University, Tbilisi, Georgia

²Freie Universität Berlin, Berlin, Germany

Abstract

The PROFILES project is a four-year European FP7-funded project in the field of "Science in Society", aiming at disseminating Inquiry-Based Science Education (IBSE) in Europe. To achieve this goal, the 22 PROFILES partners from 21 countries are conducting innovative learning environments (PROFILES type Modules) and long-term teacher training programs for the enhancement of teachers' continuous professional development (CPD). Both supportive action strategies are supposed to raise the self-efficacy of science teachers, enabling them to take "ownership" for teaching students in more effective ways, so that as many students as possible can benefit from the PROFILES approaches of teaching and learning science. To evaluate professional development processes we focus on the reconstruction of in-service teachers' professional attitudes about IBSE. For this purpose we use the Stages of Concern model. In our report, we present pre-post test results to demonstrate how professional attitudes change during a Georgian PROFILES CPD term.

Keywords: PROFILES, stages of concern, in-service teachers in Georgia

The PROFILES project

Results of the Relevance of Science Education Study [1] illustrate that students in many countries have only little interest in science and in learning science. To cause a change, different reports [2,3,4] suggest that Inquiry-Based Science Education (IBSE) might be an innovative approach to enhance learning outcomes. Educational projects such as the PROFILES (Professional Reflection-Oriented Focus on Inquiry-based Learning and Education through Science) project support this change by disseminating the IBSE approach in Europe [5].

PROFILES is one of the European FP7-funded projects in the field of "Science in Society", promoting a student motivational, everyday life related and inquiry-based approach to science teaching [5,6]. For the PROFILES project, 22 partners from 21 countries develop innovative IBSE-related lesson sequences and train in-service and pre-service teachers in long-term programs (at least 40 hours in a six to twelve month period with four or more meetings [5,6]).

The PROFILES project in Georgia

Therefore, one goal of the working group at Ilia State University (Georgia) – as one member of the PROFILES Consortium – is the development and realization of IBSE-related Continuous Professional Development (CPD) programs for Georgian in-service science teachers. In this context, in-service science teachers are invited to participate in

specific CPD training courses, working on and later implementing the PROFILES type modules [5,6]. Five PROFILES type modules have been adapted by the team of the Ilia State University in Georgia:

- “Stumbling over Biodiversity” (a PROFILES module for biology lessons) [12],
- “Preventing Holes in Teeth” (a PARSEL module for biology lessons) [13],
- “Brushing up on Chemistry” (a PARSEL module for chemistry lessons) [14],
- “Traffic Accident: Who is to blame” (a PARSEL module for physics lessons) [15], and
- “Cola and Diet Cola” (a SALiS module for science lessons) [16,17].

The aim of the CPD training and the work with PROFILES modules is to encourage in-service teachers to implement IBSE in their schools and integrate the approach into their teaching practice. In order to evaluate the impact of the provided CPD program, we analyse teachers’ attitudes about their profession because the theory of planned behaviour [7] implies that attitudes influence behaviour intentions, and these intentions in turn influence the actual behaviour. In the context of the Georgian PROFILES training, this means that the more positive and open-minded a teacher’s attitude about IBSE is, the more likely it is that this teacher will implement IBSE in his/her classes.

Evaluation of the Georgian PROFILES CPD program

To gain insights into in-service teachers’ attitudes about the implementation of IBSE, we refer to the “Stages of Concern (SoC)” theory and questionnaire [8]. The SoC model is based on seven stages (SoC scales): A – Unconcerned, B – Informational, C – Personal, D – Management, E – Consequence, F – Collaboration and G – Refocusing.

Applying the SoC theory provides information about the teachers’ attitudes towards IBSE by creating SoC-Profiles (e.g. the ‘Cooperator’, ‘Opponent’, ‘Non-User’, ‘Docile Performer’ etc.) [8,9]. For this reason we adapted a German SoC questionnaire focusing on IBSE, which was developed and tested by Schneider and Bolte in accordance with Hall and Hord [11,12,8]. The Georgian questionnaire was applied in a pre-post test in the frame of the Georgian PROFILES long-term teacher training program.

Additionally we collected written feedbacks in order to analyse the implementation of the PROFILES modules.

Results

19 science teachers from different regions of Georgia participated in the 1st PROFILES CPD program (7 biology, 6 chemistry, and 6 physics teachers). In the following we present first feedbacks about the implementation of the PROFILES modules in schools.

Georgian teachers’ impressions and feedback regarding their experiences when they started to teach inquiry based by using the PROFILES modules or approaches in the science classes after the PROFILES-based CDP courses:

A biology teacher (N1) mentioned: “Students were involved with great interest. One boy, who was never active during the lessons, was the best in all PROFILES activities”;

A physics teacher (N2) stated: “Students became very active; they did measurements in the school corridor and involved the students from other classes”;

A biology teacher (N3) fed back: “All students were very active. They did the video in the dental clinic on their own initiative, and brought their own resources in the classroom for investigations”;

A biology teacher (N4) said: “After the implementation of PROFILES modules I found my own way of teaching”; and

A chemistry teacher (N5) answered: “Students asked me to have similar lessons at least once a week, and during the lessons they considered themselves “great researchers”.

Regarding our more empirical insight, the analyzed Stages of Concern profiles for both times of collecting data (pre- and post-test) are shown in Figure 1.

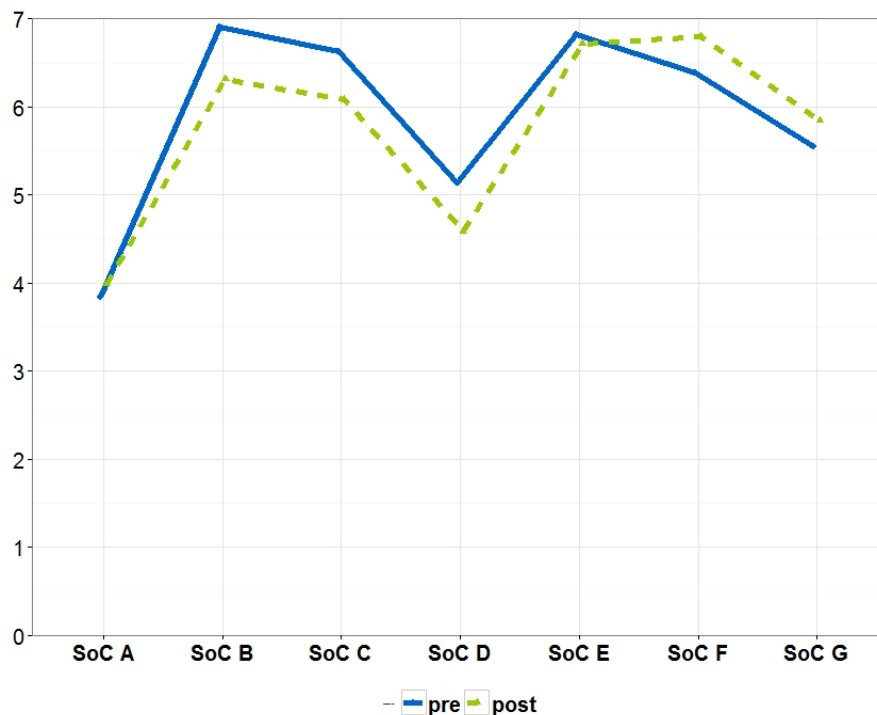


Figure 1. Stages of Concern profiles of the Georgian in-service teacher PROFILES group (N=19) in the pre and post tests; SoC A “Unconcerned”¹, SoC B “Informational”, SoC C “Personal”, SoC D “Management”, SoC E “Consequence”, SoC F “Collaboration” and SoC G “Refocusing” - Mean scores (Differences in SoC B and F are statistically significant – $p < .05$) (status: September 2013).

Discussion

From the written feedback, we draw the conclusions that the PROFILES modules were received very well and that the PROFILES approach has been implemented successfully. For example, a biology teacher (N6) said that she now found her own way of teaching. This suggests that she will continue implementing IBSE in the future.

We also observe a ‘positive’ result regarding the development of the teachers’ professional attitudes about the implementation of IBSE in school. At both times of collecting data we monitored the typical SoC profile of a ‘Cooperator’ [9]. With the theory of planned

¹ Please note: A high value on the SoC-Scale A “Unconcerned” means that the test persons’ awareness about Integrated Science is on a low level.

behaviour in mind [7], the participants of the PROFILES CPD program in Georgia will integrate IBSE-related PROFILES modules into their teaching practice with high probability.

A closer look shows that the participating teachers are more informed about IBSE (SoC B) and have a stronger focus on Collaboration (SoC F) at the end of our PROFILES treatment course. Considering the SoC scale “Refocusing” (SoC G), the participants were also more concerned about optimizing IBSE at the end of the CPD course. These results can be considered positive for the implementation of innovative educational programs [8].

However, the development of attitudes can take years and depends on the attractiveness of the educational program [8]. It can be concluded that despite the attractive offer from the Georgian PROFILES working group, there is still a long way to go. Nevertheless, the results suggest that PROFILES in Georgia is on a good course to help the participating teachers find their way to becoming better professionals and experts of IBSE.

All in all, our results show that it is possible to affect the participants’ attitudes about the implementation of IBSE in a positive manner by means of the PROFILES CPD program for science teachers in Georgia. Therefore, we will provide further IBSE-oriented and PROFILES-based CDP courses for the new generation of science teachers in Georgia to develop and consolidate their IBSE-related teacher ownership as well as to enhance scientific literacy among the pupils.

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