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Making educational reforms practical for teachers : using a modular, success-oriented approach to make a context-based educational reform practical for implementation in Dutch biology education

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Summary

Teachers play a crucial role in the implementation of educational reforms. A successful implementation ultimately depends on how teachers work out the reform proposal in their everyday classroom practice. To implement the reforms the teachers need to translate the reform proposals to their everyday classroom practice. This is often a challenging task because educational reforms are usually formulated at a relatively abstract level, for example as goals or principles, instead of at the concrete level of the everyday classroom practice. This everyday practice with all its limitations and challenges strongly determines what teachers are willing and able to implement and hence the success of the implementation of the educational reforms. Teachers tend to adjust the proposed reform to match their own teaching practices, which often undermines the essence of the reforms.

The research in this dissertation focuses on ways in which reforms can be implemented, taking into account both the everyday practices of teachers and the goals and principles of a reform proposal. Literature emphasizes that the practicality of a reform should hereby be the focal point.

The specific educational reform proposal that was researched was the current educational reform for biology education in the Netherlands: the introduction of a context-based approach. This reform is proposed by The National Reform Committee for Biology Education (CVBO) to address three issues in biology education: a lack of relevance, a lack of coherence between biological concepts and an overloaded curriculum for the students. One of the main principles behind this reform is that biological knowledge is organised and offered in contexts that are relevant to students. The CVBO presented the context-based approach mainly as an update of the subject matter, whereby it is inevitable that there are implications for the everyday teaching practice.

The central question in this dissertation asks how the context-based approach can be made practical for teachers. To answer this central research question, it is important to know which criteria need to be met for educational reforms to be

considered practical by teachers. First, teachers should be able to envision how the reform would work out in their classrooms (instrumentality). Second, the content of the proposal should be connected to how teachers regularly teach (congruency) and third, the proposal should have high benefits and low cost in terms of effort and time (cost). In this dissertation, two correlated approaches are presented that are based on the above-mentioned criteria for practicality and aim to make educational reforms practical: a modular approach and a success-oriented approach.

The modular approach is based on working with lesson segments as building blocks for a lesson. An educational reform can be described in terms of already existing lesson segments. Hence a reform can often be realized through recombining and adjusting already existing lesson segments. The modular approach used in this study uses lesson segments to design lessons that teachers regularly teach. With the lesson segments the following steps were taken: (1) the usual, most observed lesson of a teacher was categorized into lesson segments; (2) this was evaluated by the teacher and compared with the educational reform, which was also split up into lesson segments; (3) the teacher could then change the order or the content of the lesson segments to adjust his regular teaching practice in the direction of the desired educational reform.

The success-oriented approach implies building on the foundations of earlier successful experiences to achieve a certain goal. A process of change is often started by identifying and analysing problems and followed by offering information or help to eradicate deficiencies. Using elements of solution-focused psychotherapy this research proposes a different approach: building on earlier successful experiences. The success-oriented approach in this research meant that teachers looked back on their previous lessons in which they had had a successful experience with aspects of context-based education (e.g., "I had a successful lesson a few years back in which students took the role of General Practitioner and had to educate others about contraceptives"). These earlier successful experiences with aspects of the reform were then used by teachers to propose changes in their own teaching practices that were in line with the reform. In this research the modular and the success-oriented approach for making an educational reform practical have been worked out in four separate studies.

In the **first study** (Chapter 2) an ID model was designed to structure the modular approach. The most important criteria for this instrument were that it

should contain lesson segments that allowed teachers to (1) identify all sorts of lesson practices and (2) change their lesson practices towards the given change proposal. After constructing an initial model, it was internally validated through a Delphi study, in which eleven teacher educators took part as experts in various school subjects. In three phases of individual responses and anonymous individual feedback, the experts reached consensus on a model that met the required criteria. The resulting model exists of a set of lesson segments with which, by selecting and rearranging, a wide variety of instructional approaches can be analysed and generated. The model relates to the criteria of practicality in the following way: it is instrumental, congruent and involves little cost because teachers can create new content with already familiar lesson segments, and through rearranging and adjusting can realize a proposed reform.

In the **second study** (Chapter 3) we focused on the way in which making the context-based approach practical influences teachers' intentions to change their everyday practice towards the reform. Both the modular and the success-oriented approach were used to develop a 'Motivating-for-Educational-Change' interview technique (MECI) that was used in interviews with nine biology teachers. After the interviews the strength and the specificity of the resulting intentions were compared with the baseline values ($t=0$). During the interviews it became clear that by comparing lesson segments, every teacher was able to think back of a successful experience that covered (an aspect of) context-based education. After the interviews it further became clear that participating teachers had more, stronger and more specific intentions. The reason that was given for this was that looking back on earlier successful experiences helped them to realize that they had already applied some aspects of the educational reform in their regular lessons. This led to a feeling of competence, but also to a better understanding of how the reform could be worked out in a classroom setting. Thus, the interview technique is a potential tool to motivate teachers for change at the onset of professionalization initiatives.

The **third study** (Chapter 4) describes the development and the implementation of a professional development program and analyses the way in which making the context-based approach practical, influenced the lesson practices and intentions of participating teachers ($n=8$). The underlying design criteria for this professional development program were both the modular and the success-oriented approach,

and also the support given to participating teachers, which was from a distance and according to their individual needs. The results show that teachers maintain their strong intentions to change during the process. Furthermore, there seems to be a more or less shared learning route that is followed when teachers start to change their regular teaching practice towards the reform. The success-oriented approach appears to have had specific influence on formulating strong intentions, which relates to the criteria of congruence. The modular approach, in which teachers worked with lesson segments, was mentioned as an essential part of the process by virtually all participants. Teachers indicated that this helped them to see how the reform is linked to their current teaching practice, but also how to practically work out the reform in a classroom setting. Hence this approach seems to be congruent, instrumental and involve low cost. The support for the teachers, from a distance and according to their individual needs, was experienced as positive, especially because preparing the lessons and reflecting on the lessons could be done in their own environment and in their own time. In this way this last design criteria adds to the practicality by its low cost.

In the **fourth study** (Chapter 5) the research focused on a different way of experiencing success. In general teachers reflect on problems and/or successes on the basis of their own subjective impressions of a comment from a single student. This chapter analyses the measure in which teachers could use more objective student data both to experience success and to change their lesson practice. Two problems needed to be taken into account: (1) technical problems such as not knowing how to collect students' data or not having time to collect these data and (2) problems to interpret and use these data to propose a change.

In this study, teachers collected data from students in a practical way by giving out short questionnaires in their own lessons to measure the learning outcome as well as the guidance of the learning process. Teachers each went through a 'Plan-Do-Check-Act' (PDCA) cycle four times, in which they prepared a lesson for 'Plan', they gave the lesson and collected data in 'Do', they interpreted data in 'Check' and they formulated intentions to change in 'Act'. In the 'Check' and 'Act' phase the teachers received support. Using the data-frame theory a few practically relevant 'frames' were developed. These frames were designed to help teachers allocate the student data to a specific part of their lesson and were based on the modular approach. Two elements were analysed:

(1) the way in which teachers used the frames to interpret and use their student data in the 'Check' and 'Act' phase and (2) the way in which the students' data can serve to objectify the successful experiences and the influence this has on the development of lesson practices of participating teachers.

The final chapter (Chapter 6) describes and discusses the findings of all the research. The separate studies show the measure in which a modular and a success-oriented approach have made context-based education practical for teachers. It showed that combining these two approaches can help teachers to (1) formulate strong and specific intentions to change and (2) gradually change their regular teaching practice towards the proposed reform.

Using the modular approach helped teachers to understand the proposed reform in relation to their own teaching practice. Furthermore, this approach helped teachers to take their own teaching practice as a starting point for their process of change. With this the modular approach relates to two criteria of practicality, namely instrumentality and congruence. The success-oriented approach proved to help teachers to relate the reform to something they had already successfully tried out in their own teaching practice, which relates to the criteria of congruence. Thinking back to earlier successful experiences also provided new ideas with regard to practically working out the reform, which in turn influenced the specificity of the intentions. This relates to the criteria of instrumentality. Both approaches combined helped teachers to experience the benefits of the proposed reform in a relatively short time and with little means, which specifically relates to the practicality criteria of low cost.

As with every research, this research has its limitations. In this research a choice was made to study the topic in a qualitative manner with a relatively small amount of participants. It is therefore recommended that the outcomes of this research be further explored in larger groups. Further research could also include aspects that were left out for this research, e.g.: How do teachers' beliefs develop during a professional development program that is aimed at teaching teachers how to teach context-based education? Another possible study could include analysing the development of the strength and specificity of intentions when the MECI interviews are held for different educational reforms.

This research project has given several suggestions for successfully implementing educational reforms. Firstly, educational reforms should be split up into smaller units (lesson segments) that are identifiable for teachers in their everyday practice. Secondly, for every individual teacher strengths and earlier successful experiences should be identified with the help of a 'Motivating for Educational Change' interview (MECI). In this interview teachers will be asked to formulate intentions for a first change in their teaching practice. Thirdly, this could be followed up by a professional development program that is based on both the modular and the success-oriented approach. In this program teachers can build on previous successes and gradually change their teaching practice towards the educational reform. In this way an educational reform can be made practical for teachers for implementation in everyday classroom practices, without losing the essence of the reform.