



Curriculum in development

SLO • Netherlands Institute for Curriculum Development

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Colophon

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Preface

Curriculum in development. The title of this book refers to both the dynamic discussions that continuously take place across a wide range of curricular issues and the evolutionary thinking about concepts and approaches in curriculum development. Changes in society constantly demand new knowledge and skills and require the continuous development of our educational system. How do processes of curriculum development evolve? What actually is a curriculum? And how to ensure the quality of curricular products? This book will focus on these questions.

What started as an endeavour to summarize our knowledge base about curriculum development for our colleagues at SLO, may also provide teachers, educators, policy makers, and other parties involved in educational development with a clear and concise introduction into the tricks of the trade of curriculum development.

The book discusses basic concepts in curriculum development and presents useful frames of thinking and strategies. The notions presented in this book, edited by us on the basis of contributions by various SLO colleagues, will continue to develop over the coming years. No doubt, there will be subsequent versions.

Annette Thijs & Jan van den Akker

1. Curriculum and curriculum development

1.1 What is a curriculum?

1.1.1 Curriculum or 'leerplan'

Occasionally it turns out to be surprisingly difficult to define seemingly simple terms in a concise and univocal manner. A well-known complaint found in international educational literature is that there are as many definitions of the term 'curriculum' as there are authors. While some authors are expansively verbose, others demonstrate a rather narrow view limited to a specific context. In confusing cases such as this, it often helps to search for the etymological origin of the concept. The word curriculum stems from the Latin verb *currere*, which means *to run*. The Latin noun curriculum refers to both a 'course' and a 'vehicle'. In the context of education, the most obvious interpretation of the word is to view it as a course for 'learning'. The very short definition of curriculum as a '*plan for learning*', used by the American Hilda Taba in 1962, therefore seems quite adequate. It is reflected by related terms in many languages, including the classical Dutch term *leerplan*, the German *Lehrplan*, and the Swedish *läroplan*. In line with Taba, we propose to define the term curriculum as a *plan for learning*. This simple definition does not easily or unnecessarily narrow the perspective, but permits all sorts of elaboration for specific curricular levels, contexts and representations. Such specifications will prove quite helpful to interpret, understand and communicate about curriculum issues.

1.1.2 Levels and curriculum products

A first, extremely useful, distinction appears to be a specification of the level of curriculum and curriculum development. Although many further refinements are possible, the following division into five segments has proved to be very useful to understand the different levels to which curriculum products may apply (cf. van den Akker, 2003, 2006).

Level	Description	Examples
SUPRA	International	• Common European Framework of References for Languages
MACRO	System, national	• Core objectives, attainment levels • Examination programmes
MESO	School, institute	• School programme • Educational programme
MICRO	Classroom, teacher	• Teaching plan, instructional materials • Module, course • Textbooks
NANO	Pupil, individual	• Personal plan for learning • Individual course of learning

Table 1: Curriculum levels and curriculum products

The 'higher' curriculum levels will affect the 'lower' ones, especially if they have a mandatory status that limits the room to manoeuvre for large target groups. A clear example is the influence of examination programmes and core objectives on textbooks. Authors take these macro frameworks carefully into account. Teachers, in turn, place such great confidence in this that they will hardly consult the original policy documents. The relationships from macro via meso to micro are looser. Certainly in the Netherlands, with its tradition of freedom of educational organization, the government tends to exercise restraint in stipulating content, and allows schools, teachers and pupils a relatively large amount of curricular freedom.

It is also helpful to realize that curriculum products, including those at micro level, may vary strongly in their scope and scale, ranging from generic, e.g. publishers' methods, to very site-specific, such as a teaching plan designed by a teacher for use in his own practice. In case of large-scale curriculum innovations with generic intentions, many distribution and implementation problems often occur. The challenge for professional curriculum developers who operate on different levels is to anticipate these, not only concerning the product characteristics, but also, in collaboration with the many parties involved, regarding the change strategy.

1.1.3 Curriculum representations

A second, clarifying distinction concerns the different forms in which curricula can be represented. Although further refinement is possible, the following three levels, split up into six forms, will normally suffice for clear communication.

INTENDED	Ideal	Vision (rationale or basic philosophy underlying a curriculum)
	Formal/Written	Intentions as specified in curriculum documents and/or materials
IMPLEMENTED	Perceived	Curriculum as interpreted by its users (especially teachers)
	Operational	Actual process of teaching and learning (also: curriculum-in-action)
ATTAINED	Experiential	Learning experiences as perceived by learners
	Learned	Resulting learning outcomes of learners

Table 2: Forms of curriculum

The division into six representations, built on the work by John Goodlad (1979; see also van den Akker, 2003), is especially useful in the analysis of the processes and the outcomes of curriculum innovations. The more global three-way division is often used in international comparative studies that frequently focus on large-scale assessment of attainment levels

within the curriculum, and sometimes on the endeavours to relate the effects to the original intentions and – regrettably rarely as yet – to the implementation process. In any case, this distinction of forms emphasizes the different layers of the curriculum concept and demonstrates the often substantial discrepancies between the various forms. Although this may not necessarily be a problem, an often-voiced desire is to reduce the gap between dreams, actions and results. The bottom layers often provide more possibilities for observation and assessment. Especially implicit assumptions and views are not easily defined in a clear-cut and unambiguous manner, while they do affect the educational practice; that is why these are sometimes referred to as the ‘hidden’ curriculum.

1.1.4 The curricular spider web

The core of a curriculum generally concerns the aims and content of learning. Changes to this core usually presuppose changes to many other aspects of (the plan for) learning. A clarifying way to visualize the relationship between the various aspects is the so-called *curricular spider web* (van den Akker, 2003).

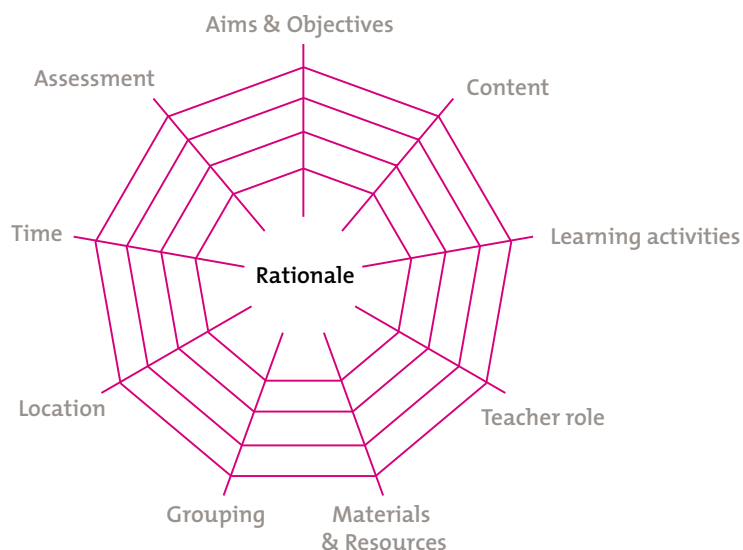


Figure 1: The curricular spider web

The core and the nine threads of the spider web refer to the ten parts of a curriculum, each concerning an aspect of learning and the learning programme for pupils (see Table 3).

COMPONENT	CORE QUESTION
Rationale	Why are they learning?
Aims and objectives	Towards which goals are they learning?
Content	What are they learning?
Learning activities	How are they learning?
Teacher role	How is the teacher facilitating their learning?
Materials and resources	With what are they learning?
Grouping	With whom are they learning?
Location	Where are they learning?
Time	When are they learning?
Assessment	How is their learning assessed?

Table 3: Curriculum components in question form

The rationale serves as a central link, connecting all other curriculum components. Ideally, these are also connected to each other, providing consistency and coherence. The metaphor of the spider web emphasizes the vulnerable nature of a curriculum. Although a spider web is relatively flexible, it will most certainly rip if certain threads are pulled at more strongly or more frequently than others. The spider web thus illustrates a familiar expression: every chain is as strong as its weakest link. It may not be surprising, therefore, that sustainable curriculum innovation is often extremely difficult to realize.

Curriculum design or innovation can start with any component. Traditionally, the learning content receives the most attention. Over the past years, new insights and views about learning have provided a source of inspiration for innovation. Whereas textbooks have been a significant component of the curriculum for a long time – they were, sometimes, even put on the same footing – the recent opportunities presented by ict provide a new impulse for change. The location, also, proves to be a less neutral factor than was often presupposed. Learning may take place anywhere inside or outside the school building, and the layout of the learning environment appears to be more influential than presupposed. The time factor is a classical object of curriculum discussions: how is the always scarce amount of time distributed across domains and learning tasks?

Naturally, the relevance of the ten components varies for the five curriculum levels mentioned earlier. At macro level, for example, the ‘what questions’ concerning objectives and content components usually receive more attention than the ‘how questions’ concerning pedagogy, educational materials, and the learning environment. Also, the consistency between objectives and content on the one hand and assessment and examinations on the other is of great importance at the macro level.

At school and classroom level nearly all components play a role. Here, overall consistency is

of crucial importance for successful and sustainable implementation of innovations. This is a great challenge. It is an often uphill struggle with much trial and error, while making only slow progress.

1.1.5 Perspectives on curricular issues

There are many different ways to look at curricular issues. Three prominent perspectives are:

- *substantive perspective*
focusing on the classical curriculum question about what knowledge is of most worth for teaching and learning (see paragraph 1.1.6)
- *technical professional perspective*
referring to how to address curriculum development tasks, especially the professional challenge of successfully translating intentions into curriculum products, that are used in practice and that lead to desirable learning outcomes (see Chapter 2)
- *socio-political perspective*
referring to curriculum decision-making processes and, indeed, battlefields (see Chapter 2), where values and interests of different stakeholders play a role.

Although distinction between the three perspectives is useful for studies and analytical activities, all three play an equally important part in practice. It is therefore important for design teams to include sufficient expertise for each of the three aspects.

In addition to the above-mentioned three perspectives, a ‘critical’ perspective becomes visible in a part of the – often sociological – curriculum literature. Here, the emphasis lies on a critical analysis of the shortcomings of the educational system, in particular its curricular aspects. Typical questions include: Who defines the content of the curriculum? What are the – both formal and hidden – effects of the curriculum for certain target groups?

1.1.6 The content perspective: views on the ‘what’ of learning

The question ‘What are we going to learn?’ is a core question in curriculum development. What are desirable aims and content to equip pupils for their role in tomorrow’s society? Developments in technology, economics and science call for a continuously changing set of desirable knowledge and skills (Klep, Letschert & Thijs, 2004). Opinions about what we should be teaching pupils are much divided. This is clearly reflected in the media, where articles about the importance of innovation and concerns about the quality of the educational system are the order of the day. Many stakeholders are involved, each taking its own stance: parents, pupils, teachers, trade & industry, trade unions, religious groups, social

organizations, researchers, and, of course, politics. Each group has its own considerations and preferences related to pedagogical views, concerns about qualification, subject-matter insights, and political or societal issues. Also, the predilection for tradition – the nostalgic curriculum – plays a part; from their own educational experience, people often have deeply rooted views on how education should be shaped.

The more complex society becomes, the greater the pressure on education to do justice to a variety of social interests. In order to avoid overloading, it is important to prioritize. We need to make bold choices based on clear arguments. But which arguments really matter? In literature on curriculum development, three main sources for selection and prioritizing aims and content are mentioned:

- knowledge: academic and cultural heritage for learning and future development
- social preparation: issues relevant for inclusion from the perspective of societal trends and needs
- personal development: elements of importance to learning and development from the personal and educational needs and interests of learners themselves.

This trichotomy is clearly articulated by Tyler (1949). Tyler believed that subject disciplines' needs, society's needs, and pupils' needs, should together determine the educational objectives. In his view, a good curriculum strikes the right balance between these three perspectives. Additionally, educational-philosophical and learning-psychological considerations may help to further limit and refine.

In addition to choosing the most relevant content, curriculum development also concerns the sequencing of content into a consistent and coherent curriculum. It is essential to arrive at a coherent organization of content, both horizontally and vertically. The *horizontal coherence* involves the coherence between subjects and/or subject-transcending themes within domains of the same educational level. Horizontal coherence may also be realized by tuning in other components from the spider web, for example when teachers make mutual agreements upon forms of assessment. Also, the coherence between intramural and extramural activities can be looked into, for example in art and culture education. The *vertical coherence* of content across one or more school years is often visualized by means of curricular strands. Curricular strands, or longitudinal learning trajectories, are sequences of learning content. Such a sequence may be linear, stepped, or concentric. Curricular strands are also concerned with the alignment of educational objectives and content between subsequent educational stages.

1.2 What is curriculum development?

1.2.1 Five core activities

Curriculum development is focused on the improvement and innovation of education. During this process, which may take many years – especially where generic curriculum development is concerned, which extends beyond a specific local context – desires and ideals are incorporated in a cyclic process of design, implementation and evaluation to achieve concrete results in practice. Literature contains a variety of models for curriculum development (see van den Akker & Kuiper, 2007). In these models five core activities are distinguished, as shown in Figure 2.

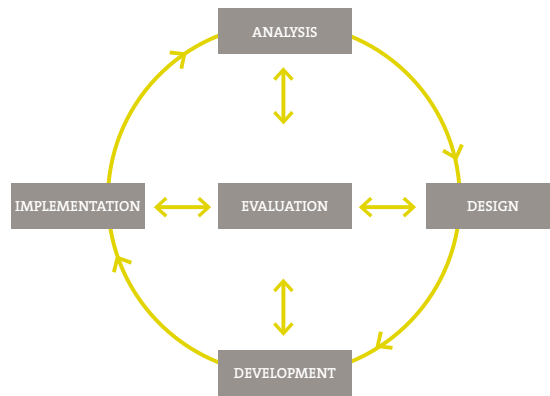


Figure 2: Core activities in curriculum development

In a cyclic process, analysis, design, development, implementation, and evaluation take place interactively. Curriculum development often starts with an analysis of the existing setting and the formulation of intentions for the proposed change or innovation. Important activities in this phase include a problem analysis, a context analysis, a needs analysis, and an analysis of the knowledge base. Based on these activities, first design guidelines are drawn up. The design requirements are carefully developed, tested and refined into a relevant and usable product. Evaluation plays an important role in this process, as can be seen from its central position in the model. Evaluation activities cast light on the users' wishes and possibilities in their practical context and reveal the best way to attune the product to the practical setting. When the product has sufficient relevance, consistency and practical usability, the impact of the product can be investigated. Whereas the primary emphasis lies on generating suggestions for product improvement (formative evaluation), during later phases, this emphasis is shifted towards the evaluation of effectiveness (summative evaluation) (see Chapter 3).

1.2.2 Four approaches to curriculum development

How the five core activities are conducted depends on the development approach envisaged by the curriculum developer. Four types of curriculum development approaches can be distinguished (Visscher-Voerman & Gustafson, 2004):

- instrumental approach
- communicative approach
- artistic approach
- pragmatic approach.

Instrumental approach

The instrumental approach emphasizes the importance of a *systematic design process*. Based on thorough analysis, clear and measurable objectives for the development process are formulated. These objectives provide the reference points for the design process (planning by objectives).

An important advocate of this movement is Ralph Tyler. He was one of the first curriculum thinkers to reflect on strategies for systematic curriculum development. In his influential book *Basic principles of curriculum and instruction* (1949), which has been published in 36 editions and nine languages, he made it his aim to simplify and systematize the complex task of developers by providing them with a clear, step-by-step plan. Using insights gained from large-scale studies into educational innovation, he arrived at a framework, the *Tyler rationale*, comprising four important questions for all curriculum developers himself:

- *Objectives:*
which objectives should education aim for?
- *Learning experiences:*
which learning experiences are most suitable in order to obtain these objectives?
- *Organization:*
how could these learning experiences be organized effectively?
- *Evaluation:*
how can we determine whether the objectives have been achieved?

Apart from these, Tyler formulated a fifth question, which is usually ignored when referring to Tyler's ideas, but which is quite relevant in the Netherlands: What is the best way for schools to conduct this process? This question is discussed in paragraph 2.2.

The Tyler rationale is widely used. Its strength lies in its simplicity: the complex design process is reduced to just a handful of questions (which, by the way, are further elaborated and specified by Taba in 1962). The Tyler rationale also emphasizes the importance of a rational and goal-directed approach. By systematically answering the four main questions based on factual arguments, the validity and internal consistency of a curricular product

can be enhanced. Critics, however, also point at a few disadvantages of this instrumental approach. The strong emphasis on the attainment of predetermined objectives leaves little flexibility to adjust to the often changing needs of users and growing insights of designers. Also, the technical approach focuses on factual, empirically found data, while education is also concerned with personal views and opinions; also, social-political aspects play a prominent part in many curricular issues.

Communicative approach

The communicative approach emphasizes the importance of *relational* strategies. From this perspective, building relationships with stakeholders and soliciting the input of developers and other parties involved are crucial. Whereas an objective analysis of the problem situation forms the starting point for an instrumental approach, the communicative approach starts with the more subjective perceptions and views of the designers, the target group, and other stakeholders. Designing is regarded as a social process in which the interested parties each have their own vision on the problem situation and the desired improvement. The best solution for the situation – i.e. the best design – is the one in which all parties involved reach consensus. Therefore, deliberation and negotiation are the core of the design process.

A well-known example of the communicative approach in curriculum development is the *deliberative model* by Decker Walker (1971, 1990). In Walker's view, the then popular instrumental models, such as Tyler's, were not of much use in the complex practice of negotiations about desired features of curricular products. Walker's ambition was to make a naturalistic model that would reflect the actual practice of curriculum development. His model comprises three phases:

- *The platform of ideas:*
During this first phase, designers and other parties involved present their views and opinions about the problem, while striving for consensus
- *Deliberation:*
Designers and other parties involved generate possible solutions for the problem identified and discuss the most desirable solution
- *Design:*
During this phase, the results of the deliberation phase are transformed into a draft of the final product.

One of the strengths of the deliberative model is the broad social support that the intended product will have; after all, users and other parties involved were given ample opportunity to contribute. However, deliberation processes can be very time-consuming and laborious and may not necessarily result in internally consistent products.

Artistic approach

The artistic approach emphasizes the *creativity* of the designer. In this approach, it is assumed that designing is a subjective process that is guided by designers' personal views and expertise. There are no objective criteria or fixed procedures for them to follow; it is more important for designers to creatively anticipate, from their own vision, the unique characteristics of the target group. Above all else, the designer is an artist who will follow his own intuition, taste and experience as guidelines in the design process. In this context, Elliot Eisner (1979) uses the term '*connoisseurship*': the skills and the ability to value what is educationally relevant. Like wine-tasting, designers will sharpen their visions and expand their curricular insights by experience and by comparing their ideas to those of others.

Eisner is a well-known advocate of the artistic approach of curriculum development. In his book *Educational Imagination* (1979), he emphasizes the importance of a more holistic approach to education, in which the teacher plays a central part. In his view, design decisions that matter are taken by teachers. Teachers will anticipate the situation as it happens and make decisions about the curriculum based on their own vision and experience. According to Eisner, such a reflection on the curriculum should be aimed at the seven aspects of the curriculum: objectives, content, learning situations, organization of learning experiences, organization of content, presentation forms, and evaluation forms. The artistic approach points curriculum developers to the importance of *creative interaction* with the unique characteristics of the specific context. The strength of this approach lies in the emphasis it puts on curriculum enactment in practice and the room it provides to constantly attune the curriculum to meet the needs of the students in a meaningful way. A drawback is the often narrow scope of the products, because they are focused on a specific context of use and are based on the particular vision of the designer.

Pragmatic approach

The pragmatic approach focuses on the *practical usability* of curricular products. Curriculum development takes place in close interaction with local practice and users. Formative evaluation is a core activity. Design and evaluation activities take place interactively. Based on a short preliminary study, in which experts and literature are consulted, a first, rough outline of a possible final product is developed relatively quickly. In this first *prototype*, specifications of the design are visualized. This prototype is developed into a full version of the product during a number of rounds of design, evaluation and revision. By constantly gearing the product to the wishes and possibilities of the users, the prototyping method aims to increase ownership and practical usability of the product. This close interaction with practice can be challenging at times, for example if users' wishes greatly vary or if they are difficult to combine with the insights of experts and literature. In that case, the designer's vision should be the deciding factor.

The general aspects of the four design approaches are summarized in the table below.

	Instrumental approach	Communicative approach	Artistic approach	Pragmatic approach
Sequence of activities	Logical sequence	No strict sequence	Completely open process	Cyclical
Characterization of activities	Rational process	Intensive deliberation during a part of the process	Creative reflection during the whole process	Frequent evaluation with users
A good curriculum	meeting predetermined requirements	meeting requirements about which a broad consensus exists	meeting the designer's requirements	meeting the users' requirements

Table 4: Characteristics of design approaches

The four approaches each contain valuable elements. Which approach is to be preferred depends on the level of curriculum development. At macro level, the communicative or instrumental approach is often used, while the artistic one is more suitable for use at micro level, in the classroom. The scope of the curricular product also plays a part. For the development of context-specific products, the artistic or pragmatic approach will offer great possibilities, while the instrumental or communicative approach is especially useful for the development of generic products. Finally, the approach chosen depends on the composition of the design team. In a large team of designers, much time is needed for discussion, which will automatically place the emphasis on the deliberative approach. If the designer operates alone or as part of a small team, there is more latitude for individual creativity, as emphasized in an artistic approach.

2. Curriculum development at different levels

In Chapter 1, different approaches to curriculum development were discussed. We have seen that the approaches vary according to the level at which curriculum development takes place. In this chapter, we will describe the process of curriculum development at three levels within the educational system: national level (macro), school level (meso) and pupil level (micro). We will discuss the strategies, core questions and challenges that play a role in these three contexts.

2.1 Curriculum development at macro level

2.1.1 A multitude of claims

Curriculum development at macro level focuses on the development of generic curricular frameworks.

These frameworks, such as core objectives and examination programmes, provide guidelines for educational objectives and content at national level. An important challenge in the development of these frameworks is to meet with the great diversity of societal demands on education. Many stakeholders and ‘claimants’ have their own demands and expectations concerning education. These curricular requirements are coloured by the interests they have or represent, such as the interests of parents and parents’ associations, religious groups, trade & industry, lobby groups, or social organizations. Each group has its own vision on education, subject content, moral issues, and desirable social competences. Many of the *claims* from society are reflected by the *aims* of education, i.e. the assignments or objectives to be realized or aimed for. As a result of the growing diversity and dynamics in society, the social expectations of education are greatly inflated, increasing the pressure on schools and teachers.

The government is responsible for the quality of education. A major challenge is to deal with the different expectations in society, elaborate these in well-balanced curricular frameworks, and to monitor and stimulate the quality of educational output based on these frameworks. To monitor the quality of education, the government draws up laws and regulations by defining, on macro level, examination requirements, core objectives, attainment targets, qualification frameworks, periodic assessments, and frameworks for supervision and enforcement.

A core question for the government is which common objectives to pursue in education. In almost all European and other western-oriented countries, there is a broad debate on what should be at the core of education. The central question in this debate is how to shape education in such a way that it passes on relevant cultural heritage, prepares students for their participation in society, and allows them to develop their talents to the full.

How education can contribute to the knowledge society and strengthen the economic competitiveness of a country is another popular subject for discussion, as is the contribution of education to a variety of social needs. Such debates are usually not limited to the educational sector, but often spread out to claimants and opinion leaders in various sectors and layers of society.

2.1.2 Curriculum policy by governments

Within this dynamic context, governments have to make substantive choices to guarantee the sustainable quality and social relevance of education. This decision making process is also influenced by international developments and frameworks, such as agreements about the Common European Framework of Reference for modern language education or the Bachelor-Master structure in higher education. When weighing and defining the core of the curriculum, different strategies are used to legitimize and validate the choices to be made. Experts and stakeholders of many kinds may play a part in this (see paragraph 2.1.4). When justifying the curricular choices, the first arguments put forward are those concerning the relevance and desirability of the objectives and content components. Obviously, all interested societal parties want to join in this debate. However, where practicality of the wishes is concerned, schools and teachers must lead the discussion. Important questions include:

- competences of the pupils: can they fulfill their new expected roles?
- competences of the teachers: do they have the necessary expertise to implement the innovation?
- social support for innovations: are schools and teachers positive towards the intended change?
- learning time: can the innovation be carried out within the available time frame?
- educational arrangements: are relevant teaching approaches and learning resources available?

The organization of curriculum policy making also involves certain choices:

- Should emphasis be put on a communal and uniform educational programme or should there be room for flexibility, diversity, and choices for schools and pupils?
- Is there central steering or decentralized autonomy and responsibility?
- Is supervision based on a firm control system and on centrally defined results, or on a decentralized accountability system and confidence in the competences of schools and teachers?

There are different ways in which governments control curriculum decision making. Many countries have a highly centralized education system. At government level a curriculum is defined with detailed regulations for objectives and content, school time, selection of educational materials, teaching standards, and tests. There is little room for curricular input by schools and teachers. In some European countries, particularly the Scandinavian ones, this central steering is less prominent. There, objectives and content are laid down in a general plan and further details are left to the schools. In the Netherlands, the schools' autonomy concerning content is also considerable.

In almost all countries, periodic shifts and movements in curriculum policy towards a more or less central or decentralized control are visible (Kuiper, van den Akker, Letschert & Hooghoff, 2009). Both forms of curriculum policy have their strengths as well as weaknesses (see Fullan, 2008; Hargreaves & Shirley, 2009). A detailed, prescriptive curriculum presents a clear view of the desired results and offers much to hold to in practice. In the short term, such a curricular model often leads to more improved learning results than a more decentralized model. However, it turns out to be a very complex matter to sustainably anchor these effects. The advantage of a more flexible curriculum, whereby schools can fill in their own details, is the direct involvement and co-ownership of schools and teachers. This is highly motivating and will stimulate professional development; as a result, it will lead to a more sustainable form of educational improvement. However, the risk involves the lack of a clear, communal focus on objectives and content, making it more difficult for schools and teachers to work systematically towards large-scale educational improvement.

2.1.3 National curricular frameworks

In the Netherlands, educational objectives and content are specified in core objectives, attainment targets, and examination programmes. In primary education and lower secondary education, desired objectives and content are reflected in *core objectives*. Core objectives describe what pupils should learn in school in order to perform well in society or to proceed to the next level of education. They present a frame of reference for public accountability by the government and by schools concerning the choices made, the education offered, and the learning results realized. Core objectives are periodically reviewed (see Letschert, 1998). In primary education, the third generation of core objectives is currently in use. Since the first generation in 1993, the number of core objectives has been substantially reduced – from 122 to 58 – and the objectives are formulated in more general terms. Broader and more global descriptions are used, without specifications of teaching and learning activities. Thus, schools are given more freedom to fill in their own details

in the curriculum. A similar development took place in secondary education, where the 300 core objectives of the lower secondary education were reduced to the current 58 core objectives.

Core objectives are concretized in educational methods, materials and learning trajectories. For the different subject areas in primary education, SLO develops intermediate objectives and learning trajectories on the basis of core objectives. For the core objectives in lower secondary education, SLO develops examples of detailed programmes, in which the objectives and content are distributed across the different school years.

The objectives and content for upper secondary education are specified in *examination programmes* that are developed by committees per subject or subject area. Although the composition of these committees may vary per subject, they usually comprise subject matter experts, representatives from subsequent levels of education, teachers, as well as the Dutch Testing and Assessment Agency (Cito), and/or the Dutch College for Examinations (CvE). SLO often has a coordinating and supporting role.

There is no set time period for the revision of examination programmes. Revision usually occurs upon request, for example by higher educational institutions that notice a lack of knowledge and skills in enrolling students. In preparation of the revision process, SLO develops *subject dossiers*. A subject dossier describes the state of the art in the subject domain, bottlenecks in current educational practice, and important points for revision of the subject. The dossier is drawn up on the basis of a broad consultation of stakeholders, including teachers, pupils, subject matter experts, and trade & industry, and in close collaboration with subject associations.

The examination programme contains a description of the attainment targets that are to be tested in the central examination and the school examinations. Further details are contained in an examination syllabus. CvE, the Dutch College for Examinations, is responsible for this *syllabus*, which contains the precise subject matter used in the central examination programme. SLO also develops *guides* for school examinations. For each official examination subject, the guides indicate the relevant content to be dealt with in the school examination. The guides are not prescriptive.

While national curricular frameworks in the Netherlands give an increasing freedom to schools, the government tends to exercise more substantive control on the curriculum in other domains. Recently frames of reference have been drawn up to more precisely define the desired learning results in *literacy and numeracy* at different levels within the educational system (see paragraph 2.1.4).

Another recent curricular initiative from the government is the '*canon*'. The canon describes 50 perspectives on the Dutch cultural heritage, which, in combination, provide an overview of what each Dutch citizen should know about the history and culture of the Netherlands. The need to foster cultural literacy in education arose from a social concern about the lack of historic and cultural knowledge. The inclusion of this initiative in curriculum policy was, however, not instantly clear. The canon related poorly to the existing core objectives, in which the cultural and historic heritage was laid down in a different way: in historic periods rather than perspectives, and formulated along more general lines than is the case with the canon. Recently, Dutch Parliament decided that the canon is not a separate obligation for schools, but should be used as a starting point and illustration when handling the different historic eras.

2.1.4 From policy to curriculum development

The recent development of reference levels for literacy and numeracy in the Netherlands clearly illustrates the process of curriculum development at macro level. These reference levels have been developed as a result of a general concern about the quality of the pupils' and students' mastery of basic skills in language and arithmetic. In part, this concern seems to be supported by empirical evidence. In international comparisons results of Dutch students have declined. Furthermore, tests made by student teachers at the start of their teacher training course show that a substantial number of these students experience difficulties in answering questions that are also asked of (above-average) pupils at the end of primary education. Different reasons are given for the loss of the basic skills in literacy and numeracy, including inadequate pedagogical approaches and learning resources, lack of school time, lack of maintenance during the learning career, teachers' lack of knowledge and skills, and insufficient alignment among school types.

Against this background, the government set up the *Expert Group Continuous Curricular Strands for Literacy and Numeracy*, in 2007, in order to propose a framework in which the desired learning results – or reference levels – for literacy and numeracy at different levels are formulated in a more precise manner. The objective of this frame of reference is to improve alignment among school types between primary education and the entrance level of higher education. The framework consists of reference levels that specify the necessary basic knowledge and skills in literacy and numeracy of pupils and students, including an indication of the attainment levels to be pursued.

The reference levels are formulated for different age levels, and are not explicitly linked to specific educational programmes.

The Expert Group's task was to formulate views on the desirable core of literacy and numeracy and to propose how to address this in subsequent educational levels. The group consisted of subject matter experts, education experts, researchers and teachers. An important task was to reach consensus among the experts and their wide variety of opinions. The following strategy was followed:

- based on intensive deliberation, a general outline of the framework was developed by the Expert Group;
- two individual task groups for literacy and numeracy further specified the framework for their respective domains;
- the two task groups also formulated recommendations for implementation and implications for teacher training courses.

The draft framework that was thus developed was presented to teachers during a major curriculum conference across educational sectors.

After presentation of the advice to the members of Parliament, deliberation started on the content, the practicality, and methods for validation and legitimizing. An important step was the consultation of the field. This consultation was carried out under the auspices of the school councils for primary and secondary education. During the consultations, teachers were encouraged to voice their opinions about the desirability, the practicality, and the feasibility of the advice, as well as the methods for implementation.

In the next phase a policy proposal was drawn up, and further specified by:

- adding details to the framework for specific target groups;
- giving examples of educational arrangements;
- developing monitoring instruments;
- developing educational tools.

In this process widening public support for the proposals was a core concern. Input by users and stakeholders was greatly stimulated and highly valued, even if this would sometimes lead to altering parts of the original advice by the Expert Group.

Broadening commitment and support for innovation proposals in the educational area is a crucial concern at macro level. Schools and teachers should be able to relate to the innovation, if it is to flourish in the teaching practice. The role of schools in curriculum development is further discussed in the next paragraph.

2.2 Curriculum development in schools

2.2.1 The school's curricular task

In the Netherlands, current educational policy offers schools ample opportunities to develop their own curricular profile. Within the national curricular frameworks, schools can emphasize specific aims and add relevant content in line with the schools needs. In doing so, schools are faced with the complex challenge to develop a relevant and cohesive curriculum. In this respect various questions and dilemmas arise, such as:

- *Which curricular choices will we make?*

Questions schools may ask themselves, include: What is our vision on learning? What ambitions do we pursue, together with our pupils? What are the features and criteria for a cohesive curriculum? To what extent should the school concept be completed before teams can start adding details? What does a continuous curricular strand for a subject or a domain look like?

- *How will we achieve cohesion between the choices made?*

Relevant questions for schools in this respect: How do we develop a continuing learning trajectory in the curriculum? How do we achieve alignment between subjects; is it relevant to integrate subjects? How to develop relevant teaching materials: are we going to develop or arrange for these ourselves or should we select existing materials? How to enhance the development capacity of our team?

- *Who is involved in curriculum decision making?*

Related questions are: Who are we going to involve in curriculum decisions, both within and outside the school? Which colleagues will contribute to the school curriculum? How do we get all parties involved to go along in the innovation? What are the competencies these developers should have? What is the part played by the teams and the school management? What conditions should be met to ensure success of curriculum innovation?

In this process of curriculum decision making, schools often come across questions and dilemmas that have little to do with curriculum development, but which do affect this process. For example, a team working on an ambitious curriculum innovation, may only be prepared to make small changes as a result of the limited size of the team. Or there might be limited mutual trust between the management and teachers, preventing an innovation from getting off the ground. And frustrating innovation attempts in the past may also hamper new adventures. In short, curriculum development within a school is never an item in itself, but is always a part of school development as a whole.

Various studies have shown that sustainable curriculum innovation in schools builds on synergy between curriculum development, teacher development, and school organization

development. In the following three paragraphs, we will illustrate these three types of development and their mutual relationship.

2.2.2 Teacher development

Teachers fulfill an important role in curriculum innovation in school. The implementation of educational change is strongly influenced by teachers' perceptions of and attitudes towards a specific change. These perceptions are not static but change and evolve during the change process. This is illustrated by the *Concerns-Based Adoption Model* (CBAM) (cf. Loucks-Horsley, 1996). The model distinguishes three main phases of concerns that teachers pass through during a change process:

- *Stage 1: self orientation:*
In early phases of the change process teachers primarily have questions about how the change affects their personal performance and teaching practice: What does the change entail for my personal performance? How will it affect my teaching practice?
- *Stage 2: task orientation:*
During the process, teachers' concerns gradually shift towards task-oriented ones, including: How am I going to use the teaching method? How to organize the lessons?
- *Stage 3: impact orientation:*
When the first two phases have been largely concluded, teachers will start concentrating on the impact of the change: Does this change work for my pupils? How may I further improve this situation?

According to the concerns-based adoption model, it usually takes several years before teachers are mostly concerned about the impact of the change. In implementing change, schools should use time lines that match the development of teachers' needs and concerns. In practice, however, schools often want to make quick progress. They tend to implement new working methods before teachers have been given the opportunity to create an image of the innovation for themselves. Or the board wants to evaluate the impact of the change on pupil learning before teachers have properly familiarized with the new approaches and materials.

Curriculum innovation in school is also affected by the extent to which teachers are prepared to innovate. The *willingness to change* relates to the views teachers have on the underlying problem that is addressed by this particular change. As teachers take the problem more seriously, and feel that they can contribute to the solution, their willingness to change will increase. The extent to which teachers are prepared to change can be expressed in five levels (cf. van Eekelen, 2005):

- *problem denial:* teachers are not prepared to change their educational practice

- *tentative recognition*: teachers recognize the underlying problem, but believe it is caused by something or someone else, and are not prepared to change
- *preparation*: teachers accept that change is needed and are prepared to implement it; they would like concrete information to help them with implementation
- *implementation*: teachers have recently started to implement the change; it takes a lot of effort and they are tempted to fall back into old routines
- *maintenance*: teachers are completely familiar with the change and cannot imagine how they used to do things differently in the past.

Each of the five phases requires a different approach to change and to teacher guidance.

This model also demonstrates that the curricular change within a school will be all the more successful if it takes teachers' willingness to change into account and if it addresses a common need in the school.

2.2.3 School organization development

Curriculum development within schools is also influenced by the school organization in which the change is to be realized. In this paragraph, we will focus on two main aspects of the school organization: the school culture and the infrastructure of the school.

With regard to *school culture* teacher collaboration and leadership are important issues. Collaboration between teachers is crucial to develop and implement change and reflect on its outcomes. In Dutch secondary schools teachers often work on curriculum development in design teams. There are different ways to collaborate within a team (Nieveen & Handelzalts, 2006; Onderbouw-VO, 2006):

- *As a group of autonomous team members*:
Teachers have not collaborated before and tend to wait and see which way the wind blows. Participation takes place on a voluntary basis and there are no formal working arrangements.
- *The starting group*:
Teachers have not collaborated before and are now willing to have a go at it. The teams are initiated by managers and there are no formal working arrangements.
- *A team of colleagues*:
Team members are familiar with each other's strengths and weaknesses and feel responsible for the shared results. They will only call each other to account if necessary.
- *An enterprising team*:
Team members are familiar with each other's strengths and weaknesses and take these into account. They feel very responsible, are proud of the results, and call each other to account.

- *The dream team:*

Team members make use of each other's strengths and weaknesses and feel responsible for each other, the task, and the school. If necessary, they will call each other to account. The type of team greatly determines the curricular ambitions that are within their reach. As teachers become real team players, their activities become more cohesive, and they are better able to enter into complex curricular discussions. This variation between teams also implies that different teams have different needs. For the task and management of a team, the following is true: 'one size does not fit all'.

School culture is also reflected in the distribution of leadership and curriculum control within the school. Based on extensive research MacBeath (2005) distinguishes three types of leadership:

- *Delegated leadership* (top-down):

Curriculum decision is organized in a top-down manner. Ideas for educational change are formed by the school management and are delegated to various parties within the school according to corresponding sub-tasks; the parties are expected to make a positive contribution to the change.

- *Incremental leadership* (combination of top-down and bottom-up):

Leadership is not hierarchically determined: everyone can be a leader, including pupils. As the parties involved demonstrate leadership qualities, they will be given more responsibilities and are supported in their role. This form of shared leadership exists by virtue of mutual trust.

- *Teacher leadership* (bottom-up):

Teachers are influential actors in curriculum decision making. In these schools teachers are often organized as teams working towards a common goal. For teams to fulfill their role effectively, teachers must have the ability to achieve good results together, as a team, and they must respect and trust each other.

The way in which the school customarily allocates responsibilities greatly affects the way in which curriculum improvement can take place within the school. In schools with delegated leadership, teachers will expect a clear specification of tasks together with criteria to be met. The role of the management is to monitor the results of the team according to set specifications. In schools with teacher leadership, teachers are used to deliberate about the proposed change. In order to stimulate cohesiveness in the curriculum, they will have to determine for themselves which limits they set for the innovation possibilities.

A productive school culture needs a corresponding *infrastructure*. The infrastructure refers to the facilities, such as time and budget, that are available to the school for learning and changing, and the communication tools that are used for the coordination and implementation of the innovation. Here, we can distinguish three types of school environments:

- The school as a *teaching* environment:
Such a school focuses on the school as a location for pupils to learn. Teachers have no additional means for educational innovation besides time for lesson preparation and evaluation and there is limited opportunity for teachers to work together. There is little communication about educational matters.
- The school as a teaching as well as a *professional learning* environment:
This school also presents teachers with the opportunity to learn. Teachers can follow refresher courses or develop themselves professionally in other ways, e.g. through collaboration. Little (1990) distinguishes four types of collegial collaboration among colleagues: telling each other stories, helping each other out, sharing experiences, and working together. The first three types are particularly aimed at stabilizing the working relationships, but will, in practice, not easily lead to innovation and professional development. In schools that actively want to innovate, teachers should work together towards this innovation and reflect upon their experiences. This is in line with the arguments presented by advocates of professional learning communities (cf. Hord, 2004; Lieberman & Miller, 2004; McLaughlin & Talbert, 2001).
- The school as a teaching, a professional learning, as well as a *curriculum design* environment:
Such a school offers teachers the opportunity to provide good education, to learn together, and to develop education together. Teachers are given the opportunity to do so by means of coinciding development hours and a well-equipped work space where they can set to work.

Careful communication is another precondition for cohesive curriculum innovation within the school. To monitor cohesion, it is important for all parties involved to inform each other about their activities, to reflect on implications, and to indicate to what extent the initiatives correspond with the framework of innovation. A framework of innovation often helps to guide and monitor innovation activities within a school. Obtaining consensus about the innovation may also be stimulated by '*cross-over structures*'. These comprise carefully composed consultative structures, in which individuals from different bodies are combined in order to optimize exchange of ideas and consensus about the innovation (cf. Fullan, 1999; McLaughlin & Talbert, 2001).

2.2.4 Towards realistic innovation ambitions

In the previous paragraphs, we have seen how teacher development and school development affect curriculum development processes within the school. For curriculum innovation to be successful, it is important that the school's innovation ambitions are in line with the teachers' commitment and their willingness to change, the abilities of the different teams, and the culture and infrastructure of the school. In practice, this is a complex endeavour. Many schools work on their ambitions in spite of considerable opposition, and with the idea that loose ends may be tied up during the process. Nevertheless, the question should be asked what a teaching team can contribute to curriculum innovation, considering teacher development and school development (Nieveen & Paus, 2009). It is wise to formulate realistic innovation ambitions. Let us conclude this paragraph with a concise overview of possible curricular ambitions, in increasing order of complexity:

- *Making the existing curriculum more explicit:* many teams starting with innovation will benefit from analyzing the current practice, as teachers do not always have a clear view of educational practice of colleagues and the design of education as a whole.
- *Finding common grounds:* analyzing and discussing the existing curriculum often leads to further collaboration and suggestions for strengthening cohesion. Collaboration often starts with practical concern (e.g. how could topics be combined and how do they fit with the timetable) rather than programmatic concern (e.g. how does this fit with the development line of the pupil and the overall program).
- *Developing horizontal cohesion:* a next challenge could be to strengthen cohesion between subjects by developing cross-curricular themes and projects, or to develop broad learning areas comprising of different subjects.
- *Developing vertical cohesion:* in order to develop a continuous learning trajectory throughout the school years, teachers should not only be familiar with the years in which they are active, but also with the years preceding and following these.

Teams, and individual teachers within the teams, can make enormous leaps in their development, especially if the school organization moves along in a stimulating way. Schools will greatly benefit from staff with curricular expertise and a good overview of developments within the school. Together with other parties involved within the school, these curricular leaders could explore if there is a need for external support to fill the gap between ambition and reality.

A proactive and responsive external facilitator will have to search for the 'zone of proximal development' of the teachers, the teams and the school organization in order to develop a well balanced curriculum. Both for the school and the coach this requires a good overview of all developments within the school and the ability to think critically about realistic ambition levels for curriculum innovation in the school.

2.3 Curriculum development at micro level

2.3.1 Lesson materials

Curricular products that are developed at micro level include lesson materials and resources. These form part of the written curriculum, next to core objectives, examination programmes, attainment targets, qualification structures, and syllabi (see paragraph 1.1.3). As opposed to examination programmes, lesson materials and resources have an informal, that is to say a non-compulsory, status. Teachers and schools make their own selection from the range of available educational materials. Teaching materials, in the form of printed and/or digital methods published by educational publishers, prove to be a convenient, efficient and often indispensable tool to support day-to-day teaching. Convenience and efficiency have, however, a downside as well. Teachers can be excessively dependent on these materials. This phenomenon of ‘textbook teaching’ may hinder rather than foster curricular innovations. Nevertheless, schools in the Netherlands are increasingly involved in innovation. Given the ample local curricular authority for schools, and also thanks to the increased digital possibilities, teachers more and more choose to develop their own material or arrange elements from the existing materials to form a new integral program (SLO, 2008).

In learning resources most, if not all, components of the curricular spider web are specified. Learning resources can thus be regarded as the carriers of the curriculum. In this way they form an ideal vehicle to concretize generic innovation intentions for use in teaching practice. This is often done by means of *exemplary lesson material*. Such examples of teaching material are developed to concretize an intended innovation for a certain subject or subject cluster at micro level, i.e. at group, class, or teacher level. The development of these materials often starts from a basic vision (ideal curriculum, whether or not specified in a vision document) related to the generic curricular framework. This exemplary interpretation of innovation ambitions may also result in the wish to further fine tune vision, ambitions, and curricular frameworks. In the end, exemplary lesson materials aim to provide a source of inspiration for various target groups, such as educational publishers, for the development of new methods and modification of existing ones. Also, teacher educators can use the materials when working with student teachers for purposes of orientation and practice.

The central question in this paragraph is how (exemplary) lesson material may help teachers to familiarize themselves with the intended innovation. This question is based on the assumption that the teacher-curriculum combination is a serious factor where stimulation of the quality of learning for pupils is concerned. The statement that teachers make a difference when realizing curriculum innovations is an obvious one. In addition,

(exemplary) lesson material is an important variable. For teachers who strive to put the innovation into practice, these (exemplary) lesson materials are important carriers of the intended innovation. For these materials to fulfill their catalytic function, they should be developed with specific attention to active adaptation by teachers, a role that will allow them to learn. Such *educative curriculum materials* (Ball & Cohen, 1996; Davis & Krajcik, 2005) can provide a bridge between the content-specific, pedagogical, and organizational challenges entailed in a curriculum proposal and desired learning of teachers. Later on, we will discuss the functions and features of such materials. First, let us look at the process of teacher learning in more detail.

2.3.2 Teacher learning: what and how?

A curriculum innovation implies changes in the acting and thinking of teachers and, therefore, involves a drastic learning process for those involved. Changes are needed in three dimensions (Fullan, 2007):

- the use of other teaching materials
- the adoption and demonstration of different behavior, in a didactical, pedagogical, and organizational sense, and the consequential ‘unlearning’ of existing roles and routines
- the changing of views and attitudes concerning the profession, the pupil’s role, and the own role.

But first and foremost, changes have implications for the teachers’ *pedagogical-content knowledge* and skills (van Driel, 2008). Reorientation on and reinforcement of *pedagogical content knowledge* are considered the keys to successful curriculum improvement.

An important difference between the learning of teachers and the learning of pupils is that teachers have an extensive and greatly varied set of experiences. Such experiences may form a favorable starting point and frame of reference for new learning experiences, but the opposite may also be true. If the new information is inconsistent with the existing frame of reference, this may lead to insecurity and even rejection.

An important similarity, on the other hand, is that a number of social-constructivistic principles that apply to the learning of pupils also seem to apply to the learning of teachers. In this context, prominent sources (see Borko, 2004; Bransford, Brown & Cocking, 2000; Darling-Hammond & Bransford, 2005, and others) point out the importance of:

- stimulating active construction of meaning by (re)designing, experimenting, and reflecting
- aiming for the zone of proximal development
- stimulating interaction and collaboration, e.g. by forming teams in an attempt to break through the barriers of isolation

- the changing phases of involvement (self-concerned, task-concerned, impact-concerned; see paragraph 2.2.2)
- the tendency teachers have to form an opinion about the practical use of a proposal to change during the early stages of its introduction (*'practicality ethic'*), whereby they judge the proposal according to the extent to which the proposal and the own teaching practice correspond (congruence), the level of difficulty and the scope of the proposed change (complexity), and the relationship between the expected results and the necessary effort and investment (cost/benefit ratio).

2.3.3 Exemplary lesson materials and teacher development

Over the past two decades, a large knowledge base has been developed regarding the primary functions and effective features of exemplary lesson materials, particularly on the basis of studies by the School of Education of the University of Michigan (see Ball & Cohen, 1996; Davis & Krajcik, 2005) and the Department of Curriculum Design & Educational Innovation of the University of Twente (the starting point is marked by van den Akker, 1988). This knowledge has, however, not yet been systematically applied.

The most important lessons from this research can be summarized as follows. Materials should first and foremost focus on elements that are essential for the innovation and which may, at the same time, be considered vulnerable as a result of possible complexity or lack of clarity. Given this aim, exemplary lesson materials can be ascribed the following functions:

- they offer a basis for orientation for what can be expected during lessons
- they stimulate internal dialogue and reflection regarding questions such as: How does the material relate to own opinions and own teaching practice? Can the material be used for preparation and execution of lessons and if so, how? Which reactions and learning outcomes from pupils can be expected?
- they present specific guidelines for use in practice
- they prevent early watering-down of the intended innovation concerning content and pedagogy and, at the same time, stimulate local adaptation and ownership of the innovation
- they offer a basis for the exchange of experiences, feedback, discussion, and reflection.

Exemplary curriculum materials can also stimulate teachers to (re)design their own materials and/or to make a more selective, creative and conscious use of existing textbooks and materials.

Characteristics of effective exemplary lesson materials include:

- a modular and flexible design and structure;
- a lot of attention to essential, yet vulnerable elements of the innovation, especially those concerning the preparation of lessons, the subject matter content, the role of the teacher, and the nature of assessments and tests;
- a balance between providing concrete suggestions and procedural specifications on the one hand (including some justification for choices made), while avoiding exhaustive regulations on the other. The latter is important in order to stimulate active adaptation. At the same time, concrete and specified guidelines are necessary – especially in early stages of implementation – in order to actively support teachers to gain experiences that are prototypical for the innovation, which will combat feelings of insecurity and avoid premature modifications.

An important lesson is that no matter how carefully designed and tested, the use of exemplary lesson materials alone has its limitations. Such materials have proved especially effective if applied in combination with more comprehensive professional development schemes for teachers. These particularly concern activities that will stimulate collaboration with and coaching by experts and colleagues, for example by means of the exchange of experiences, collegial feedback, as well as reflection-in-action and reflection-on-action, focused on user experiences with the material. In such '*blended scenarios*' virtual teacher networks may also play a role. Multimedia cases with visualizations of the envisaged teaching practice also have an added value (van den Berg, Blijleven & Jansen, 2003). However, it will have become clear that the teaching of teachers is not a 'quick fix'; on the contrary, it requires time, embedding in school development, and support as well as pressure from the part of the school management, the board, and the government.

2.3.4 How to develop examples of lesson materials?

Exemplary lesson materials that support the learning of teachers in a context of innovation require a careful design approach. Generally, it is characterized by an iterative cycle of analysis, design, development, and evaluation (see also paragraph 3.2). The analysis is explicitly focused on the formulation of design principles in terms of functions and features of the materials to be developed; this is done on the basis of a thorough analysis of literature, context and target group needs. During the phase (or phases) of testing, a prominent role is reserved for formative evaluation, with pronounced attention to *observations* of lesson preparation and implementation and *interviews* in order to gain insight into perceptions of teachers and learning experiences of pupils. During the whole design process, teachers and subject experts are closely connected. Such an approach

will result in a combined outcome: examples of teaching material with a proven quality in terms of relevance, consistency, practicality and effectiveness that are suitable for further scaling-up, will contribute to the professional development of teachers, and to the knowledge concerning the design of such materials.

3. Quality of the curriculum

3.1 Quality criteria

In the previous chapters, we have looked at different development approaches that affect the quality of a curriculum. The quality of education is often subject of debate. There are different ways in which people assess the quality of a curriculum. Does it teach relevant things? Does it lead to adequate results in national assessments and examinations? Does it allow pupils to achieve to their full potential? Does it enable a smooth transition to subsequent educational levels? Does it prepare pupils effectively for the job market? There are many aspects at stake. In this chapter, we will specify four criteria for the quality of a curriculum (cf. Nieveen, 1999, 2009) (see table 5).

Criterion	
Relevance	There is a need for the intervention and its design is based on state-of-the art (scientific) knowledge
Consistency	The structure of the curriculum is logical and cohesive
Practicality	<i>Expected practicality</i> It is expected that the intervention is usable in the settings for which it has been designed
	<i>Actual practicality</i> The intervention is usable in the settings for which it has been designed
Effectiveness	<i>Expected effectiveness</i> Using the intervention is expected to result in desired outcomes
	<i>Actual effectiveness</i> The implementation of the intervention leads to the desired outcomes

Table 5: Quality criteria

The quality criteria more or less build on one another. Whether a curriculum is effective will also depend on the practicality – can it be implemented as intended? – and on the relevance and consistency of the intended objectives and content components.

In the list of quality criteria a distinction has been made between the expected and the actual practicality and effectiveness of a curriculum. Concerning teaching materials, for example, the *expected* practicality and effectiveness can be assessed through screening of the materials by teachers. Details about the *actual* practicality and effectiveness of the materials can only be gathered when teachers and pupils have used the new materials in the actual educational practice (see paragraph 3.3.2).

3.2 Producing evidence for quality

In order to develop a high-quality curriculum, evaluation is of great importance. From a concern about the frequent failure of (large-scale) innovation processes, as was recently highlighted in the Dutch context by a Parliamentary commission on education (Commission Dijsselbloem, 2008), there is a growing interest in studies into the effectiveness of curriculum innovations. In education, new methods and approaches are often implemented without sufficient clarity about their added value. When developing or implementing innovations, political interests or ideological views often prevail over a solid knowledge base or views on possible effectiveness. Therefore, the Education Council of the Netherlands (2006) argued for a more *evidence-based approach* to educational development: an approach in which specific evaluation methods are used to find empirical evidence for the effectiveness of an intervention and in which results from previous evaluation studies are used to guide the design process. Such a *data-driven approach* is also increasingly adopted by schools themselves; in this approach schools and teachers formulate clear goals and systematically work towards reaching these goals by making use of specific assessment data.

The importance of evidence-based education is increasingly taking root, both in the Netherlands and abroad. While the need to gather empirical and scientific data is stressed by many, opinions differ on what type of evidence proves that a curricular innovation is effective. Two perspectives are discussed.

The first perspective is the *What Works Clearinghouse (WWC)* in the United States of America. Since the beginning of this century, the USA have been using an evidence-based educational policy, whereby evidence is only valid if the underlying studies meet with strict 'evidence standards'. A firm requirement is that the studies must be experimental or quasi-experimental and that respondents are appointed randomly to experimental and control groups (What Works Clearinghouse, 2008).

The second perspective originates from the Education Council of the Netherlands (2006) in its advice about evidence-based approaches in education. The Council pleads for more emphasis on evaluation of the effectiveness of educational methods and on use of scientific knowledge in the design of educational innovations. The Council proposes a phased approach to evidence-based education: to obtain a provisional idea of what is working, why, and how, within a certain – new – domain, many years of exploratory studies, development and practical experiences are needed first; only then more strict experiments with control groups will be justified. This approach deviates from the WWC approach because it also allows 'softer' forms of research, resulting in only preliminary evidence, in early stages of the design and implementation of innovations.

Whereas the Education Council in the Netherlands relates educational quality specifically to learning results of pupils, it is preferred to give a wider interpretation to the term, because a high-quality curriculum is relevant, consistent, practical, and effective. Evidence for these four criteria is best obtained by means of a cyclic approach alternating analysis, design, and evaluation activities. We will refer to this method by the term *development research* or (curricular) *design studies* (van den Akker, Gravemeijer, McKenney & Nieveen, 2006; van den Akker, 2009). In case of design research, research activities are woven into the development process in order to optimize the robustness and the potential success of the curriculum. In design studies, evidence is gathered in different ways:

- grounding design specifications in a solid broad knowledge base by means of needs and context analysis, literature study, and expert appraisal
- through focused and continuous evaluation during the different developmental stages.

This strategy calls for intensive interaction with various experts and potential users.

The approach not only benefits the quality of the product, but has the added advantage of contributing to public support for the new curriculum and professional learning of all parties involved. Altogether, this greatly enhances the chance for successful implementation.

3.3 Evaluation and curriculum development

A design research perspective offers rich possibilities to reinforce the quality of curriculum development. From this perspective, curriculum evaluation is focused on the four quality criteria of relevance, consistency, practicality, and effectiveness – with some shifts in emphasis during the curriculum development process. This becomes apparent in different ways:

- through analysis activities early in the process, to provide a solid ground for subsequent design decisions;
- through frequent formative evaluation during the process, aimed at determining the quality of intermediary products and the generation of improvement proposals.

Summative evaluation, at the conclusion of a process, is aimed at the assessing of the effectiveness of the final product and contributing to knowledge development.

3.3.1 Analysis

Thorough analysis will contribute to the quality of curriculum development. By obtaining insight in the existing situation, the needs of those involved, and the conditions for innovation, the relevance and practicality of the design can be increased at very early stages. The aim of the analysis phase is two-fold:

- to gain insight in the existing situation and the possibilities for improvement and innovation
- to specify the desired features of the design (design specifications) and how these can be developed (procedural specifications).

Important activities include an *analysis of the user practice* (context and needs analysis) and an *exploration of the scientific knowledge base* (literature study and expert appraisal).

The *analysis of the user context* is needed to gain insight in the problem at stake, that is the gap between the current and desired situation. The core question is: which problem does the design address? A *needs analysis* looks into the perceptions of stakeholders on the current situation – what works well, what should change - and the features of a more desirable situation. A *context analysis* is aimed at exploring the problem environment and mapping out the scope for innovation. Questions to be asked during a context analysis include:

- what does the user context look like?
- what is the innovation scope, considering needs and abilities of the teachers, e.g. their willingness to change, and conditions in the school (e.g. room for collaboration)?
- what means, including time, finances, and staff, are available for development?

Investigation methods that are frequently used in needs and context analysis include interviews, focal groups, lesson observations, and case studies.

In order to make relevant and valid design decisions, it is also important to gain insight in the state of the art knowledge base. This can be done by means of literature study, expert appraisal, and the analysis and evaluation of existing projects and products. Questions asked during the knowledge-base analysis focus on:

- What recent insights from educational research and subject matter discipline may be used in the design?
- What available (related, promising) curricular products could serve as a source of inspiration and what lessons may be learned from the implementation and the impact of these products?

3.3.2 Formative evaluation

The main aim of formative evaluation is to improve the quality of (intermediate) curricular products. The planning of a formative evaluation starts with formulating a clear evaluation question. As the development process progresses, attention is shifted from questions concerning the relevance and consistency of the intermediate product to questions concerning its practicality and, finally, its effectiveness. This changing focus has

implications for the selection of evaluation methods. Here, we distinguish five evaluation methods (cf. Nieveen, 2009; Tessmer, 1993):

- *Screening*: members of the design research team check the design with some checklists on important characteristics of components of the prototypical intervention.
- *Expert appraisal*: a group of experts (for instance, subject matter experts, instructional design experts, teachers review the materials) reacts on a prototype of an intervention, usually on the basis of a guideline with central questions of the design research team. Usually this is done by interviewing the respondents.
- *Walkthrough*: the design researcher and one or a few representatives of the target group together go through the set up of the intervention. Usually this is carried out in a face to face setting.
- *Micro-evaluation*: a small group of target users (e.g. learners or teachers) uses parts of the intervention outside its normal user setting. Here, the main activities of the evaluator are observing and interviewing the respondents.
- *Try-out*: a limited number of the user group (e.g. teachers and learners) uses the materials in the day to day user setting. If the evaluation focuses on practicality of the intervention, the following evaluation activities are common: observation, interviewing, requesting logbooks, administering questionnaires; if the evaluation has its focal point on the effectiveness of the intervention, evaluators may decide to request learning reports and/or give a test.

Table 6 shows which evaluation methods are most relevant in the different stages of the design process.

Design stage		Design specifications	Global design	Partly detailed intervention	Complete intervention	Implemented intervention
Quality criterion						
Relevance		- Screening - Expert appraisal	- Screening - Expert appraisal	- Screening - Expert appraisal	- Screening - Expert appraisal	
Consistency		- Screening - Expert appraisal	- Screening - Expert appraisal	- Screening - Expert appraisal	- Screening - Expert appraisal	
Practicality	<i>expected</i>	- Screening - Expert appraisal	- Screening - Expert appraisal	- Expert appraisal - Walkthrough	- Expert appraisal - Walkthrough	
	<i>actual</i>			- Micro-evaluation - Try-out	- Micro-evaluation - Try-out	Survey, (Quasi) experiment, Case-study
Effectiveness	<i>expected</i>	- Screening - Focus group	- Screening - Focus group	- Expert appraisal	- Expert appraisal	
	<i>actual</i>			- Micro-evaluation	- Micro-evaluation - Try-out	Survey, (Quasi) experiment, Case-study

Table 6: Table for selecting formative evaluation methods

Next to a choice of methods, activities, and tools, the planning of an evaluation also requires the selection of respondents. In the case of teaching materials, four groups of respondents can be distinguished:

- the design team itself
- experts, including subject professionals, designers, teacher educators, education supervisors
- users, including teachers and pupils
- other stakeholders, such as parents.

The type of respondents to be selected depends on the particular evaluation question. Subject matter experts will be able to provide a clear answer to the question whether the design is in line with recent insights within a certain knowledge domain. If, however, the design team is ready to develop a layout for the design, graphic designers need to be involved.

Once a certain group of respondents is selected, it is important to consider the number of respondents to be approached. Especially during the development stages, the most important objective of a formative evaluation is to locate shortcomings and to generate ideas for further improvement of the design. For this purpose, it is not necessary to select large numbers of respondents. More important is to ensure *triangulation*, i.e. including a variation of respondents per respondent group (for example, two strong pupils, two weak pupils, and two average pupils, in the case of a micro evaluation). Thus, the information from one respondent may be verified or complemented by information from others. For example, a screening of the design may be performed by several developers, and a try-out carried out in three different classes rather than a single one.

When planning an evaluation, it is also important to consider the role fulfilled by developers themselves during the evaluation. During later development stages, it will be desirable to involve external evaluators, rather than the developers themselves, to evaluate the actual effectiveness of the curriculum (see paragraph 3.3.3). During the early stages, however, it seems legitimate and even desirable to let developers conduct the evaluation activities themselves. In this way it is more likely that the evaluation will lead to modifications in the curriculum. The development team can carry out the evaluation at any desired moment and the results are quickly implemented in revisions of the product. Secondly, the developers learn a lot from their evaluation activities. For example, they can directly experience how the product is used in practice. However, the developers should be well aware of their natural inclination to become so attached to their own design that they might not be able to make objective assessments of shortcomings in the design. In that case, the involvement of external evaluators becomes desirable.

3.3.3 Summative evaluation

Whereas formative evaluation focuses on locating shortcomings in (intermediate) products, and generating revision decisions, summative evaluation is aimed at determining the impact and effectiveness of the product. The focus is on the extent to which implementation of the product leads to the desired outcomes. The desired results are related to the intended objectives of intervention. For example, the objective might be to give publishers a curricular framework to guide them during their development of methods in order to meet with core objectives. Another objective may be to improve teacher's pedagogical content knowledge in view of implementation of a new curriculum. In schools summative evaluation primarily focuses on pupils' learning results. Therefore, in this paragraph, we will concentrate on studies into the effects of instructional material at pupil level. Such an evaluation does not only concern the question whether the desired learning results occur, but also whether the effects established can be ascribed to the teaching material developed.

The most powerful study design to reveal effects – more particularly: cause-effect relationships – is the classical experiment (Rossi, Lipsey & Freeman, 2004; Swanborn, 2007). Such a study design concerns two study groups (an experimental group and a control group), two measurements (pre-test and post-test), and the random appointment of respondents to one of the two conditions. In the educational practice, however, the random appointment of respondents is not an easy matter; often, it is an almost impossible task to withhold a certain form of education to a group of pupils, or to change grouping arrangements in schools. An alternative study set-up to determine causal relationships is a quasi experimental study design. Like the classical experiment, a quasi experiment comprises an experimental group and a control group, and a measurement prior and after the programme. The difference is the random appointment of respondents to groups. In the classical experiment, individual *respondents* (e.g. pupils) are appointed at random to the groups. In the quasi experiment, *existing groups* (e.g. classes with pupils) are randomly appointed to an experimental group and a control group. When planning and performing a summative curriculum evaluation by means of a quasi experiment, it is important to take the following issues into consideration (Gravemeijer & Kirschner, 2008; Swanborn, 2007; Wayne, Yoon, Zhu, Cronen & Garet, 2008).

- *Discrepancy between the intended and implemented curriculum:*
When implementing a curriculum in educational practice, the various parties involved, such as teachers and pupils, will usually carry out the curriculum according to their own needs and wishes. This may cause a discrepancy between the intended and the implemented curriculum, which may, in turn, affect the learning results. This means that insight into the implemented curriculum, obtained, for example, by means of

observations and interviews concerning the teaching practice, is important for the interpretation and explanation of the effect results.

- *Comparability of groups:*

If it is not possible to randomly appoint respondents to groups, it is essential to ensure that groups are made comparable by means of matching or statistic control. The groups must be comparable in characteristics that influence the effectiveness of the curriculum. If a relevant feature is not included, this may influence the results of the study. Suppose the effectiveness of new teaching material for mathematics is investigated. If this material would be more suitable for girls, and the experimental group would contain a relatively large number of boys, the results might wrongfully show a lack of effect. Furthermore, it is important to look for an adequate representation of the population of schools, allowing generalization of the results.

- *Curriculum-assessment overlap:*

An important point of attention is the extent to which tests of learning results are geared towards the curricular intentions. If this is not the case, possible effects may not be revealed. Also, the moment of the assessment should be well-chosen.

- *Sufficient time, money and number of respondents:*

Usually, the set-up of an experiment or quasi experiment is costly and time-consuming. Many respondents are needed and, in addition, it takes a long time before learning effects can be measured. This makes it difficult to find a sufficient number of schools and teachers willing to participate. Especially the willingness to participate in a control group is often very low.

It will have become clear that a summative curriculum evaluation is a complex, costly and time-consuming matter. Therefore, it is important not to carry out such a study until the curriculum is developed to such an extent that it has sufficient potential effectiveness. Furthermore, it is essential that implementation studies take place parallel to the experimental or quasi experimental study. This way, potential implementation problems during the effect study can be anticipated. Furthermore, a (rich) description of the implementation context will also benefit (future) users who want to use the curriculum in their own setting.

4. Working towards sustainable curriculum improvement

The importance of implementation is the leitmotiv running through this book. After all, the ultimate goal of curriculum development is to improve educational practice. This was already discussed in the first chapter, where curriculum development was described as a comprehensive and often lengthy, cyclic process of analysis, design, evaluation, and implementation. Anticipation of future – possibly large-scale – implementation should be kept in mind during the entire development process. All too many projects have turned out to be a great fiasco because too little attention was given to implementation issues.

During the curriculum development process, the emphasis on implementation reveals itself in various ways:

- At the start of the process, analyses of lessons from the past and of current use in practice may contribute to insights in the most favorable way to initiate the intended changes.
- Intensive deliberation with the target group and other stakeholders is important in order to validate the innovation and to ensure broad public support for its implementation.
- Formative evaluation of preliminary designs provide concrete insights in how to improve the practicality of the curriculum-to-be.
- Also, assessment in an increasingly wide circle of schools will clarify the conditions – particularly at teacher and school level – that are preferable, or prerequisite, for successful implementation.
- Towards the end of the development process, it is desirable that curriculum developers formulate recommendations for the professional support of teachers, as well as the team leaders within schools, in order to facilitate successful implementation.
- Curriculum developers could also conduct support activities themselves, or contribute to the professional development of educational supervisors of institutions that can organize these activities in various local settings.

Supporting teacher development often proves to be the key to the success of curriculum innovation. In Chapter 2, we have discussed this matter at length. Initial curriculum implementation is not possible without the professional learning and development of teachers. Moreover, the development of the school's organization and culture is also essential to ensure sustainable curriculum changes within the school. Collaboration among all sections and levels in and around the school is an important precondition for sustainable educational development. Today, terms such as 'public support' and 'ownership' may sound somewhat trendy, but they do denote important aspects. Hargreaves and Shirley (2009) also draw attention to the importance of broad ownership and the shared responsibility for sustainable innovation. Facilitating leadership is an important aspect in this, as well as room for diversity and the freedom to place one's own accents in curricular choices.

Curriculum developers at SLO are especially involved in generic projects aimed at broad target groups and a wide range of contexts. It is an illusion for them to become involved in all of these contexts. However, by carrying out their own curriculum development work in a careful and goal-oriented way, in interaction with other educational stakeholders, they will certainly be able to contribute to this wide range of practices. Relevant stakeholders include:

- institutes for teacher training and professional development
- educational publishers
- institutes for testing and assessment
- policy-makers and inspectorate
- educational researchers.

The curriculum spider web in Chapter 1 stresses the importance of internal cohesion among curricular components. It is also advisable to think and work from an external system web, including all relevant stakeholders and aiming at fostering a systemic approach to curriculum development. The active involvement of relevant social organizations – from parents to trade & industry – will also foster broad public support for and commitment to innovations. Such an approach will contribute to sustained improvement of education.

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