Science curriculum formation in Denmark
Challenges in introducing a new curriculum
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The focus of this paper is to give an account of the process by which the most recent physics/chemistry lower-secondary school curriculum was formed in Denmark. The main empirical source is interviews with five key persons involved in producing the curriculum. New features were introduced into the curriculum for the first time, including competence goals and a special matrix structure for describing the entire curriculum in terms of learning goals. The specific concern of this investigation was that apparent discrepancies between the actual curriculum document, and the ways in which it was being presented would serve to create unnecessary difficulties for teachers. This issue is particularly salient in relation to the Danish curriculum, because teachers are expected to interpret specific curriculum requirements in relation to the general purpose of subject, and then form teaching units that often must integrate different points within these requirements. Rather than speculate about the validity of these discrepancies, the aim was to reveal the actual process by which the curriculum was formed, in order to give an empirical underpinning for a sharper interpretation of the actual document. The expectation is that more insight into the actual construction of the curriculum will help teachers and researchers better understand how to approach using an official curriculum. The interviews revealed several critical points where the actual document produced did not actually reflect the general characteristics that were used to describe the curriculum. While these mismatches do not make the new curriculum unusable, the lack of documentation and public acknowledgement of these discrepancies serve to hinder productive use of the curriculum. The paper concludes with a reflection about the need for acknowledging discrepancies in the communication of official curriculum documents, as a way to improve the realisation of their intentions.

Keywords: curriculum-making, curriculum reform, physics/chemistry curriculum

INTRODUCTION

In 2013, a new lower-secondary science curriculum was introduced into Denmark, as part of a general reform of the primary and lower-secondary curriculum for all subject-matter areas. On the one hand, the basic content of this new curriculum was familiar because the revision started with the existing curriculum from 2009, but with the requirement to remove some of the content, without adding any new content. On the other hand, the new curriculum was radically different from the 2009 curriculum, because some new features were introduced, which had not previously been used in the Danish curriculum. In particular, the entire curriculum was formulated in terms of knowledge, skill, and competence goals, which was inspired by the European Qualification Framework for Lifelong Learning (2008). Furthermore a special matrix structure was developed to express the relationship between knowledge, skill, and competence goals.

For a variety of reasons, a need arose to investigate the process by which the new structure of the curriculum was produced. One set of reasons concerned that lack of clarity about how to understand this new structure.

a. The new features introduce radical new challenges for school teachers, because they have not previously worked with a curriculum formulated in terms of learning goals, and they have not worked with competence goals for pupils’ achievement.

b. While the Ministry provided a guidance document which explained how to use the new curriculum structure, there were no background documents available from the Ministry of Education, which explained systematically the logic or motivation of this new matrix structure, and it has not been possible to find examples of this kind of structure elsewhere in the academic research literature.
c. Most importantly, it appeared that there were discrepancies between the logical structure of the matrix that was used to present the curriculum, and what appeared in the actual document.

A second set of reasons concerned the fact that this new curriculum revision is considered an important part of a larger school reform, which is part of a broad political agreement. Part of the agreement was that the curriculum should be simplified to support raising the academic level of pupils’ achievement, and to make it easier both for teachers’ daily work with planning, implementing, and evaluating teaching, and for leaders and parents to understand the curriculum, so that they could be actively involved in supporting pupils learning (Aftale, 2013, p. 9). This simplification effort was motivated in largely because of an evaluation report that documented a variety of reasons for why teachers were not using the existing curriculum (Danmarks Evalueringsinstitut, 2012). However, if the new curriculum structure is not easy to understand, as noted in the previous point, then there is a present danger that the good intentions of the curriculum reform will be lost (despite the good intention to clarify and simplify the curriculum). There are already many well-documented examples of the failure of school reforms to achieve their purposes because the key actors (e.g., teachers) do not understand adequately what is being requested (e.g., Spillane, 2004).

A third set of reasons arose from criticisms and concerns raised in academic and professional publications about the new focus on learning goals as a way to describe the curriculum. Some of these debates were heated, but at times it seems that many of the criticisms were based on a misunderstanding of the new curriculum and how it was supposed to be used. And a final set of reasons arose from my practical experience with teachers, where many seemed to be interpreting the new curriculum as defining the limits of what could be permitted in their teaching, rather than appreciating the need to work constructively and integrative in relation to the curriculum.

Although the new curriculum was made by working groups, which the Ministry has commissioned, the formal status was such that the Ministry was responsible for the formulation of the curriculum, which was formally approved by an act of Parliament. From this point of view, it seemed difficult for members of the working groups to make public statements about the curriculum, including how to interpret or understand then new, unfamiliar structures.

In light of this situation, I decided to make interviews with persons who were involved in the process of producing the new curriculum. Rather than speculate about the intentions and characteristics of the new curriculum, it seems appropriate to get an empirically-grounded understanding of the origins of the curriculum structure, which could be used to give a more justified interpretation of the curriculum and how to use it. The basic focus of this paper is to provide an account of the process by which the most recent physics/chemistry curriculum for lower-secondary education in Denmark was formed. A special feature of the paper is that the analysis is based on interviews were five persons who were centrally involved in the process.

**METHOD**

The curriculum revision for the physics/chemistry curriculum occurred in two phases. In the first phase, a so-called “master” group was commissioned by the Ministry of Education to develop a general template by which learning goals should be described. The same template was to be used for all subject-matter areas. Thereafter a workgroup for physics/chemistry was commissioned to use the general structure to guide their formulation of the new curriculum.

The “master” group had 11 members, where three of them were ministry officials, and three others were appointed from school unions and the regional government association. The remaining five members had either an academic (3) or professional (2) background. Interviews were conducted with two of the academic
members and one of the professional members. The physics/chemistry workgroup had five members plus a ministry liaison. Two members of the workgroup were interviewed.

Prior to the interviews, I obtained documents that described the commission of the master group and the workgroup in physics/chemistry, as well as the instructions that were given to the workgroup. I also obtained the timeplan and meeting schedules for both the master and workgroup. Semi-structured interviews were used. The informants were asked to give a chronological account of the process by which they conducted their work with the master template or with the physics/chemistry curriculum. Informants were asked to focus only on describing the process, and not to give their opinions about the process. The intent was to obtain a reasonably descriptive account of what happened, rather than presuppose a particular interpretation in advance. The master group interviews were completed prior to the interviews with the workgroup, so that it was possible to understand the intentions of the master group, when interviewing the physics/chemistry workgroup.

RESULTS AND DISCUSSION

The interviews with the members of the physics/chemistry workgroup revealed that they had difficulties in following the template provided by the master group. The process can be characterized as a dialectical interaction, in which the workgroup attempted to fit the content to the constraints and requirements matrix structure. They then evaluated their attempt, making adjustments, which often broke with the template structure, so that they could preserve coherence, or be sure to include topics that have been historically important in the curriculum. Rather than a simple process of “filling in the blanks” of a generic template, the final product emerged out of repeated efforts to create a coherent structure, without the workgroup ever having a predetermined plan that they were trying to implement.

An argument is made that it is impossible to provide an unambiguous curriculum document. The present investigation shows that it could be productive for a Ministry to include meta-communication about their curriculum documents, particularly to identify areas where the existing documents do not actually meet the intended characteristics. These honest communications of “failure” may prove to be an effective way to help teachers and others gain better insight into the intentions and characteristics of the curriculum documents.

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