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Future of Education and Skills 2030: Curriculum Analysis

Bridging curriculum design and implementation

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This draft paper was written by Jan van den AKKER, Curriculum Research and Consultancy, The Netherlands. This paper is to describe the existing evidence on how to increase the chances for successfully bridging curriculum design and system-wide implementation.

This is still a **"working document"**.

For ACTION: participants are invited to COMMENT before 5 November 2018.

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Abstract

This review examines how thinking about implementation of curriculum already in the design stage can have an impact on the actual later implementation. The aim is to develop a shared conceptual framework about curriculum design and implementation approaches. The review also examines how change theories relate to curriculum implementation and what curricular policy steers and facilitate systematic and sustainable curriculum change at all levels. A few country examples of successful approaches are included in this review.

Introduction

This paper is written within the context of OECD's project Education 2030, in particular the position paper on The Future We Want, with its Learning Framework and Design Principles. It marks the transition from Phase I to Phase II of the project, as it addresses the challenge of how one can already anticipate on implementation issues when still in the design stage of innovation.

As overall perspective, we consider the process of transforming visions on (future-oriented) learning (like in Education 2030) into school practices and classroom realities at large-scale (system-wide) as a major challenge for long-term curriculum renewal.

Curriculum development can be defined as a comprehensive, systematic process to transform ideas about desirable aims and contents for learning into documents/materials that stimulate instructional practices that foster learning activities and experiences that lead towards intended outcomes. Thus, curriculum development has both a product and a process dimension (cf. Priestley & Biesta, 2013).

The current, world-wide wave of curriculum reform is spurred by:

- the technological revolution, with ICT as ubiquitous phenomenon in society, with implications for the aims, contents and tools of learning; see Bialik & Fadel, 2018; Collins, 2017; Voogt, J., Knezek, G., Christensen, R., & Lai, K.-W., 2018;

- the "glocalisation" trend: addressing the educational implications of internationalisation/globalisation in combination with efforts for meaningful identities at local/national levels (both economic, cultural and socio-political).

Curriculum innovation has already quite some history. The first world-wide big wave of curriculum innovation (after the Sputnik-shock, initially especially in the Western world, but later world-wide) occurred during the 60's and 70's. Gradually, it became clear that the implementation (and subsequent impact) of those massive investments was far less than hoped. Many studies have analysed these implementation problems. During the last decades, the best synopsis of lessons learned is offered by Fullan (1982, 2008, 2016). Those lessons are rather sobering, pointing to many failures and disappointments in curriculum innovation. Existing practices appear to be remarkably resistant for curriculum change (Cuban, 1992). Although it is relatively easy to find pockets of promising innovation efforts, it appears that successful, large-scale and sustainable curriculum implementation remains a huge challenge.

Moreover, we have to realise that the emphasis during those first wave of 'modern' curriculum innovation (about half a century ago) was mostly subject-based, in particular on education in mathematics and the natural sciences. The current wave of curriculum innovation has a broader scope, basically addressing the aims and contents of the whole curriculum. That makes the challenges for recent and forthcoming change even more complex (cf. Fullan, 2018; Shirley, 2018).

Obviously, Project Education 2030 represents an ambitious effort to formulate a global vision for future-oriented learning that, when operationalised in comprehensive curriculum (re)design endeavors, will, no doubt, also meet many considerable implementation challenges.

To support the clarity of forthcoming deliberations in project Education 2030, it would be helpful to have:

- a shared conceptual framework/theory of change about curriculum design and implementation approaches;

- an overview of research- and experience- based lessons learned about how to increase the chances for successfully bridging curriculum design and system-wide implementation, by anticipating early on during the process of curriculum (re)design.

- a number of selected specific examples of (rather) successful approaches.

This paper will address all these three aims, by presenting:

- first, in order to lay a foundation for further reasoning, a very concise conceptual introduction about curriculum;

- second, some theoretical notes on educational change, through a more in-depth analysis of what makes curriculum implementation so difficult;

- third, a series of lessons learned, translated into recommendations for strategies to anticipate on implementation during the design stage;

- fourth, some examples of promising approaches in different countries.

A brief helicopter view of the curriculum field

There is no universally agreed definition of the word 'curriculum'. On the contrary, it is difficult to escape the impression that every author produces his/her own (often lengthy) definition (Jackson, 1992). However, a very concise definition, going back to its etymological (Latin) roots, says that a curriculum is, essentially, a 'plan for learning' (Taba, 1962; van den Akker, 2003; Thijs & van den Akker, 2009; the last source refers to a more elaborate conceptualisation of curriculum development).

One should immediately add that this simple 'plan for learning' can exist at many (system) levels of education:

- Supra (international, comparative)

- Macro (national)

- Meso (school, institution)

- Micro (classroom, group)

- Nano (individual, personal).

Thus, the curriculum does not exist. It is always necessary to specify the level of curriculum one is referring to, in order to have clear communication. At the same time, it is important to realise that curriculum change at scale (as obviously the case in Education 2030) will eventually have to relate to basically all those levels, thus implying much interaction between the various levels.

Moreover, it appears to be useful to realise that a plan for learning can have many components. Traditionally, people associate curriculum primarily with aims, contents and (perhaps) the organisation of learning (cf. Walker, 1990). Especially when trying to

redesign a curriculum and trying to make it work in practice, experience has shown that it makes sense to expand the number of aspects for planning of learning. For example, the so-called 'curricular spider's web' (van den Akker, 2003; 2013) visualises the interrelationships between ten planning components in a curriculum (figure 1), raising ten relevant questions about learning of students ("they"). The rationale serves as a central link, connecting all other curriculum components. Ideally, these are also connected to each other, providing consistency and coherence.

Figure 1. The Curricular Spider's Web
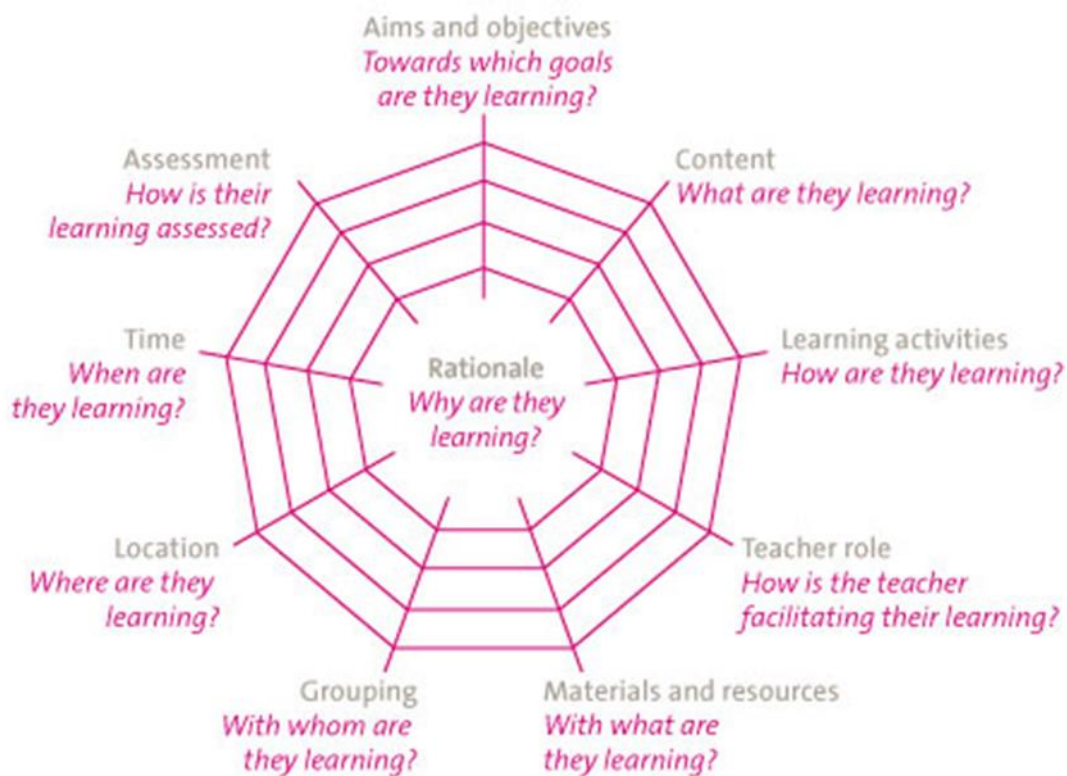
The spider's web illustrates a familiar expression: every chain is only as strong as its weakest link. This seems to be a very appropriate metaphor for a curriculum as it points to the complexity of efforts to improve the curriculum in a balanced, consistent and sustainable manner.

Another noteworthy observation about curriculum is that it can be identified in various representations (Goodlad, 1979; van den Akker, 2003):

- Visionary: the ideas, ideals and intentions (in case of 'national' curriculum renewal in particular of policy makers and curriculum developers; but the initial intentions can also come from school practice itself), giving directions to or underpinning choices in the curriculum.

- Written: how the intentions are elaborated and specified in a written format.

- Perceived: how the intended curriculum is interpreted, in particular by teachers.

- Operational: how the curriculum is enacted in classroom practice.

- Experiential: how the curriculum is experienced, in particular by students.

- Attained: what are the learner outcomes of the enacted curriculum.

This distinction in six representations can be seen as a more nuanced, dynamic elaboration of the trio of intended/implemented/attained curriculum, familiar from many education studies. In principle, every proposal for curriculum renewal will challenge or even disturb the existing interrelations between the various representations. It is not hard to understand that it is quite challenging to restore balance and create a new sort of harmony between all those representations.

Last but not least in this very brief synopsis of central curriculum concepts, it is wise to recognise that curriculum (at whatever level or representation) is created and enacted by a multitude of actors and stakeholders. For local curriculum development, the complexity may already be quite challenging, but at 'generic' efforts, across a wide variety of contexts, the complexity may become overwhelming. Such complexity is also caused by the multitude of different, often clashing values and interests at stake. That also explains why curriculum change has inevitably a strong political character (Connelly & Connelly, 2010). And, of course, the scope and features of a specific educational sector (school type; age levels) usually also have serious implications for curriculum design. For example, in secondary education (especially at upper level) the dominance of (separate) subjects is much stronger than in primary education, resulting in varying degrees of openness to cross-curricular initiatives.

Theory of educational change, or why is curriculum implementation so complicated?

Notwithstanding big investments in research and development during the first wave of curriculum reform, the target group of teachers often appeared poorly informed about an intended innovation, while its practical application remained limited, and its impact on student learning was unclear. Simplistic explanations for innovation failures, like lack of time and resources, or resistance' by users (especially teachers) are insufficient or inadequate. More sophisticated explanations are offered in the highly influential writings of Michael Fullan (1982, 2016) who has pointed out that educational change is not a single entity or event, but a multidimensional process that includes at least three dimensions (Fullan, 2016, p. 28):

- the possible use of new or revised materials (instructional resources such as curriculum materials, standards or technologies);

- the possible use of new teaching approaches (i.e., new pedagogies, especially learning partnerships with students);

- the possible alteration of beliefs (e.g., pedagogical assumptions and theories underlying particular new policies or programs).

In combination, these changes require an oftentimes difficult and long process of sense making through continuous learning, evaluation and readjustment. The big number of actors engaged in large-scale curriculum change implies that many actors have to adapt or even transform their subjective meaning. As Fullan (2016, p. 28) states: "The real crunch comes in the relationships between these new ideas and the thousands of subjective realities embedded in people's individual and organisational contexts and their personal histories. How these subjective realities are addressed or ignored is crucial for whether potential changes become meaningful at the level of individual use and effectiveness. It is worth

repeating that changes in actual practice along the three dimensions – in materials, pedagogy and beliefs, in what people do and think – are essential if the intended outcome is to be achieved."

Given the multitude of actors, primarily the teachers, but also the numerous stakeholders and participants at many levels of education development that are in any way influencing the work of teachers, it is obvious that large-scale curriculum change is a long and bumpy road with may ambiguities and uncertainties. And if one takes eventual learner outcomes as most important criterium for ultimate impact – which is not strange as curriculum is essentially a plan for learning – one has to realise that many factors at school, classroom and individual levels are of influence on those results. Which underscores the complexity of the whole process and explains why hard evidence of impact is often rare to find.

Which factors are of influence on curriculum implementation? The most well-known synthesis is (again) delivered by Fullan (2008, 2016). He distinguishes three categories of (interactive) factors affecting implementation of educational change:

- Characteristics of the change (need; clarity; complexity; quality/practicality)

- Local characteristics (district/community; principal; teacher)

- External (f)actors (government and other agencies.

These factors can easily be applied to curriculum implementation. In relation to the change itself (the 'product' dimension), familiar flaws in curriculum design that contribute to poor implementation are that the curriculum proposal is either overloaded and/or complicated. Very common is also a lack of internal consistency, for example: changing aims and contents without attention to related changes in pedagogy, assessment, instructional resources, time arrangements and the like (cf. the curricular spider's web mentioned beforehand). Such problems are a serious threat to the 'practicality' concerns (Doyle & Ponder, 1977) of teachers towards new curriculum proposals.

The 'process' dimension of curriculum change relates especially to local characteristics and external (f)actors. Some problematic patterns can be observed in curriculum development strategies (Fullan, 2008, 2016; Van den Akker, 2018):

- Curriculum policies (at both macro and meso level) with a lot of pressure (but without accompanying support) increase the risks of symbolic implementation and window dressing, also leading towards 'false clarity' (users have not grasped the essence of the innovation) and even painful unclarity (disappointment, frustration and cynicism).

- Weak connections between the various system levels (national, local, school and classroom; cf. the six levels aforementioned). In particular insufficient attention to curriculum change at school level, where connections should be made between the pillars of (site-specific) curriculum development, (collaborative) teacher professional development, and organisational development (with important roles for school leaders).

- Probably crucial: no adequate professional development of teachers to prepare and support them for their new tasks, while they fulfil a central role in mediating the (new) curriculum to their students at classroom level (i.e. the essential implementation level).

- Also, lack of curricular capacity building for other actors with a strong influential role on teachers, e.g. school leaders, textbook developers, teacher educators, inspectorate.

- Insufficient cooperation (or even conflicting influences) between the many different (direct and indirect) actors in curriculum change, in particular poor alignment of assessment to curriculum.

A general pattern is that the worlds of policy, practice and research are often diffuse and widely separated. A crucial challenge for more successful innovations in education is to build bridges between many levels, factors and actors. Such bridging efforts should not wait until curriculum frameworks and materials have been developed – they preferably already start during the (upfront) analysis stage, so even before actual design activities are undertaken. That increases chances on the design of curricula that respond to the needs and contexts of many participants and that builds upon available knowledge bases. Moreover, it helps to further broad 'ownership' and active support during implementation process.

What makes in particular curriculum development (thus the whole process of curriculum analysis, design and implementation) so problematic can also be better understood from a socio-political stance. it often seems appropriate to describe 'curriculum reform' (the word itself already elicits irritations with some because of its reference for drastic change and disrespect for existing practices) as a war zone, full of conflicts and battlefields between stakeholders with different opinions, values and interests. Problems manifest themselves in the (sometimes spectacular and persistent) gaps between the intended curriculum (as expressed in policy rhetoric), the implemented curriculum (real life in school and classroom practices), and the attained curriculum (as manifested in learners' experiences and outcomes). A typical consequence of these tensions is various frustrated groups of participants blaming each other for the failure of reforms activities.

Although such blaming games often seem rather unproductive, there are some serious critical remarks to be made about many curriculum development approaches worldwide, also in recent times. Firstly, many curriculum reform efforts are characterised by overly big innovation ambitions (especially those of politicians) within unrealistically short timelines and with very limited investment in people, especially teachers. Secondly, often there is a lack of coherence between the intended curriculum changes with other system components (especially teacher education and assessment/examination programs). And lastly, but not least, timely and authentic involvement of all relevant stakeholders is often neglected.

From a strategic point of view, the literature has offered us many (technical-professional) models and strategies for curriculum development. Three prominent approaches are Tyler's (1949) 'rational-linear' approach, Walker's (1990) 'deliberative' approach, and Eisner's (1979) 'artistic' approach; see overviews in Marsh and Willis (2003) and Thijs and van den Akker (2009).

Obviously, the context and nature of the curriculum development task at hand will determine to a large extent what kind of strategy is indicated. It is noteworthy that we are seeing more 'blended' approaches that integrate various trends and characteristics of recent design and development approaches in education (for an overview and a series of examples, see van den Akker and Kuiper, 2008). Some key characteristics of these are:

- Pragmatism: recognition that there is not a single perspective, overarching rationale or higher authority that can resolve all dilemmas for the curriculum choices to bemade. The practical context and its users are in the forefront of curriculum design and enactment.

- Prototyping: evolutionary prototyping of curricular products and their subsequent representations in practice is viewed as more productive than quasi-rational and linear development approaches. Gradual, iterative approximation of curricular dreams into realities may prevent paralysis and frustrations. Formative evaluation of tentative, subsequent curriculum versions is essential for such curriculum improvement approaches.

- Communication: a communicative-relational style is desirable in order to arrive at the inevitable compromises between the wide circle of stakeholders/participants with various roles and interests, and to create an acceptable degree of harmony between all parties involved.

- Professional development: in order to improve the chances of successful implementation, there is a trend towards more integration of curriculum change and professional learning and development of all individuals and organisations involved.

However, there are several persistent dilemmas for curriculum development that cannot easily be resolved, let alone through generic strategies. For example, how can aspirations for large-scale curriculum change and system accountability be combined with the need for local variations and ownership? The tension between these conflicting wishes can be somewhat reduced if one avoids the all too common 'one size fits all' approach. More adaptive and flexible strategies avoid detailed elaboration and over-specification of central curriculum frameworks. Instead, they offer substantial options and flexibility for schools, teachers and learners. Although struggles about priorities for aims and content remain inevitable, the principle of 'less is more' should be pursued. Moreover, what is incorporated into a core curriculum should be clearly reflected in renewed examination and assessment approaches. (In many countries existing, high-stakes examinations tend to reflect past priorities, creating a serious obstacle for changing instructional patterns).

When thinking about curriculum implementation, the perspectives of 'mutual adaptation' (interaction between users and product result in changes of both) and 'enactment' perspective (teachers and learners together create their own curriculum realities) is increasingly replacing the 'fidelity' perspective on implementation (teachers faithfully following curricular prescriptions from external sources) (Snyder, Bolin & Zumwalt, 1992).

Even within centralised systems/jurisdictions (with oftentimes a high-fidelity tendency), it has become clear that real and sustainable implementation can only succeed when teachers have a prominent role in changing their own practice. That trend puts even more emphasis on teachers as key people in curriculum change. Both individual and team learning is essential, in particular when school-wide change is aspired. Thus, teachers need to get out of their customary isolation. Collaborative design and piloting of curricular alternatives can

be very productive (see, for example, Handelzalts, 2009), especially when experiences are exchanged and reflected upon in a structured curriculum discourse. Interaction with external facilitators can contribute to careful exploration of the 'zone of proximal development' of teachers and their schools. Cross-fertilisation between curriculum, teachers, and school development is a conditio sine qua non for effective and sustainable curriculum improvement. Such an approach also resonates the pleas of Hargreaves and colleagues (Hargreaves & Fullan, 2012; Hargreaves & O'Connor, 2018) for leading innovations 'from the middle' (instead of over-emphasising top-down or bottom-up approaches) and for stronger forms of collaborative professionalism.

Moreover, for teachers and schools to change their curriculum practice, it is vital that all actors (with a steering or supporting role in the education system around the schools) contribute and facilitate (and not hinder) the intended curriculum change.

Lessons learned and recommendations

Let us try to translate lessons learned and conclusions from the previous sections into recommendations, with ample use of the findings of a recent, international study on curriculum development approaches (Van den Akker, 2018). The recommendations focus on actionable issues for the process of curriculum policy making.

a) Create curriculum clarity and a joint sense of direction for all participants and stakeholders through coherent national frameworks but strive at the same time after strong local curricular awareness, agency and expertise of schools and teachers (and to some extent also students).

b) Let those frameworks be based upon broadly discussed (with wide, proactive and interactive involvement of experts, practitioners and stakeholders) and justified overall-vision on the what & why of learning. Doing so, try to reduce the (inevitable) political struggle and ambiguity in the role divisions of actors.

c) During curriculum design, strive after combination of participatory approaches (emphasising input from teachers and schools) with expert input (utilising input and support from curriculum agencies, teacher educators and researchers).

d) Optimise consistency within curriculum choices and arrangements (cf. spider's web: vision in middle plus nine components).

e) Focus in curricular policy making on steering and facilitating systematic and sustainable curriculum change at all (nested) levels (from nation to classroom).

f) Stimulate a systemic approach: all (f)actors, interventions and conditions in the education system working in line with the agreed upon curriculum vision and principles.

g) Recognise the role of (historically grown) policy cultures of central vs decentral emphasis in education policy. Drastic deviations from that culture (or frequent pendulum swings) are better be avoided. Keep in mind that only modest, often superficial, changes in classroom practices are to be expected from overly centralistic policies.

h) Combine 'top-down', 'bottom-up', and more 'horizontal' approaches, i.e. taking the school as centre of renewal. At the same time, one has to realise that over the last decades 'school-based curriculum development' is an often tried but also often

failing approach. Few schools appear to be (ongoing successful) environments for collaborative professional learning and development.

i) View curriculum change as long term (continuous, evolutionary) process (so not an 'adoption event'). Ambitions should be accompanied with patience, trust and investments in capacity building.

j) Aim at an implementation philosophy with no high-fidelity expectations (of central, prescriptive, highly detailed frameworks), but strive after mutual adaptation, enactment, and encouragement, with room for diversity, flexibility, choices, thus stimulating local, context-specific ownership (see Nieveen, Sluijsmans & Van den Akker, 2014).

k) Avoid hyper-active management and control approaches from above, with an overdose of accountability measures (see patterns in USA and England in recent decades); show trust and confidence in schools and teachers and invest in their 'curricular capacity building'.

l) Let assessment practices (especially examinations) follow the intended curriculum. That often implies: less central, more school-based and teacher-led, more valid (assess what is seen as really important), more flexible, more formative.

m) Conduct continuous monitoring, evaluation and research to feed and evaluate progress of implementation process and outcomes.

n) Consider multiple criteria of design and implementation quality (cf. Nieveen & Folmer, 2013):

- o Relevance (shared interest for intended context)

- o Consistency (with knowledge base; congruent design)

- o Practicality (especially for teachers)

- o Effectiveness (especially student impact)

- o Scalability and sustainability (within and across organisations)

o) Invest in predictability, standardisation and continuity of curriculum (re)design/renewal trajectories with long-term timeframes.

p) Invest in curricular capacity building of schools and teachers through manifold approaches of professional development that stimulate and support context-specific, collaborative curriculum design and evaluation (in/through communities of practice, professional learning communities and networks, action research, lesson studies, teacher design teams, and the like; see Pieters, Voogt & Pareja Roblin, 2018).

q) Stimulate the design, formative evaluation and sharing of 'good', preferably adaptable exemplifications of successful curriculum practices. Such exemplary or 'educative' materials can orientate and support teachers in their familiarisation with innovative curriculum proposals (Ball, D. & Cohen, D., 1996; Davis & Krajcik, 2005)

r) Extend investments in curricular capacity building to relevant actors in the curricular environment of teachers: school leaders, pre- and in-service teacher educators, education publishers, education boards, inspectorate.

Examples of promising practices

An overall conclusion of our analysis is that successful, systematic and systemic approaches inevitably take a lot of time, so patience and stamina are needed. It also helps to think about curriculum change more in terms of continuity and evolution than in (short-term) revolution. In particular, politically-driven ad hoc measures are usually ineffective and spoiling the climate for sustainable renewal. It is better to invest in building up more or less stable approaches and procedures to periodical curriculum revision, with broad participation of society, experts and practitioners. Below we offer two examples (both incorporated in the study of Van den Akker 2018) of approaches that more or less illustrate such maturity.

The first one stems from Finland. It refers to the overall trajectory that has evolved for ongoing (re)design of its national curriculum frameworks.

Collecting information:

- Views and experiences of pupils and teachers with previous reform.

- Exploratory studies on future trends.

- Exploratory research on specific topics (e.g. children's well-being).

- Evaluative studies of specific projects.

- Analysing reforms and curricula in other countries.

Curriculum design process:

- Forming an advisory group of the process and curriculum groups for the preparation of the general part of the curriculum.

- Creating and publishing curriculum websites and the Curriculum Roadmap (common planning tool).

- Shaping of the first draft (three months); publishing it; receiving feedback next month; publishing feedback and summaries/conclusions made on the basis of the feedback two months later.

- Forming curriculum groups for subject syllabi preparation and formulating guidelines for subject syllabi preparation (two months). Subject groups then start their work.

- Proceeding with the preparation process, several conferences, seminars and meetings.

- Publishing first drafts of subject syllabi and of the refined draft of the general outline of basic education. Working with feedback in similar way as before.

- Refining all core curricula based on feedback.

- Final decisions on the core curricula (after 2.5 years).

Local curriculum processes:

- National guidance through the Curriculum Roadmap, teacher education and support material.

- Drawing up of local curricula for teaching and learning based on the new curriculum framework; actual start after 1.5 years.

Evaluation of the reform:

- Follow up surveys and curricula evaluation commencing immediately after implementation.

- Evaluation of the whole reform process and its results by the Finnish Education Evaluation Center (two years).

- Research project (continuously) on the reform process and its results (by various universities).

The second example is from the combined states of Berlin/Brandenburg in Germany (where the various states are the responsible jurisdictions in curriculum policy making). It portrays another matured example (including their own reflective remarks) of a long-term approach, based upon their most recent trajectory:

- A typical interval period for curriculum revision is about ten years (although some states in Germany show longer time intervals than that), which is probably too slow for rapid integration of emerging topics (e.g. Informatics), but often too quick for schools to absorb.

- The concrete (re)design and development activities take about three years, but more time is needed for analysis upfront, for preparations of implementation afterwards and the actual uptake by schools. And then a couple of years of experience before it makes sense to start thinking about a new round of revision. That means that altogether it takes at least an interval of ten years between revision trajectories.

- The importance of (more) investing in school-based curriculum development. For example, LISUM [curriculum expertise and support agency] has produced a brochure for schools about how to address their own curriculum challenges, including making their own school-specific choices.

Future inspiration might come from Switzerland where the Kanton-based system reflects very decentralised approaches with lots of curriculum autonomy for small regions. That seems to result in relatively slow changes at system level, but sustainable changes in school practice.

- For school-based curriculum development many efforts are needed for communication, coordination, cooperation and support. Schools tend to develop their own voluminous file about their own school-specific curriculum, which can be a quite time-consuming process of sense making. Moreover, translating that into consistent classroom practices is another challenge.

- The intention is to start soon with anticipating a new round of curriculum revision around 2022-23. Major points of attention will be the experiences with the increased attention to competencies and to the efforts to include special education in the 'regular' schools.

- New adaptations of the curriculum before that time (in about five years) are probably better left to the initiative and preferences of individual schools themselves than to decision at state level.

Of course, there are more examples to be found of promising approaches for parts of or entire curriculum development trajectories. For example, Singapore appears to be quite successful in continuous professional development and capacity building for continuous curriculum renewal. A remarkable characteristic that probably helps a lot in that respect is the job rotation system where people periodically change roles between the working contexts of policy (at ministry level), teacher education and research (at universities), and school practice (principals and expert teachers). Such exchanges contribute to a collaborative culture of curriculum renewal.

Singapore has also established a standard pattern for the overall trajectory, with a somewhat shorter duration (six years) than the examples from Finland and Germany (which take about ten years). The figure below shows that process, in conjunction with a comparable process as practised in British Columbia (Canada):

Table 1. Examples of the process of curriculum renewal

British Columbia	Singapore
Research	Planning and Consultation
Design	Design and Development
Development	Trialling/Prototyping
Review, Trial, Revision	Communication and Implementation
Phased Implementation	Post-Implementation Feedback & Review

It is beyond the scope and size of this paper to describe many more examples. Some interesting analyses of national (curricular) innovation approaches are presented in two yearbooks of CIDREE (Consortium of Institutions for Development and Research in Education in Europe, including many national curriculum agencies), focusing on dilemmas around balancing regulation and freedom (Kuiper & Berkvens, 2014), and on bridging the gap between political decisions and classroom practices (Nyhamm & Hopfenbeck, 2014). Thus, both publications focus on the process dimension of curriculum implementation.

Exemplary, international references that focus on the structure and design of national curriculum frameworks themselves (thus the product dimension) are recently published by UNESCO (Opertti, R., Kang, H., & Magni, G., 2018; UNESCO, 2017).

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