Chapter 5
Implementation of the Chain Reaction Project in Georgia

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ABSTRACT

Ilia State University (ISU) is one of Georgia's leading universities in teacher education and has taken part in a number of EU funded projects aimed at implementing new approaches to science teaching in Georgia, including those with an inquiry-based science education (IBSE) focus. This chapter gives an overview of the Chain Reaction project in Georgia, including discussion of the teacher professional development scheme, the perceptions of teachers following participation and implementation of the project, and the impact of Chain Reaction on students' motivation and teachers' professional development.

INTRODUCTION

There have been several major educational reforms implemented in Georgia since the collapse of the Soviet Union in 1991. Since 2004, new versions of national curricula for both primary and secondary schools have been piloted and put in place. Modern science education reforms emphasise the importance of students gaining experience in inquiry. This means that teachers must cultivate the knowledge, skills, and thought processes necessary to mentor their students through authentic investigations (Windschitl, 2003). The new science curriculum in Georgia has an emphasis on inquiry-based and student-centred teaching and learning activities (Kapanadze et al., 2010; Slovinsky, 2012). An IBSC (Inquiry-based Science Curricula) supports students performing science activities rather than merely memorising facts and theories. The curriculum also aims to motivate students; students work to find solutions to real problems, the resolution of which requires them to apply ideas they have learned previously (Edelson, 2001; Singer et al., 2000). Despite several new versions of textbooks being published as a result of the new Georgian National Curricula, most teachers are still not sufficiently prepared to implement student-active learning methods and do not possess the skills necessary to apply the learning processes required by the new curricula. Additionally, school laboratories are rarely properly equipped.

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As a result of this, in-service teachers' education has been identified as a key point for supporting the reforms, with new standards for teacher education being developed and approved by the Ministry of Education and Sciences of Georgia (TPDC, 2012). The new standards identify specific competencies required from science teachers to enable them to effectively achieve the desired outcomes defined in the national curricula. The Teachers Professional Development Centre (TPDC) under the Ministry of Education and Sciences of Georgia, which is officially responsible for in-service teacher training in the country, organizes centralised short-term training. These professional development courses are based primarily on traditional approaches to science education, and many feel that teachers do not get any practical benefit from them. The traditional science education approach focuses mainly on factual knowledge (what we know), while inquiry-based science education aims at asking deeper questions (how we know) and providing understanding of scientific processes and the nature of science itself (Bartholomew et al., 2004). Teachers should be made aware that by engaging students in inquiry they become active learners able to obtain their own knowledge. Through inquiry, scientists gather information and propose hypothetical predictions and explanations while accessing and building on prior experiences and knowledge (Shope & McComas, 2015). Opportunities to engage students in inquiry claim to improve educational achievement in the sciences while also cultivating positive attitudes toward science, which in turn may increase participation in science careers (Kanter & Konstantopoulos, 2010).

An analysis of the current TPDC science training modules reveals that few of them are learner-centred and include sessions that require substantial interaction between trainers and teachers. The module "Planning of the learning process and teaching and learning strategies'' is one example which is based on modern teaching and learning approaches (TPDC, 2012). Most of the modules, however, remain teacher-centred and need improvement. For example the physics module, in which teachers are trained to solve physics tasks, relies on lectures to deliver information and the teachers participating in the training are exposed to predominantly traditional, outdated methods of teaching and learning which increase the likelihood of them reproducing this in their own classrooms.

While this reform process is on-going, the low quality of science teaching in schools and the impact of that lack of quality on students' motivation and success remains an issue, which is often discussed and reported on during education conferences and meetings in Georgia (e.g. Chinchaladze & Burjanadze, 2016). As a result it might be that new teacher education programs are required in Georgia in order to improve the quality of science teaching in schools.

The first most important project in science education implemented in Georgia was the Tempus project SALiS (2010 – 2012), coordinated by ISU. First workshops and trainings about student-centred and IBSE approach were organised at ISU with the help of EU universities (Kapanadze & Eilks, 2014). In 2013, the science education research centre SALiS was established at the university.

Following the first *Chain Reaction* project consortium meeting at Sheffield Hallam University in the UK, the project team in Georgia prepared general information about the project and a brief description of the activities involved. This information was announced in Georgia and disseminated via social media and published on the ISU web page. From the outset, the project received a great deal of interest from Georgian schools; despite the heavy reliance on traditional teaching methods described above, many teachers in Georgia are open to innovation and eager to obtain professional development and knowledge about modern teaching methods. In each project year the number of applications for participation in *Chain Reaction* increased; in 2013-2014, we received 16 applications for participation from schools all over Georgia, in 2014-2015, 21 applications, and for the last year, 2015-2016, 26 applications.