‘Let Us Develop Together!’ - A Curriculum Development Process to Improve Scientific Literacy of the Students at Secondary Vocational Schools in Hungary

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Proposal information

The topic of this paper is the reform of science education in Hungary, started with secondary vocational schools. Teachers of Biology, Chemistry, Geography, and Physics were really shocked by the ministerial decree which decreased with 40% the total number of the scientific lessons in the whole educational period of the vocational education last August. A new subject (Science) was introduced in 9h grade in secondary vocational education at the same time. The main targets of this subject are to improve the students’ scientific literacy and skills, to support them in becoming responsible citizens, and to help them to live a healthy life. There are 108 lessons – all in a single academic year - to attain these targets. In grades 10-12 in secondary vocational education one scientific subject is taught (Biology, Chemistry, Geography, or Physics), as the theoretical basis of the vocational training depending on the profile of the school. The teachers who have to teach this new Science subject are trained for and are experienced in teaching one or two scientific disciplines, but they are not qualified to teach complex science. The Hungarian Institute for Educational Research and Development (HIERD) was appointed to develop the science curriculum for grade nine of secondary vocational schools in cooperation with some scientists and teachers. The curriculum has to improve the scientific literacy of the students by active learning about those topics which are closely connected to their daily life.

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The main questions and tasks of this curriculum development process are the following: Which complex features of nature are connected to the daily life of the students, allowing for experimentation? Which skills should be improved by learning this subject? How can the teachers trained in special disciplines manage the learning of Science? How should teachers be supported to facilitate active learning? The development process is based on the following principles: The new science curriculum has to be based on the national and international experiences, and should take the expectations of different stakeholders into account. For the success of the development process, it has to be led by professional curriculum developers, who have to cooperate with practitioners. Thematic ideas and methodological suggestions have to be tested in practice, and the reflections of the teachers have to be used in the finalization of the themes and methods. The new curriculum should be flexible to fit the varied possibilities and needs of the teachers, students, and schools. The development process has to be communicated continuously. The core element development process is the action group led by the Curriculum Centre of HIERD. Educational researchers and curriculum developers, experts of school improvement, textbook developers, and IT-experts are represented in this group, also linked to a group of teachers, playing different roles. They can tell their opinion and needs to the development experts, they can share their experiences at the National Public Educational Portal, they can share their views with each other and the developers in a facilitated online forum, and some of them can develop some elements of the curriculum. The development process is supervised by a board, in which the Hungarian Academy of Sciences, the Ministry of Education, three different universities involved in initial and in-service teachers training, the Chamber of Teachers, two professional science associations, and the chief management of HIERD are represented.

Methods

Situation analysis: The first step is an overview of the most important national and international trends and experiences of curriculum development and teaching of science. The next step is studying the learning environment of science teaching in secondary vocational schools and detecting teachers’ opinion, their attitudes and needs in teaching science. The results of desk research are to be summarized in an essay. Questionnaires for teachers and school leaders are the instruments of this part of the development process.

Conceptual framework: A small group of experts creates a skeleton of the curriculum (targets, basic ideas, skills to be developed, suggested topics, and possible methodologies). The knowhow of different learning theories and projects, also the literature lessons for curriculum and skills development (e.g. Inquiry Based Learning/IBL, Strategies for Assessment of Inquiry Learning in Science/SAILS), (e.g. Trilling & Fadel, 2009; Fazekas & Halasz, 2014; Gordon - Győri, 2002) and the experience of those alternative schools, where science has already been taught are used for this work. After valorisation of the framework, some detailed examples and a template for will be worked out.
Preparation of the detailed programme: On the basis of the accepted curriculum framework, professional developers and the teachers who are selected by an application, create the modules of the curriculum in a common format, using the template. The modules will be finalised after considering the reflections of some practicing teachers.

Continuous communication: Different tools (thematic meetings, leaflets, a webpage, newsletters, and a conference) are used to inform teachers about the milestones of the development process and an online forum is operated to share their ideas and suggestions.

Online teachers’ manual: Supporting teachers is one of the core elements of the successful implementation of the intended curriculum. The teachers’ manual, should be produced by the end of this academic year, incorporating a range of practical information to help teachers. It will contain the conceptual framework, the skeleton of the curriculum, and the detailed programme of some learning units. The online format makes its continuous update easy.

Improving a teachers training programme: An accredited teachers training programme, organized in blended form, will provide theoretical and methodological support for the teachers in need.

**Conclusion**

The situation of teaching natural sciences in vocational secondary schools in Hungary has changed so dramatically that it has to take on absolutely new basis. As the main target of Science is the improving the scientific literacy, the new curriculum should focus on the skills to be developed (such as thinking skills, inquiry skills, and 21st century skills) and the facilitation of active learning. The topics of the curriculum are only tools for skill (and personality) development, they should be motivating for both students and teachers, and should serve for active learning. The topics have to be problem-centred. Teachers have to possess different methods of active learning (e.g. experimental learning, inquiry based learning, debate) and ways to improve the scientific skills. Teachers with different experiences, motivations, attitudes, and needs should be able to tailor the curriculum for their situation. A wide range of complex scientific topics connected to daily life and possible methodologies to study them could support the implementation, offering both a general framework and professional autonomy. A teacher training programme, a teachers’ manual, and supporting the horizontal learning of teachers are equally important elements of the implementation and the continuous development of the programme.

**Keywords:** paradigm shift, curriculum development, active learning
References


