Innovating education through research

NRO programme

2016 – 2019
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Chapter 1: The 2016-2019 NRO research programme

1.1 Introduction

This programme sets out the themes into which the Netherlands Initiative for Education Research (NRO, see Appendix 3 for a list of abbreviations) will initiate and coordinate research in the 2016-2019 period. The main themes are elaborated in the following chapters. This introduction explains what the NRO is, what types of research it initiates and coordinates, how this programme and the main themes are established and what research will be initiated outside the programme.

1.2 The NRO

Mission and organisation

The NRO was established in 2012 to coordinate the programming and funding of research into education in the Netherlands. This new research initiated and coordinated by NRO involves all levels and forms of education, from pre-school education to adult education. In addition, the NRO aims to provide an overview of education research which has been executed or is currently being carried out and maintains national and international contacts that may enhance education research in the Netherlands or increase its relevance. Finally, the NRO is committed to ensuring that the results of research are disseminated to and used by policymakers and education professionals. In this way, the NRO contributes to innovations and improvements in education.

A broad-based steering committee (see Appendix 1) monitors the NRO’s strategic course. The research is coordinated by four programme councils. There are separate councils for fundamental, policy-oriented and practice-oriented research and for overarching and cross-cutting research themes. These programme councils consist of representatives from science, teaching practice and research practice (see Appendix 1). A bureau supports the Steering Committee and the councils. The NRO is part of the Netherlands Organisation for Scientific Research (NWO).

Types of research and the associated requirements

This programme covers all the research types coordinated by the NRO, i.e. practice-oriented, policy-oriented and fundamental research. This division stems directly from the fact that the NRO receives earmarked funds from the Dutch Ministry of Education, Culture and Science (Dutch acronym: OCW) for these three types of research.

The NRO defines practice-oriented research as research for which the research questions are prompted by professional practice and where the resulting knowledge can contribute directly to this practice (Andriessen, 2014). By analogy, the NRO defines policy-oriented research as research for which the research questions are prompted by policy and where the resulting knowledge has implications for this policy. Fundamental research is research for which the research questions are prompted by scientific curiosity and where the resulting knowledge leads to validation of existing knowledge and the development of new knowledge and insights. The NRO supplements these definitions with a number of requirements for the interaction between practice, policy and research.
For practice-oriented research, the NRO imposes the requirement that research proposals must be submitted by researchers in partnership with educational institutes. These consortia are required to have engaged in demand articulation, i.e. discussions between researchers and educational institutes on issues that arise in practice and which lead to research questions. Practice-oriented research, therefore, is research for which the demand articulation is prompted by the teaching practice and which is conducted within and in partnership with that practice. Practice-oriented research yields knowledge, understanding and/or tangible products that contribute to improving teaching practice.

For policy-oriented research, the NRO imposes the requirement that the researchers must consult, for example, with the OCW policy officers involved before the start of the project. This ensures that the various parties’ expectations of the research and the final product are aligned from the outset. The policy perspective also plays a role in assessing the proposals, although the independence of the research is, of course, not under question.

For fundamental research, the NRO imposes the requirement that the research must have demonstrable added value compared to the research conducted at universities with first-flow funding, i.e. the research must specifically be innovative and complementary. The NRO also believes that fundamental research must provide the potential for knowledge development relevant to policy and practice in (Dutch) education. Dutch education and Dutch education research benefit from doctoral and post-doctoral research into education. This strengthens the research infrastructure in the Netherlands in this field and ensures that more well-trained education scientists can work for or in education. The NRO therefore chooses to earmark part of the funds for fundamental research projects in which one or more doctoral programmes and/or post-doctoral research projects are required. Researchers submitting proposals for fundamental research are required to be employed by a university or other research institute and to have a solid international academic track record, or – in the case of postdoc researchers – to belong to the best of their generation in their field.

The three research objectives mentioned above – contributing to professional practice, strengthening policy and innovation of scientific knowledge and insights – are set out under each other as if they are three different types of research. Much research, however, also encompasses two or all three objectives: research based on the demand from professional practice can also contribute to theory formation, and policy-oriented research can be relevant to practice or vice versa. Programmes in which the different types of research are carried out in parallel or are integrated, are usually coordinated by the Overarching Programme Council for Education Research (OPRO).

Variation in research

The type of research to be conducted depends on the desired outcome of the research. A number of research types are described briefly below.

Descriptive/exploratory research aims to assess the state of play regarding a specific topic. With this type of research, no relational connections are established between variables. Relational research, on the other hand, is focused on analysing relationships between variables in specific situations, without necessarily being able to provide explanations. In explanatory research, mechanisms are sought that can help to explain relationships between variables. A possible fourth approach is action research. In action
research, researchers and practitioners (e.g. teachers, school managers, etc.) collaborate closely to establish whether the actions of those practitioners have the desired effect. These types of research are not mutually exclusive, and they may very well overlap. Descriptive research, for example, may precede explanatory research. There is still no consensus on the terminology for different types of research, and different terms are used.

Depending on the research questions, research types may also differ in the choice of design and methods. For example, relational research may use a correlational design to analyse the relationship between the variables. In explanatory research, the choice might be for a (quasi) experimental or longitudinal design. In action research, the so-called design-based approach is often used.

A logical connection between research questions, research goal and method(s) is crucial for the quality of the research proposals to be assessed positively. The assessor must be open to different approaches, and the selected approach should be developed in a consistent manner.

Education can be researched from different theoretical perspectives, so much of the existing education research is multidisciplinary. In conducting this research, contributions can be expected from various scientific disciplines such as education science, pedagogy, subject didactics, economics, sociology, history, cognitive neuroscience, psychology, public administration, ethics and law.

### 1.3 Creation of the programme

To produce the present research programme, the NRO proceeded as follows.

#### Exploratory meetings

The NRO organised seven exploratory meetings for stakeholders, including:
- A delegation of the Association for Education Research and the Inter-University Centre for Educational Sciences together with lecturers in higher vocational education who work in the field of education and pedagogy.
- A delegation of independent (private) education research institutes.
- A delegation of the Netherlands Bureau for Economic Policy Analysis, the Netherlands Institute for Social Research, Statistics Netherlands, the Inspectorate of Education and the Education Council.
- A delegation of teaching advisors.
- Directors and executives nominated by the Primary Education Council and the Secondary Education Council (the industry organisations for primary and secondary education; respectively PO-Raad and VO-Raad).
- Teachers nominated by the Education Cooperative.
- Experts in the field of education economics and the sociology of education.

Prior to the meetings, the NRO published a general online survey for the participants and subsequently asked each group more in-depth questions online. NRO asked the participants about the social trends they expect in the medium term and the impact that these trends could have on education. The results of these surveys formed the basis for the meetings. The participants mentioned specific topics and
questions and indicated the type of education research (fundamental, practice-oriented or policy-oriented) best suited for this.

In response to the request to participate in these exploratory meetings, the MBO-raad prepared its own memo, which the NRO discussed with a small delegation. Furthermore, a meeting was held between the Programme Council for Policy-Oriented Research and a number of OCW policy officers to explore the issues they consider important. In addition, consultation took place with legal educational experts and the skills-platform set up by OCW for programming research into competency-based education. Finally, a meeting was held between representatives of the NRO and the National Initiative for Brain and Cognition (NIBC).

**Input from available publications, the Programme Councils and the Steering Committee**

The results of the meetings are summarised and integrated with the trends and research topics listed in the following publications:

- The report of the WRR ‘Towards a learning economy’ (Naar een lerende economie; Wetenschappelijke Raad voor het Regeringsbeleid, 2013).
- The OCW’s 2015 Knowledge Agenda (Ministerie van Onderwijs, Cultuur en Wetenschap, 2015).
- The VSNU’s Educational Sciences Sectoral Plan (Commissie Sectorplan Onderwijswetenschappen, 2014).

The NRO Programme Councils subsequently provided instructions for further prioritisation and focusing of the main themes of research.

**Elaboration by experts**

On the basis of all the meetings held, the NRO was able to establish what the parties involved in education and education research considered to be the main themes to be explored further in the coming years. Experts were then asked to elaborate the selected main themes for each topic.

The NRO would like to thank the following experts for their input and contributions to this programme: Nienke Nieveen and Ludo Verhoeven (educational offer and curriculum), Marijke Kral and Jeroen van Merriënboer (education and technology), Thijs Bol and Anne Bert Dijkstra (socialising function of education), Douwe Beijaard and Rosanne Zwart (development of teaching professionals), Roel Bosker (lifelong learning), Orhan Agirdag and Sjoerd Karsten (the education system and governance in education) and Jan van Tartwijk and Nienke Molenaar (education innovation and the role of research).

The programme text was edited by Jeroen van Merriënboer, Peter Sleegers and Theo Wubbels to produce a coherent whole.
1.4 The main themes of this programme

On the basis of the approach outlined above, seven main themes were selected for research in the coming period. This concerns first of all the Educational offer and curriculum. Platform Onderwijs2032 has formulated the government’s opinion in this respect, which expresses a keen ambition to reconsider the curriculum for primary and secondary education. Research must, for example, provide insight into which content can best be addressed, and how and when this should be done.

The fact that education takes place in a technological society leads to the second main theme: Education and technology. Schools are increasingly using the possibilities offered by technology, which creates new questions in terms of applications in education as well as the impact of technological innovations on education as a whole.

There is also increasing focus, within mainstream education, on the third main theme: The socialising function of education. Not only is there more focus on integrating citizenship in the curriculum (as Platform Onderwijs2032 also points out), it is also important to ask to what extent these curricular elements generate socially relevant results and how in-school and out-of-school learning can be integrated with respect to civic skills.

In addition to being urged to look at all these main themes, the teaching professionals will also be called on to play a key role in improving education for other reasons. The development of teaching professionals is therefore the fourth major theme. This involves not only teachers but also school managers and teacher training institutes.

Education cannot be limited to the age range of four to twenty-four – an insight prompted for example by the opportunities offered by pre-school education and the varying challenges during lifelong learning. Education and lifelong learning, from toddler to pensioner, raises new questions and is the fifth main theme. It involves key moments and transitions in the learning pathway, including the transition to the labour market and lifelong learning.

In the Netherlands, the education system is organised in a specific way, with features such as learning pathways, vocational orientation and mobility between learning pathways as well as a specific form of state governance. The question is what this system is capable of, including in the international context, and what the possibilities and desirability of governance in education are. This brings us to the sixth main theme, The education system and governance in education.

Systematic circulation of knowledge and co-creation are necessary for innovative education. This is also one of the missions of the NRO: what options are there for making research into education relevant to teaching practice? This is the focus of the last main theme, Education innovation and the role of research.

These themes are discussed in the following chapters, as is the state of play of these themes in research. In addition, research themes are formulated and, by way of example, a number of research questions are suggested.

1 More information on Platform Onderwijs2032, can be found at: http://ononderwijs2032.nl.
1.5 Additional research and research into specific topics

This programme provides the substantive basis for Calls for Proposals which the NRO will publish on its website (www.nro.nl) between January 2016 and January 2020. These calls will be announced in the NRO newsletters. Appendix 2 contains an overview of the NRO Calls to be published.

In addition, funding is earmarked for additional research not directly associated with this programme:

- Cohort study
- International comparative research (including PIRLS and TIMSS)
- Education research in postdoc programmes
- Research for vocational education

Besides conventional funding – which will be devoted to the key issues set out in the programme – the NRO also receives additional funding from OCW for additional research into specific topics. In the next few years this will in any case involve:

- Green education
- Inclusive education
- The Teachers’ Agenda
- Education & ICT Breakthrough project
- Effects of anti-bullying programmes
- International comparative research

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*Bestuursakkoord MBO 2014.*

*Kennisagenda 2015.* Den Haag: OCW.

*Bestuursakkoord voor de sector primair onderwijs. Definitieve versie 10 juli 2014.*


*Naar een lerende economie: Investeren in het verdienvermogen van Nederland.* Amsterdam: Amsterdam University Press.
Chapter 2: Educational offer and curriculum

2.1 Introduction

Reconsidering the aims and content of curricula and the implementation thereof will be a main theme in education in the coming years. This is evident in the main elements of the government’s opinion as formulated by Platform Onderwijs2032, which expresses a keen ambition to reconsider the curriculum for primary and secondary education. The parties that would need to be involved in producing the curriculum and how this should take shape also deserve attention.

This chapter discusses three research themes for educational offer and curriculum. The first theme concerns research into what should be learned and when this needs to be learned. The second theme concerns research into integrating educational content and coherence in the curriculum. The third theme concerns research into the relationship between in-school and out-of-school learning.

2.2 What should children learn and when?

Increasing globalisation, technologisation and internationalisation of society calls for a reorientation of the learning objectives and content of education. When it comes to defining the content and organisation of the curriculum, research has focused on curricular strands that relate mainly to organising educational content and on interdisciplinary 21st century skills. In a technological society characterised by an exponential increase of freely available information, self-regulation and ICT literacy are especially important. Using ICT skills also leads to changes in basic skills, such as arithmetic and reading.

Curricular strands

A well-designed curriculum organises the study material in such a way that students can develop their talents optimally (Goodlad, 1994). According to Craik and Bialystok (2006), students should first focus on forming stable representations – such as concepts, words and numbers – in all subjects to be included in a programme. After this, the students can move on to initiation and regulation of thought processes, such as logical reasoning, experimenting, designing and modelling. Finally, it is important to focus on managing these thought processes through working memory and learning to deal with cognitive load, that is, the cognitive limitations that people experience when having to (simultaneously) process a lot of information.

From the perspective of the brain, learning and developing talent involves the formation of neural networks that can be used productively, for example because of multiple, multimodal representations (see De Jong et al, 2009). Brain research shows that in the first years of life, neural networks are built in which dynamic connections between astronomical numbers of neurons ensure the exchange of information. Nonetheless, the development of the brain also imposes restrictions on what can be learned and when (Blakemore & Frith, 2005). Representations of words and numbers are learned relatively early. It is only later that these lead to language comprehension, language production, divergent thought processes (aimed at generating as many solutions to a problem as possible) and convergent thought processes (aimed at finding the best possible solution) are established (Craik & Bialystok, 2006). The development of processes related to the regulation of these thought processes in the frontal cortex (e.g.
self-regulation) continues into late adolescence. Genetic predisposition on the one hand and early experiences, practice and pedagogical situations on the other hand determine which connections are made and how strong these connections are (Blakemore & Frith, 2005). Depending on the input from the environment, certain connections are strengthened and others are weakened; during periods when the brain is receptive to this input, innovative (learning) situations can stimulate emerging talent. For example, a child’s brain may adapt to prolonged exposure to two or more language systems and, on that basis, develop a multilingual language competency in the working memory. Likewise, experiences with science and technology will contribute to the child’s brain being receptive to exploring, experimenting and designing.

21st century skills

Competences like communication skills, social and cultural skills, creativity, critical thinking and problem-solving are called 21st century skills (Voogt & Pareja Roblin, 2012). Although the term ‘21st century skills’ suggests that these are new skills or competencies, this is far from the case. What’s new about them is that these skills are growing in importance. Indeed, the labour market shows a decline in manufacturing and a sharp rise in jobs requiring 21st century skills (OCW, 2015; Onderwijsraad, 2014). What typifies 21st century skills is that they are ‘interdisciplinary’, yet research shows that teaching 21st century skills ‘outside’ a domain (e.g. in a general problem-solving course) is ineffective and does not lead to application of the skills learned in new situations (Van Merriënboer, 2013). It seems better to teach these skills within a wide range of fields (i.e. interwoven with domain-specific skills) and to continuously draw students’ attention to the commonalities (Mayer & Wittrock, 1996).

Self-regulation

Self-regulation is a particularly important 21st century skill in education, since the regulation of learning processes has direct consequences on learning outcomes. To be better able to impart self-regulation skills to students in primary and secondary education, it is important to focus on the underlying neuro-cognitive processes. Learning to regulate one’s own behaviour – such as planning, deciding, thinking before acting and being able to manage one’s feelings – takes a lot of time and continues into late adolescence (see Diamond, 2013). The teacher can promote self-regulation by making students aware of their own learning behaviour (De Boer, Donker-Bergstra & Kostons, 2012). The teacher does not only tailor the instruction to the object of learning, but also the learning process itself. The teacher can, for instance, help students to organise and structure information (methodical skills); self-reflect or correct (evaluative skills) and to concentrate, keep their motivation and reduce anxiety (socio-emotional skills). Tailored guidance, which gradually decreases as students are better able to regulate their own learning, enables students to better regulate future learning processes themselves and makes them increasingly less dependent on their environment (Zimmerman & Schunk, 2008).

ICT literacy

In all models for 21st century skills, ICT literacy is considered a prerequisite to function well in a technological society. Research shows that young people certainly do not ‘automatically’ develop ICT literacy, nor do they all do so to the same extent (Van den Beemt, Akkerman, & Simons, 2011; Uerz, Kral, & De Ries, 2014). Education has an important task in this respect, and that is to help prevent a new
digital divide. A skill directly related to ICT literacy is computational thinking. This involves understanding how to use technology to solve complex problems, which can be learned by learning how to program, how to make models or how to build simple robots (Grover & Pea, 2013). Analysing problems and developing solutions logically and in a structured manner are key to computational thinking (Wing, 2006, 2008). Computational thinking is considered of importance for all disciplines and professions (OECD, 2013). The Royal Netherlands Academy of Arts and Sciences (KNAW, 2012) suggests that students are not being adequately prepared for the current demands of the labour market and society in this respect.

Impact of technology on basic skills

The technological society requires a reassessment of learning goals and teaching methods not only in the area of ICT but also in other domains; for example, when it comes to reading and writing. It appears that young people are reading less and less by choice (European Commission, 2012; Sociaal en Cultureel Planbureau, 2015). Voluntary and ‘deep’ reading is precisely what is required to develop so-called higher-order reading skills, where reading is focused on understanding the storyline or argument. Youngsters read a lot online, but this is mostly non-linear reading, i.e. scanning for information and isolated facts (Wolf, 2007). Paradoxically, online reading and processing of information in education (e.g. studying course material on an iPad) makes great demands on higher-order reading skills. Teaching methods will therefore have to seek new ways to develop higher-order reading skills with online study materials (Clemens, 2014; Driessen, 2013). Similar developments apply to other skills, such as writing, mental calculation and topography.

New research

New research must contribute to improving the scientific basis of what should be covered in the curriculum and when this should – in curricular strands – be offered. One important theme concerns embedding 21st century skills in the curriculum, particularly self-regulation and ICT literacy. It should also be examined what impact ICT has on learning basic skills such as reading and writing. Examples of research questions are: how best to arrange study materials so that the learning process runs as smoothly as possible? What innovations are needed in the curriculum so that all students can develop their 21st century skills as best as possible? To what extent does the brain’s developmental stage restrict the possibilities children have to regulate their own learning process? Where and in what structure can computational thinking be incorporated into the curriculum? How do basic skills like reading and arithmetic change under the influence of new technology?

2.3 Integration and interconnectedness

In its current form the school curriculum is primarily linear and, especially in secondary education, is characterised by separation of school subjects. The offering at primary school level also has many separate aspects, for example oral language, reading, writing, arithmetic, world orientation, etc. These subjects are often taught in separate courses and little connection between the subjects is made (Bransford, Brown, & Coking, 2000). Research so far has presented several arguments in favour of increasing coherence in the curriculum. A coherent educational offer would motivate students more (Venville, Rennie, & Wallace, 2012), contribute to transparent and meaningful learning and thus offer more opportunities to apply the lessons learned in new situations (Bransford, Brown, & Cocking, 2000).
In addition, mono-disciplinary knowledge is often at odds with the multidisciplinary knowledge needed to solve complex problems; these are typically the types of issues students are confronted with later on in life when exercising a profession (Hatch, 1998).

When it comes to complex issues, not only is integration into the curriculum (which mainly focuses on enhancing the cohesion between subjects) important, but also interweaving in teaching subjects and 21st century skills. Broader subjects or profiles, in particular, offer good opportunities for this (Priestly & Biesta, 2013). In primary schools, for example, ‘language’ could be broadened to ‘languages’, so in addition to Dutch there would also be room for other languages and for considering language and communication as phenomena in and of themselves. In addition, there could be a focus on consolidating or introducing new broad subjects, or ‘profiles’, such as science and technology, health, social studies, philosophy and creative development.

**New research**

New research should provide more insight into the advantages and disadvantages of integrating subjects. Approaches can also be developed and studied to enable interweaving of the teaching of subjects and 21st century skills. Examples of research questions are: how can teaching materials from different subjects be integrated? Which profiles or ‘broad’ subjects best prepare students for their future profession? How are 21st century skills taught in different educational sectors and how are they interwoven with subject-matter knowledge and skills? Does interweaving ICT literacy with different subjects lead to the necessary transfer into new learning situations?

**2.4 In-school and out-of-school learning**

There is evidence that the more actively students are involved in the learning process, the better the outcomes are (see Bruner, 1986; Prince, 2004). Students can be activated by creating learning environments based on their daily experiences and interests and within which they can make their own choices and assign their own meaning to the learning content (see Jonassen & Land, 2012). There are at least three good reasons to use the students’ own experiences as a source of knowledge. First, society’s many demands to make the education offer future-proof is threatening to overload the curriculum. Better coordination of in-school and out-of-school learning can prevent overloading of the curriculum and reduce fragmentation of the educational offer (see for example Abbenhuis et al, 2008; Nieven, Handelzalts, Van Eekelen, & Van den Akker, 2011). Second, connecting in-school and out-of-school learning, for instance through traineeships, can contribute to a better labour market situation for young people; certain skills seem to be developed better in an out-of-school setting rather than at school (OECD, 2015). Third, better matching of in-school and out-of-school learning provides an ideal opportunity to increase student involvement in education (Konings, Seidel, & van Merriënboer, 2014).

There are a number of initiatives in primary and secondary education to integrate in-school and out-of-school learning, for example through excursions, fieldwork and visiting museums and theatres. Students in basic vocational education (Dutch acronym: vmbo) can do traineeships in neighbouring nursing and retirement homes and offer low-threshold assistance for odd jobs in the neighbourhood. Students in secondary and higher vocational education (Dutch acronyms: mbo and hbo) are actively involved in integrating in-school and out-of-school learning, for instance in Centres for Innovative Craftsmanship...
(mbo) and Centres of Expertise (hbo). Students, teachers, scientists and entrepreneurs work together at these centres with the aim of improving the quality of vocational education and to improve the connection with business and industry. To date, practical experience has shown that such initiatives make great demands on schools and teachers, but at the same time they provide a lot of guidance to improve the curriculum and the learning environment (Commissie Van der Touw, 2014).

New research

New research must lead to a better understanding of the factors that contribute to optimum integration of in-school and out-of-school learning. This involves, among other things, effects on the feasibility of studying the curricula and the involvement and employment prospects of students. Examples of research questions are: how can education be designed so that learning in school and learning out of school are optimally aligned to one another? What combinations of in-school and out-of-school learning contribute to the development of students while meeting the needs of the environment?

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Chapter 3: Education and technology

3.1 Introduction

Rapid technological changes are an essential aspect of our modern society. This also has implications for the design of education. Technological developments change the way people study, present and share information, how they communicate with each other, practise the material, receive feedback and regulate their learning. If these activities take place within the context of education and training, they are sometimes referred to by the diffuse term of ‘e-learning’. The way in which e-learning is used must fit within the educational concept and organisation of the school (meso level) as well as within national policy and accountability, for instance to the Inspectorate of Education (macro level).

Four research themes in education and technology are discussed under this main theme. The first theme is technology for presenting and sharing information and communicating about this information. Technology for task-oriented education is the second theme and the third theme is the use of technology for self-regulation of learning. The fourth and final theme describes the relationship between micro, meso and macro levels. The impact of technology on society as a whole is discussed in Chapter 6.

3.2 Technology for presentation, communication and sharing

Initially, technology in the classroom was mainly used for one-way communication, such as school radio and school television. With the advent of the computer, however, the possibilities increased: multimedia presentation of the material, interaction between the student and the material presented (e.g., navigating hypertext or exploring a digital micro-world) and digital interaction among students about the subject matter.

**Multimedia presentation of study material**

Research into multimedia presentation of study material focuses on how written or spoken text and images can best be combined. Cognitive load theory has already generated many guidelines for the optimal design of animations, slide presentations, educational videos, web lectures, dynamic visualisations, etc. (Kester & Van Merriënboer, 2013). These kinds of materials offer enriched and authentic study material and an opportunity for educational publishers. An interesting new development is the increasing ease with which eye movements can be registered. It is expected that within a decade or so this technology will be available on many commercially available devices. This will make it immediately clear which elements of a visual presentation a student has or has not looked at and for how long. On the basis of this information, new methods can be developed to allow students to study information in a more targeted manner. A relatively new trend in cognitive sciences emphasises that in addition to the mind, people also need the sensorimotor system to study, understand and present conceptual information (embodied cognition). Consider, for instance, the use of hand gestures (Wagner Cook, Mitchell, & Goldin-Meadow, 2008).

**Interaction with the study material**

Research into how interaction with the study material contributes to understanding it better includes the use of simulations in conceptual domains (De Jong and Van Joolingen, 1998) and the use of hypermedia, where students can navigate between different information elements through hyperlinks. A micro-world,
for example, gives students the opportunity to let an object fall from different heights and to examine how height, weight of the object and other factors affect the speed at which the object falls, fall time, etc. This can help students discover gravity as a physical phenomenon (Liu, Cheng, & Huang, 2011). Research shows, however, that students need support (scaffolding) to explore and navigate in interactive learning environments (Azevedo & Jacobson, 2008).

**Communication about the study material**

In addition to interacting with the study material, it is also possible to communicate about the study material with fellow students, teachers or experts (Koschman, Hall & Miyake, 2002). To date, research has mainly focused on applications developed specifically for education, such as Blackboard or WebCT. There is currently a shift towards collaborative learning through social media and social networks like Facebook (for students) or LinkedIn (for professionals). This is no longer just about collaboratively discussing the study material presented, but also increasingly about sharing it. Sharing products created by students themselves ties in well with learning through designing and producing – currently of interest because of the transition from a consumption-based economy to a creative economy. Research shows that students need support both in communicating about and learning how to share knowledge (Margaryan, Boursinou, Lukic, & De Zwart, 2015).

**New research**

New research must focus on methods that help students cope with an increasing amount of rich and complex information. Consider, for instance, direct support for reading and viewing behaviour, help with navigation or exploration of material and advice on how to share the sources found or self-constructed sources. Examples of research questions are: how can the registration of eye movements best be used to focus students’ attention on the most important parts of the study material? What types of movement are best suited to help in teaching and learning the different types of knowledge? How can social media support learning collaboratively and productively in an efficient and responsible way? How can it be made appealing for educational publishers to incorporate more interactivity into their products where desirable and effective?

**3.3 Technology for task-oriented education**

Technology is also used to let students practise and provide feedback or to reflect on their performance. The development of task-oriented applications began in the 1980s with computer-aided education based on drill and practice to practise ‘school’ tasks, mostly aimed at automating routines: learning the multiplication tables, spelling rules, topography, etc. These kinds of applications remain popular both in and out of school and increasingly make use of play elements. There is also increasing focus on applications that use real-life tasks and the integration of these applications in education.

**Applications for real-life learning tasks**

More and more applications are being created that offer students the opportunity to prepare for a future profession, a career in science or everyday life. These include serious games, 3D virtual reality and simulators. Applications on smartphones can also support learning ‘real’ tasks in the workplace, for example. Augmented reality, for instance through Google Glass, can determine which information is required based on what a student is looking at. This information is then projected ‘onto reality’, or the
application shows what an expert would look at. To learn from working on real-life tasks, it is important that students reflect on their performance and progress, for example by regularly comparing their own results with those of an expert (Van Gog & Rummel, 2010). Applications that allow for critical learning moments that occur during work to be saved in a portfolio can be helpful. This allows the student to reflect on this later in a less hectic environment (Konings & Gijselaers, 2014).

**Integration of real-life applications**

Although much is known about the learning effects of task-oriented applications, they are still not widely used in many educational sectors. A frequently proposed explanation is that they do not integrate well into the curriculum. In this connection we can distinguish between three types of integration:

1. Integration with the theoretical information that is necessary to be able to perform real-life tasks. Performing real-life tasks almost always relies on multidisciplinary knowledge.
2. Integration in continuous curricular strands. The lifeliness of task-oriented applications can, for example, increase as students develop their skills.
3. Integration with learning in the workplace. In a game-facilitated curriculum in vocational education, for example, students are given real-life tasks they have to perform either during their traineeship, at school or in a game (Van Bussel, Lukosch, & Meijer, 2014).

**New research**

New research can focus on the design and use of task-based simulations, serious games and virtual and augmented reality applications, with special attention to their integration in education. Examples of research questions are: how can a development portfolio support the process of developing skills within task-oriented applications? What demands does the curriculum impose on task-oriented applications so that they fit into existing or future educational arrangements? How does the fidelity of task-oriented simulations affect the learning process and how does this relate to the student’s level of expertise? How can task-oriented applications be designed to contribute to the integration of learning at school and learning-on-the-job?

**3.4 Technology for regulation of learning**

All too often the same teacher gives all students in the same group the same education at the same time, with the same intended result (Tomlinson, 2014). However, the ideal learning processes are generally described in the literature as cycles with the following steps:

− The student performs one or more learning tasks.
− The quality of task performance or the associated learning results are evaluated.
− On the basis of this evaluation, there is self-regulation. This determines how and what the student learns in subsequent tasks (Schunk & Zimmerman, 2011).

Precisely how this cycle proceeds depends on many factors, but the basic idea is that it delivers tailored learning that is more suited to individual learning needs than traditional classroom learning. The cycle can be managed by the teacher – who evaluates performance and progress and on that basis makes decisions about the next steps for each student individually – or by the students themselves, who assess their own performance and progress and on that basis make decisions about the next steps. The latter
case is an example of self-regulation (see Chapter 2). ICT can support this so-called regulative cycle in various ways.

**ICT that takes over regulation**

Where possible, ICT can take over this regulation. Learning and practising are computer controlled, with a system that evaluates, gives feedback or selects new study material based on collected information (adaptation). This evaluation function is becoming increasingly more sophisticated, as it provides richer feedback and new material is better selected. Now it is possible to show students studying a presentation not only which pages they viewed for how long, but also to establish how much attention they paid to different components based on their eye movements (D’Mello, Olney, William, & Haysc, 2012). Other physiological measurements provide feedback about their emotions (Harley, Lajoie, Frasson, & Hal, 2015). In programmes for practising, the evaluation function is no longer limited to an assessment in terms of right or wrong. It is also possible to diagnose and address misconceptions on the basis of patterns. These types of intelligent tutor systems have been around for decades, but only now are they beginning to get sufficiently advanced to be successfully applied in education.

**ICT that supports the teacher**

Instead of taking over regulation of the learning process, ICT can also support teachers in this respect. This is a form of data-driven education that uses learning analytics: collecting, analysing and interpreting data from a student tracking system or from the use of electronic learning resources. This makes progress in the learning processes of individuals or groups visible to teachers so that they can better tailor their teaching to the needs of individual students (individualisation) or subgroups of students (differentiation). Learning analytics can be applied to data from large groups of students to give teachers data feedback (in so-called teacher displays); in higher education, learning analytics can help teachers to better tailor their instructions to subgroups in, for example, MOOCs (massive open online courses). The instrument could also, in a different form, be suitable for school managers, for example to give them real-time visibility into the progress of educational processes so they can prevent early school dropouts.

**ICT that supports students with self-regulation**

Third, ICT can support not only teachers but students themselves in self-regulating their learning process. Reflection apps can help them to evaluate their own learning activities (Driessen, Van Tartwijk, Overeem, Vermunt, & Van der Vleuten, 2005), metacognitive prompts can help them to better monitor their own study behaviour (Bannert, Sonnenberg, Mengelkamp, & Pieger, 2015; Miller, Van Boxtel, & Sleegers, 2011) and planning tools can help students in making decisions about what will be taught and how (Bonestroo & De Jong, 2012). Current research is mainly aimed at improving and expanding the evaluation function. For example, physiological data and data from social networks give students a better understanding of how they regulate their motivation and emotions or how they function in a group. Learning analytics play an increasingly important role in this respect. In this case the data is not presented to the teacher but to the student (in so-called student displays) so that they can compare their own study behaviour with that of other (groups of) students. The student can for example see what other students with a similar profile have done to achieve good learning performance.
Fourth, ICT can help teachers to teach self-regulation skills. In that case the data say something about the quality of self-regulation, for example, how students believe they have performed a task, what improvements they see and the next steps they want to take. These data can be stored in electronic development portfolios, which offer teachers a basis for giving feedback, for example in regular coaching interviews (Kicken, Brand-Gruwel, Van Merriënboer, & Slot, 2009). In a learning environment that relies heavily on self-regulation, e.g. open online education, learning analytics can provide insight into the types of self-regulation skills that are successful.

Learning analytics therefore also offers clues for designing an online environment that optimally supports these types of skills (Van Loon, 2013). In blended learning (a combination of online learning and personal interaction between teacher and student), the question in particular is which combination of online components (e.g. self-quizzes) and face-to-face components for teaching self-regulation is the best (Spanjers, Konings, Leppink, & Van Merriënboer, 2014).

New research

New research should focus on further refinement of adaptive systems by using not only cognitive but also motivational and emotional factors. Research into learning analytics focuses on teacher displays that help teachers to regulate the learning process and on student displays that help students to regulate their own learning process. More research is also needed into applications that help teachers teach self-regulation skills to their students. Examples of research questions are: can physiological feedback help students to be less distracted by social media and apps? How do students and teachers experience the regulation of learning by an automated system? What requirements does data-driven, personalised learning impose on learning materials, the design of learning tasks and the self-regulation skills of students? How can student monitoring systems be integrated into education to make data-driven education a success? How can learning analytics be applied to data from large groups of students to provide teachers with data feedback in teacher displays that allows them to tailor their teaching to the needs of subgroups? How can differentiated or personalised forms of education where students follow different learning pathways be examined and certified?

3.5 Coherence between micro, meso and macro levels

Recent studies show that despite all the promises, the expected positive effects of technology are meagre (Heemskerk et al, 2011; Kennisnet, 2013). A major reason for this is that ICT is not yet sufficiently embedded in the curriculum (Voogt, 2008), the educational concept and the organisation of the school (Fullan, 2013). Moreover, it is not yet clear how using technology successfully in education can be encouraged through national policy and an accountability system.

Meso level and technology

Because technology is insufficiently embedded in the school, it is underutilised (Kennisnet, 2013; Kral, 2009). When underutilised, technological tools do not lead to new and better methods but are adapted to existing routines (Christensen, Horn, & Johnson, 2011). Fullan (2013) shows that technology can only really improve educational outcomes if the vision on learning and the role of the teacher are reviewed. Successful schools understand the art of creating coherence in the curriculum, the behaviour of teachers
and the way in which processes are organised in the school (Waslander, 2007). Of particular interest are the culture and leadership of the school. The organisational culture is then focused on positive outcomes for students and there is a framework (for review, data feedback and differentiation) to achieve this (Visscher & Ehren, 2011). Managers have educational leadership qualities, are ICT literate themselves and are able to develop a shared vision with as many stakeholders as possible (Imants, 2012). Chapter 5 discusses this in further detail.

Macro level and technology

The principle of consistent organisation can be extended to the macro level. The impression is that flexible education with ICT is currently hampered by the duty of accountability to the Inspectorate and the associated performance indicators. Far more than is currently the case, attention should be paid at the macro level to policies aimed at encouraging an integrated holistic approach that facilitates (or allows for) lifelong, personalised learning with the help of ICT in a continuous line. Change management principles, which are also used in other sectors, can be used for this purpose.

New research

New research focuses on alignment at the micro and meso levels (curriculum, organisation, task perception of teachers) and at the macro level (policy), where conditions can be created to facilitate an integrated, holistic approach. Examples of research questions are: how can ICT contribute to effective personalised learning pathways for students? How can school managers be supported in introducing and using ICT at their school? Which policies can contribute to lifelong, personalised learning with ICT?

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Chapter 4: The socialising function of education

4.1 Introduction

Education is not independent of society, and for several years there has been growing interest in the formative contribution of education not only to the development of young people but also to society at large. Numerous reports by the Organisation for Economic Cooperation and Development over the past 15 years have pointed to this fact (OECD, 2001, 2007, 2010, 2015). It is widely accepted that social and civic skills, which are promoted as part of the socialising function of education, are crucial for a vibrant economy and society. Interest in the socialising task of school is partly motivated by society’s reliance on education to find solutions to social problems. In this context, there is also growing interest in the collective outcome of education in social and civic skills in later life and the connection between school and society in general. There are already possibilities during the school career to establish relationships with the social environment: the school can use the environment in different ways for the purpose of education, and in turn the environment can use the school in achieving its objectives.

The socialising function of education is one of the main themes of the NRO programme. This chapter deals with two topics; first the role of education in acquiring social and civic skills and the immediate and long-term effects of that education, both individually and collectively. The second topic is the interaction between school and the environment in the context of education in social and civic skills.

4.2 Social and civic skills

One of the social functions of education is the ‘socialisation’ of students (see Droogleever Fortuijn, 2003; Peschar & Wesselingh, 1995). Education should contribute to the transfer of shared culture by teaching students generally accepted values and principles, which are a prerequisite for social cohesion. The Dutch government formulated this as follows in the letter to Parliament entitled Future-proof primary and secondary education of 17 November 2014 (Kamerbrief, Toekomstgericht funderend onderwijs, 2014): ‘the curriculum should focus on full participation in a pluralistic democratic society’. To this end, students must acquire social and civic skills. These types of skills have three components: a knowledge component, e.g. knowledge about democracy and democratic processes; a skill component, which refers to specific skills required to take part in social life; and a normative component, i.e. a sense of what is ‘normal’, or how things are supposed to be done.

A socially competent person is able to perform different social roles successfully. He or she is equipped with the right knowledge, attitudes and skills and has the ability to use these appropriately, in a way appropriate to the task and the context in which the task must be performed (Ten Dam et al, 2003). In addition to the above, other civic skills can be distinguished that contribute to social cohesion, such as dealing successfully with differences, contributing to the general interest and being willing and able to act democratically. These skills are also related to values such as tolerance, democratic will, political knowledge and participation (Dijkstra, 2012).

Acquiring social and civic skills
More and more research results on the acquisition of social and civic skills are becoming available for the Netherlands. These include periodic Cito surveys into citizenship skills and social development of students in the 8th grade of primary school (Kuhlemeier, Boxtel, and Van Til, 2012; Wagenaar, Van der Schoot, & Hemker, 2011); research in primary and secondary education based on the COOL 5-18 cohort (Dijkstra, Dronkers & Hofman, 2014; Eidhof, Ten Dam, Dijkstra & Van de Werfhorst, to appear; Geijsel, Ledoux Reumerman & Ten Dam, 2012); the 2009 International Civic and Citizenship Study in secondary schools (Maslowski Naayer, Isac, Oonk, & Van der Werf, 2010) and research at primary and secondary schools in Citizenship School Panels (Geboers, 2014; Peschar, Hoogenhoff, Dijkstra, & Ten Dam, 2010). The studies reported differences between schools in the extent to which they have an effect on students, which incidentally are usually modest. This concerns mainly cross-sectional research in which one-time measurements are carried out. Longitudinal research over several years has been carried out, but only for a few schools and students and over short periods of time.

Collective outcome of education in social and civic skills

Being socially competent not only helps students perform better, it also has collective benefits in terms of the sum of individual skills and their effects. One such outcome is the involvement of individuals in society with collective interests and their willingness to contribute to this. Another outcome is social trust and the connection people experience with each other, which is conducive to cooperation and living together. Research shows that education leads to positive results in these areas (e.g. Buisman, Allen, Fouarge, Houtkoop, & Van der Velden, 2013; Van den Berge, Daas, Dijkstra, Ooms, & Ter Weel, 2014).

New research

What is known so far about the development of social and civic skills comes mainly from cross-sectional research. Little is known about the combined impact of this development on education and personal and environmental factors. New research should focus on the longitudinal development of social and civic skills, the role of educational arrangements in this respect and the mechanisms that can explain the influence of education. A greater understanding of the relationship between social and civic skills and the role of other factors in development – such as student population and school environment, family, peers, social networks and media – is also required. A final sub-theme concerns the collective long-term effects of education on social and civic skills throughout a person’s life and career and the relative weight of the contribution of school in relation to other factors that contribute to – or erode – these skills.

Examples of research questions are: how can education promote social and civic skills? To what extent are social and civic skills interrelated and how they are connected with other educational achievements, ethnicity, group, school life and social safety? What is the outcome for society of promoting these social and civic skills, for example in the form of social integration?
4.3 The interaction of schools with their environment

Today’s students are connected directly or through various media with others for a large part of the day. This can be a source of learning. A major challenge for schools is how to use young people’s experiences and reference points in teaching them social and civic skills at school and thus motivate them and give the lesson content meaning for them (Lindeman & Van Woudenberg, 2011). A review study by Bronkhorst and Akkerman (2014) shows that connecting in-school and out-of-school learning contributes to educational success. In addition, when students experience continuity between the two worlds it seems to enhance the learning process. They feel more involved in school, are more interested in the content and are more motivated to continue learning in the future. If, on the other hand, students experience school as being far removed from their world they often have negative feelings about it, feel less involved in school and are more likely to drop out.

The importance of interaction between schools and their environment to the socialising function of schools is receiving increasing emphasis. First, the school could achieve its social objectives through a greater connection with the environment (see Verhoeven, Willems, & Sontag, 2012). Alternatively, other organisations in the neighbourhood – such as religious institutions, welfare organisations and associations – can link their goals to those of the school, for example, aiming jointly for greater social cohesion or a healthy environment (Turkenburg, 2008). Examples include explorations and traineeships in neighbouring nursing and retirement homes, but also introducing low-threshold assistance through odd jobs in the neighbourhood. How to design such interactions between school and the environment so that they match the students’ development and the needs in the neighbourhood is still in its infancy. The school’s neighbourhood or the family can be a source of inspiration, an environment in which students gain experience that can enhance the development of their social and civic skills, but can also undermine educational progress (Pauw, 2013).

New research

Given the limited research on this topic so far, another potential research theme involves identifying the possibilities of effectively combining in-school and out-of-school learning in respect of social and civic skills, the effects of learning environments in which in-school and out-of-school learning are linked, and the mechanisms responsible for these effects. An example of a research question is: how can learning environments in which in-school and out-of-school learning are integrated in respect of social skills be created in schools and what are the effects of these learning environments?

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Chapter 5: Professionalising teaching professionals

5.1 Introduction

The previous chapters discussed developments in the area of the curriculum, for example, and the use of technology in education. These influence the demands on teaching professionals and their professional development, the fourth main theme of this programme. Teachers play a central role in education and education innovation, so the professional development of teachers is also a central theme. However, the training and professional development of teaching professionals also extends to teaching support staff, school managers, teacher trainers, school boards and supervisors. Their relationship to teachers and their role in the professional development of teachers but also their impact on the school organisation and education innovation, impose specific requirements on the professional development of all teaching professionals, and are therefore also suitable as a topic of research in relation to the themes discussed below.

In this chapter we first discuss the skills teachers should have to be able to perform well in the near future. These skills are related to managing diversity, ICT literacy, curriculum development and innovation. Professional development in respect of these skills is necessary and takes place in educational processes outside the school (part of the first theme of this chapter) and, as discussed in the next section, within the school. Next, the competencies of school managers, particularly in the context of innovations and the desired professional development, are discussed. Finally, we discuss the variety of training routes, workplace learning and skills of teacher trainers in the initial training of teachers.

5.2 Developing teachers’ competencies

In this section we discuss four teachers’ competencies which are currently in the spotlight and which can be improved through research: managing diversity, ICT literacy, curriculum competencies and innovation ability.

Ability to deal with a diversity of students

Managing diversity is a major challenge for teachers, not only in primary and secondary education but also in higher education. Aspects of diversity include ethnicity, gender, sexual orientation, mental and physical abilities, socio-economic status, and motivational and interpersonal characteristics (Roorda, Koomen, Spilt, & Oort, 2011; Sierens, 2007). In education, diversity is becoming increasingly self-evident. Students who have a different mother tongue and who spent their entire youth outside the Netherlands, place extra demands on education and on their learning and living environment (e.g. Vólet, 2008). Inclusive education, i.e. education that excludes no one, is required because every child has the right to a good education (Miles & Singal, 2010). But no matter how sincere their intentions, teachers find it difficult to put inclusive education into practice (Leeman & Wardekker, 2013). Managing diversity involves more than personalised learning or differentiation in the classroom. It comes down not only to tolerating differences between students, but using these to make the institution and the classroom a close social system that is experienced by all students as safe, positive and caring (Milem, Chang, & Antonio, 2005).
ICT literacy

To prepare students for 21st century skills (see Chapters 2 and 3), the educational system needs teachers who are sufficiently ICT literate, are proficient in learning and teaching with ICT, and who can design digital material (Uerz & Kral, 2014; Voogt et al, 2014). The TPACK (Technological Pedagogical and Content Knowledge) model of Mishra and Koehler (2006) assumes that in order to make reasoned and responsible choices in the educational use of ICT, an explicit link must be made between pedagogical skills, subject matter and the technology that can support this. Moreover, the context within which education is given should be taken into account (Voogt, Fisher, & Tondeur, 2010; Voogt, Fisser, Pareja Roblin, Tondeur, & Van Braak, 2013). Research has been conducted into the skills teachers need to be able to integrate ICT in education. It is known, for example, that a teacher’s ICT literacy is associated with their didactic ICT skills and their actual use of ICT – in particular the creative use of ICT and media (Teunissen, Uerz, Kral, Van Neut, & Hölsgens, 2015a; 2015b; Uerz, Kral, & De Ries, 2014).

Curriculum skills

Research shows that teachers rarely implement the curriculum as intended by those who develop the curriculum (e.g. Remillard, 2009). Teachers adapt the curriculum as they see fit, with modifications and additions. Three types of factors determine how teachers adapt existing curriculum materials (Remillard & Heck, 2014): teacher-related factors such as subject matter knowledge and didactic knowledge, beliefs, goals and professional identity; contextual factors such as available time, infrastructure and the size and composition of the class; and student-related factors such as interest, ideas and responses from the class. How these factors are interrelated is not yet clear. Teachers must be able to teach, but also be able – individually or as a team – to develop a curriculum. They should be able to formulate principles regarding what they want to teach students and be able to create, implement, evaluate and adjust a curriculum design (Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). Teacher training and refresher training pay little attention to this expertise (Leuverink, 2012; OCW, 2010).

Innovation skills

Teachers are required to adapt to new developments in education, society and education policy. This is referred to as adaptive expertise – the ability to adapt expertise to new situations (Bohle Carbonell, Stalmeijer, Königs, Segers, & Van Merriënboer, 2014). Developing innovations may be hampered because teachers have established routines. Often they have invested a lot in these routines, but when the nature of the tasks changes these routines lose their value. Indeed, experienced teachers have a lot to lose when education innovation makes these routines redundant. From the perspective of education innovation, it is therefore important to invest in the development of adaptive expertise.

Teachers should also contribute to implementing changes at school level. As agents of change, they work together with colleagues to create something new (see Lukacs & Galluzzo, 2014). Often teachers lack sufficient knowledge and skills to implement the changes properly. Teachers conducting practical research can contribute to the success of change; this requires teachers to learn how to do practical research (Zwart, Admiraal, & Smit, 2015). In a recent review study (2013), Admiraal, Smit and Zwart
concluded that such research currently focuses mainly on teachers’ own teaching practice and that
generic statements about the significance of the research outside the studied context are not or
hardly made. Consequently, theory formation and fundamental contributions to educational sciences
receive insufficient attention. Admiraal (2013) therefore advocates academic teaching, which means
that teachers conduct academic practical research that contributes to theory formation and peer-
reviewed publications in scientific journals, similar to the situation in medicine (Bulterman-Bos,
2008). Although initiatives for this have been developed recently (e.g. doctoral grants for teachers),
there is still little understanding of the effects on educational practice.

New research

To date, not enough is known about the types of competencies and actions required of teachers
regarding the themes of curriculum (e.g. design capability and the influence of personal, contextual
and student factors on teachers’ decisions on the curriculum), ICT (e.g. creative ICT skills),
innovation (e.g. adaptive expertise and coherence with career features) and managing diversity (e.g.
introducing inclusive education) and how these competencies can be systematically developed in
teacher training, refresher training and when practising their profession at school. Examples of
research questions include: how can teachers better manage diversity in the classroom and school
and what methods have a positive effect on students’ wellbeing and learning performance? What role
do creative skills play in the ICT literacy of teachers? What interventions are effective in developing
the design skills of teachers? What methods can be used to encourage teachers to adapt their
existing routines to changing demands of teaching practice?

5.3 Professional development in the school context

In addition to training on a range of courses, professional development can take place at the
workplace, for instance by systematically analysing available data on students (see Chapter 8),
producing teaching and learning materials and participating in so-called teacher development teams
or professional learning communities (Handelzalts, 2009; Huizinga, 2014). Sufficient time, interest of
the own school and professional guidance have been shown to be some of the success factors in
professional learning communities (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006).

Professional practice and learning is contextual, and this context is dynamic and complex. Models
based on a system theory approach show, for example, that different factors at different levels
(classroom, school, cross-school) influence professional development. The interaction between the
individual (teacher and school manager) and the team is essential to the success of innovations
(Moolenaar, Sleegers, Karsten, & Daly, 2012).

Professionals in schools acquire a lot of ‘knowledge and know-how’ in an informal setting and without
a preconceived plan. They learn from their daily teaching practice (Hoekstra, 2008), from
collaborating with colleagues (Little, 2012) and from simply being part of a school organisation that is
constantly changing (Hoban, 2002). Research by Bakkenes, Vermunt and Wubbels (2010) shows,
however, that when the objective is the specific development of professionals, the learning efficiency
is greater when learning is focused, collective and organised. During the past twenty years, much
research has been conducted into the effectiveness of organised professional development initiatives
and programmes in educational organisations. Yet many innovations in the field of professional development end in failure, or the intended goals are not or only partly met (De Witte & Jonker, 2013). Current research offers insufficient clues to provide adequate answers for the failure to achieve the desired goals.

New research

Little is known about how working in teams contributes to the professional development of participating teachers. Research into teacher competencies and developing these competencies therefore has to focus not only on the professional development of individual teachers but also on their participation in teams and performance at school. It is insufficiently clear how the interactions between the collective systems in which teachers operate play out and play a role in their professional development. Insights from domains outside the educational sciences could be included in this theme, such as occupational and organisational psychology, social network theory, policy and organisational science, development psychology and the psychology of learning.

Examples of research questions are: what do teacher learning communities look like and how does participating in these learning communities help them in their professional practice? What internal and external factors in educational institutes contribute to the ongoing development of some but not all teaching professionals? How should professional development at schools be organised to promote ongoing development of teachers?

5.4 Developing school leadership competencies

School leadership is a vital link in innovation processes (Harris, Day, Hopkins, Hadfield, & Hargreaves, 2003; Nieveen, Handelzalts, Van Eekelen, & Van den Akker, 2011). School managers must for example support, encourage and monitor the change process, to determine whether the initiated innovations are in line with the school’s goals, and to perform adequate checks (e.g. fidelity checking; Van den Akker, Gravemeijer, McKenney, & Nieveen, 2006). Often school managers lack sufficient knowledge and skills to implement the changes properly. Innovations require a shared vision on learning and development and to this end the school manager must be able to provide transformative, shared and educational leadership (Moolenaar & Sleegers, 2015; Spillane & Healey, 2010). This insight is now widely accepted, but there are still very few schools in which this type of leadership has been implemented.

New research

Many research topics concerning teachers are also relevant for school managers, for example the role of adaptive expertise and of routines in their performance and the development of their skills, and their performance in complex dynamic systems. Little is known about the effects of different types of training on school managers. It is also unknown to what extent leadership should be a task of the school manager as an individual, or whether teachers can also take on these roles. Another sub-theme is how school managers can learn in the workplace, both individually and in a team, and in learning communities. Examples of research questions are: what is the most effective training route for school managers? How do school managers learn in the workplace? How can leadership tasks be
shared between school managers and teachers, and what impact does shared leadership have on the performance of teachers in the classroom? What type of interaction is there between teachers and school managers in innovations and how can this be strengthened?

5.5 Training future teaching professionals

The effects of different routes of training to become a teacher and the different approaches within these routes are a main topic within the theme of training future teaching professionals. Workplace learning plays a central role within the initial teacher training programmes and here, too, there are still many unanswered research questions. There are also research topics concerning teacher trainers, in particular about how their careers started and the use of academic knowledge in their practice.

Diversity of training routes

The Netherlands has many routes that lead to a teaching qualification. Flexible training routes and different responsibilities for training institutes and training schools are currently being trialled. Internationally, there is a wide variety of training programmes with different effects on the quality of teachers-in-training and on teaching students, and – correspondingly – the status of the teaching profession (see, e.g. Maandag, Deinum, Hofman & Buitink, 2007).

Learning in traineeships and in the workplace

Teacher training and development in the first professional years partly takes place in the workplace, for example in the form of a traineeship. Workplace learning and learning during traineeship takes place within a complex interplay of personal, professional and situational factors such as knowledge, beliefs, values and social, cultural and organisational conditions (Olsen, 2008). Despite the huge importance attached to workplace and traineeship learning, little is known about the progress and nature of the learning process, the factors that promote this learning process, and the outcome thereof (Webster-Wright, 2009; Leeferink, Koopman, Beijaard, & Ketelaar, 2015). For example, it is not clear how students learn from their traineeship experiences and what combinations or sequences of activities and situations during their traineeship result in learning. What is known is that there is a steep learning curve in the initial period of teaching qualification (Helms-Lorenz, Van de Grift, & Maulana, 2015), but much less is known about how this arises.

Teacher trainers

Teacher trainers are at the beginning of the chain that leads to teaching students, so they also have an effect on the quality of education. By now, quite a lot is known about the identity, roles and professional development of teacher trainers. It is known, for instance, how their work differs from teachers teaching students themselves (Lunenberg, Dengerink, & Korthagen, 2013). When a teacher becomes a teacher trainer, this requires a shift from promoting the learning of young students to the training of adults. This requires partly complementary and partly different skills and subject-matter knowledge, such as applying the many insights about how future professionals learn and the related didactic methods (Lunenberg, Dengerink, & Korthagen, 2013). It is important that they also rely on existing knowledge about the teaching profession. Consider for instance the issues surrounding the
professional identity teachers experience in their career (e.g. Skaalvik & Skaalvik, 2007, 2011). In connection with the growing importance of ICT literacy, the professional development of teacher trainers in this area also merits consideration (Uerz & Kral, 2014).

Teacher trainers are a diverse group of professionals, ranging from subject specialists to workplace supervisors. Studies show that trainers, like coaches and mentors, play an important role in the success of a professional development programme (see Van den Bergh, Ros & Beijaard, 2014). However, it is rarely made explicit what exactly their role is or what qualities effective trainers possess. It is even less clear which type of supervision is best in which situations (Heller, Daehler, Wong, Shinohara, & Miratrix, 2012; Hill, Beisiegel, & Jacob, 2013).

New research

Little is known about the relative success of different training routes, and so research is needed into how the skills of teachers-in-training are developed in these different routes. Furthermore, a greater understanding is needed about transforming experiences in the workplace into learning experiences. This concerns the initial training, but also the first experiences in the classroom and the first years of independent professional practice. Research into the skills of trainers and coaches is important in terms of their development as a trainer, their use of relevant research knowledge and the factors that could promote such use.

Examples of research questions include: what combination of didactic methods leads to a positive development of skills in the teacher training programme? What training interventions promote workplace learning? How can the steep learning curve of novice teachers best be supported? What do successful collaborations between training programme and workplace look like? How can teacher trainers be encouraged to pay more attention to developing the ICT skills of teachers-in-training?

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Chapter 6: Education and professional career

6.1 Introduction

The professional career of individuals is largely determined by their opportunities for formal and informal learning. Within that career, the educational career is particularly important: the route individuals take through the total offer of educational programmes within the educational system, the skills they acquire during this process and the formal qualifications they achieve. Education is an important factor in determining the type of work people will do later on in life, their income, their health, their wellbeing and even how they prepare for the last stages of life (Conti, Heckman, & Urzua, 2010; Hauser, 2011). For that matter, success at school is not only beneficial to individual students but to society as a whole. Successful school careers have a positive impact on the quality of life in society at large and on reducing public spending (Auld and Sidhu, 2005; OECD, 2007; Lochner, 2011). Not only is an individual’s career influenced by their school or university education, but also by the type of pre-school learning they had or continuing education after completing their formal education.

The central theme of this chapter, education and professional career, focuses on learning throughout one’s life, from toddler to pensioner, and on both formal and informal educational arrangements. This will be discussed on the basis of three themes. First, several key moments in education will be discussed, from access to child care to the transition to secondary vocational and higher education. Subsequently, this chapter will briefly describe the transition from school to labour market. Finally, learning during one’s professional career will be discussed.

6.2 Key moments in education

There are a number of important transitions in an individual’s school career between the earliest childhood years and joining the labour market. These key moments are discussed briefly below.

Access to child care and transition to primary school

Developmental differences between children arise very early on in life. This is partly related to genetic potential, but also to environmental factors. Programmes for pre-school and early childhood education are intended to counterbalance an inadequate environment, but the empirical evidence for their effectiveness is limited (Doolaard & Leseman, 2008). There is also little empirical evidence for the effectiveness of extending the nursery school period as a possible remedy for children with early developmental delays in primary education (Roeleveld & Van der Veen, 2007). Results of research based on pre-COOL cohort data suggest that a stimulating environment positively influences the development of young children (Slot, 2014).

Because children of working (highly educated) parents often go to child day care centres and children of less educated parents to toddler playgroups (Onderwijsraad, 2010a), there is already early segregation by socio-economic status. This is why a number of municipalities have decided to implement the recommendation of the Education Council (Onderwijsraad, 2010b) to have primary schools offer play and learning facilities for a minimum number of half-day sessions for children from
age 3. The emergence of integrated child centres, which integrate not only preschool facilities but also in-school and out-of-school facilities, could be a possible solution to segregation.

Transition from primary to secondary education

To create more clarity on the required skills at the end of primary education, reference levels for language and mathematics have been introduced (Expertgroep doorlopende leerlijnen taal en rekenen, 2008). This is aimed at facilitating a smooth transition to secondary education, but whether this is in fact the case is still not clear.

The main problem at this key moment is the structure of secondary education, where the many types of schools and learning pathways and the strict division between these mean that a selection has to be made when students complete primary education (Onderwijsraad, 2010c). At the age of about twelve, an important decision has to be made about the educational pathway, with substantial consequences for the end qualifications and subsequent professional life and career. This is why the Cito final test and educational advice has always held the interest of education research. This will continue to be the case in the future now the Cito final test is taken after the educational advice.

Transition period

In the Netherlands, the selection for a specific type of school takes place relatively early. To mitigate this, some secondary schools offer heterogeneous transition classes for one or more school years. This period provides the opportunity for further selection and determination. Nonetheless, there is a clear trend towards homogenisation of the first years of secondary education (Muskens et al, 2015) and thus a further classification into specialised schools (pre-vocational (Dutch acronym: vmbo), general secondary (Dutch acronym: havo), and pre-university education (Dutch acronym: vwo)). Research into the consequences of the transition period for students’ educational careers suggests that delaying selection is particularly advantageous – in terms of participation in higher education – for students who have the opportunity to follow learning pathways slightly above their level (Van Elk, Van der Steeg, & Webbink, 2009). Due to the cross-sectional nature, it is difficult to make statements about causes and effects, for example on the impact of structuring education on students’ success.

Choice of subjects or direction

During their secondary school years, students specialise further by choosing a profile or a sector, or by compiling a curriculum. The consequences of this specialisation are well documented, especially in view of the low participation of girls in STEM education (Science, Technology, Engineering, Mathematics; see Korpershoek, 2012; Van Langen, 2005). An interesting development in secondary education are the trials with custom diplomas, where students can take subjects at different levels, e.g. English at pre-vocational secondary education level (vmbo-t) and Mathematics at secondary education level (havo). Findings from PISA and TIMSS studies suggest that this type of system may be of value. These show that students in lower learning pathways are often better at certain subjects than groups of students in higher learning pathways.
The transition from pre-vocational secondary education (vmbo) to senior secondary vocational education (mbo) has not been extensively studied (see Korpershoek et al, 2015). It is an interesting topic because attempts are regularly made to ease the transition (trials with combination programmes of pre-vocational (vmbo) and senior secondary vocational education (mbo)) and because many ROCs (Regional Education Centres) have a lot of freedom with regard to the intake, placement and internal mobility of participants in the various levels and directions in senior secondary vocational education (mbo). In addition, the recurring demands to revaluate craftsmanship in vocational education (Onderwijsraad, 2015) means that this is an aspect that deserves more attention in terms of professional career.

Transition to and specialisation in further education

Not only should reference levels facilitate the transition from primary to secondary education, they should also do the same for the transition from secondary to higher education. Here, too, it is not yet clear whether these reference levels actually produce the desired effect. Another interesting development is the increasing differentiation in university education: the introduction of selective research masters and the emergence of different University Colleges offering comprehensive bachelor programmes.

New research

New research into key moments could focus for instance on the contribution of educational environments for different groups of learners (from toddlers to young adults) to the degree of success of their educational career. Examples of research questions are: what forms of early childhood and pre-school education contribute to a successful educational career in primary and secondary education and what educational requirements must this education meet? To what extent can child care centres contribute to young children’s success at school as well as their social-emotional development? To what extent do reference levels ease the transition from primary to secondary education and what are the unintended side effects? How can participation in STEM studies, particularly by girls, be encouraged and what educational environments contribute to this? How do trials with custom diplomas contribute to students’ school careers? Why do students choose selective programmes over a regular master programme and are certain social groups over-represented?

6.3 Transition to the labour market

Education has a qualifying function. It encourages students to acquire opportunities for an independent existence, particularly by preparing for the job market. The transition from school to labour market is therefore also a key moment in a person’s professional career.

Early school leavers

The situation of those who leave the education system without basic qualifications is worrying. Their job opportunities are poor and the gap between those with and those without a basic qualification is becoming wider. Recent studies show that early school leavers are likely to end up as NEET: not in
education, employment, or training (c.f. Mirza-Davies, 2015). The reasons for leaving school early may be due to the school system, the school, and/or personal aptitude or circumstances (De Witte, Cabus, Groot, & Maassen van den Brink, 2014).

Changing labour market

An important development in the labour market is polarisation of the occupational structure, which has been observed both in the Netherlands (Berge & Ter Weel, 2015; Kremer, 2015) and elsewhere (Goos, Manning, & Salomons, 2009). The robotisation of labour and automation of routine professional tasks (Frey & Osbourne, 2013) has reduced employment in middle-class occupations, such as machining, bookkeeping and administrative work. At the same time, the demand for professionals at the top end of the labour market and service staff at the bottom end is growing. In a recent report, the CPB (Bureau for Economic Policy Analysis) confirmed this trend of polarisation, and also noted that future school leavers with higher secondary (havo), pre-university (vwo) or senior secondary vocational education (mbo 2-3) qualifications would find it more difficult to find work and are at risk of falling to the bottom of the labour market (Berge & Ter Weel, 2015).

Future research

Not much is known about early school leavers and how they find their way into the labour market and into society. Additionally, more insight is needed into how educational programmes are affected by changes in demand and the consequences of these changes for the employment opportunities of future school leavers. Examples of research questions are: how and in what way do educational institutes train students for a changing labour market and what are the implications of this for future school leavers? What factors influence early school leaving and what are the effects of early school leaving on social inclusion and social involvement?

6.4 Lifelong learning

Learning is a continuous process during a person’s lifetime. After completing their normal educational careers, people can go on to choose specific forms of continuing education. Employees can develop their skills throughout their careers in order to cope with changing working conditions and the demands placed on them and to be better qualified for other work.

The role of knowledge and experience

Almost all research into education and learning is based on research conducted among children, adolescents and young adults. Most current theories and models for the design and development of learning materials, teaching methods and didactics have been devised and applied on that basis. However, with lifelong learning, the population is essentially different. Cognitive aging may mean that a number of general principles have to be revised (Fenesi, Vandermorris, Kim, Shore, & Heisz, 2015). Alignment with the knowledge and experience of children and adolescents results in better learning, irrespective of the educational paradigm being studied, such as problem-based learning (Schmidt & Moust, 2000), instruction (Merrill, 2002; Van Merriënboer & Kirschner, 2013), experiential learning (Kolb & Fry, 1975), and case-based instruction (Jonassen & Hernandez-
Serrano, 2002). However, concerning adults there is the problem that as they gain more knowledge and experience, it is more likely that new material to be learned will conflict with what is already known and being done. Such cognitive conflicts are not always positive for the learning process.

*The role of lifestyle*

The degree to which learning is successful depends in part on the context in and conditions under which this learning takes place. Both the inner, physical condition as a result of e.g. nutrition, sleep or stress and the external context, such as oxygen levels, lighting and temperature of the learning space, influence the learning capacity and learning process (Choi, Van Merriënboer, & Paas, 2014; NRO/NIHC, 2016). Many of the above-mentioned conditions are different for adults and seniors than for children and adolescents. While these conditions mainly concern incidental, instantaneous conditions for juveniles, for adult professionals they are often lengthy and ongoing. For adults and seniors, such a situation has different, significant psychological environmental factors such as stress, family circumstances, amount of free time and motivation for learning.

*Further training, retraining and continuing education*

Further training, retraining and continuing education are important means to bring or keep one’s level of competence up to date. At the lower levels of education, this concerns for example the acquisition of basic skills such as literacy. Immigrants need this, but also those who are illiterate or functionally illiterate (OECD, 2013; Buisman et al, 2013). There are many forms of continuing education and refresher training, both in formal and informal education, such as re-entrance and workplace learning. Shaping one’s own professional career is a skill in itself (Kuijpers, 2003).

*New research*

New research into lifelong learning could focus on the role of knowledge, experience and lifestyle in learning and adult learning. In addition, more insight is needed into how employees develop career skills and what the effects are. Examples of research questions are: what factors play a role in developing employees’ skills and how does this influence their employability and performance? What are the differences in learning activities of the self-employed, people with flexible contracts and those on permanent contracts? What types of (formal) education and (informal) workplace learning are effective for the development of both individual employees and the organisations in which they work?

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Chapter 7: The education system and governance in education

7.1 Introduction

In recent decades, the education system and the way the system is managed has undergone a radical transformation in the Netherlands. The education system has been thoroughly reformed by, among other things, the introduction of pre-vocational secondary school (Dutch acronym: vmbo), the so-called second phase (in Dutch: tweede fase) and the concept of independent study in the second stage of secondary education (in Dutch: Studiehuis), restructuring of senior secondary vocational education (Dutch acronym: mbo), and suitable education (Dutch acronym: passend onderwijs). In addition, as a result of processes aimed at increasing autonomy and market competition, the division of roles between government and the education field has changed and is not always immediately obvious. Finally, structures have emerged at the meso level (school management boards) that make self-governance possible. In addition to management boards, the role of participation bodies and regulatory councils are also relevant.

Four research themes are discussed in this chapter. The first theme is research that focuses on the Dutch education system and the evolution of this system. The second theme concerns reforms of the system and the outcome of these reforms. Governance of education at the macro level, with a focus on processes such as increasing autonomy and accountability and the implications of this for quality, accessibility and effectiveness of education, is the third theme. The last theme describes the processes of governance in education and its consequences.

7.2 Education systems

Education systems can vary along four dimensions: stratification (layering), standardisation, vocational orientation and mobility (see Van de Werfhorst & Mijs, 2010; Van de Werfhorst, Elffers, & Karsten, 2015). It should be noted that this list is not exhaustive; education systems can also vary along other dimensions, such as the extent to which special education is included in the system or is separate from it (see Bronneman-Helmers, 2011). The identification and conceptualisation of different dimensions can, in itself, also be the topic of research.

Stratification

The dimension of stratification refers to the quantity and duration of the learning pathways, or tracks, in secondary education. Some education systems such as in the US and Scandinavian countries are stratified only to a limited extent. Even if different streams exist in such systems, the students for these different streams are selected at an older age. In low-stratified systems, students studying different areas can be in the same group at school. In high-stratified systems such as in Germany, Belgium and the Netherlands, students are divided into different streams from an early age. The curricula offered are also dependent on the chosen area, and students in a selective track are offered a more academic curriculum than students in vocational programmes.
Standardisation

With the dimension of standardisation, a distinction is made between the standardisation of input and output. Standardisation of input concerns the extent to which the educational content is determined by a central body. This can be done by imposing core objectives and reference levels, as is the case in the Netherlands. In other countries – such as Turkey and Greece – the input of education has been even further standardised. Standardisation of output concerns the extent to which learning outcomes are tested and measured by standardised tests, such as the Dutch Cito test. Not every school system has these central tests.

Vocational orientation

The third dimension, vocational orientation, refers to the scope and organisation of vocational education and the combination of school and work, the so-called dual nature of vocational education. The dual system is highly developed in the Netherlands: many students follow trajectories in which they combine work and school. Vocational training programmes differ in the extent to which they train in a ‘broad’ or ‘narrow’ sense (Bol & Van de Werfhorst, 2015), the desirability of which is currently a topic of debate (Coenen, Heike & Meng, 2012).

Mobility

The fourth dimension in which school systems differ is the mobility between different streams. This concerns, for instance, the possibility for students to move from one track to another, or to get into higher professional or university education via one or more detours. Some authors refer to the number of choices in a specific system (Kerckhoff, 2001). In everyday language this is also called ‘stacking’.

New research

New research could focus on the systematic identification of the characteristics of the Dutch education system, whether or not in comparison with the characteristics of systems in other countries. The dimension of mobility deserves special attention in this respect. Much less is known about this dimension than the others, perhaps because no clear operationalisation has been defined yet. Examples of research questions are: in respect of which characteristics do education systems differ from each other? How does the Dutch education system compare to those in other countries? How can the dimension of mobility be conceptualised and operationalised within education systems?

7.3 Reforms of the education system and outcome

In the last few years several studies have been conducted into reforms of the Dutch education system and the outcome of these reforms. This concerns studies focused on a historical analysis of reforms in the Dutch education system on the one hand and quantitative studies into the outcome of the characteristics of this system on the other. We will examine the possible impact of mobility of the education system (e.g. on over-education) separately, as very little is yet known about this.
Historical analysis of reforms

One type of research focused on an interpretive and historical analysis of reforms in the Dutch education system. In her dissertation, Bronneman-Helmers (2011) shows that the formation of new government policy is often a difficult process. These prolonged processes did not result in postponement of selection – as intended – but led to a sharper stratification and more standardisation of output, e.g. through the Cito final test. In their historical analysis of the standardisation of the Dutch education system, Nieveen and Kuiper (2012) describe how policy has gone back and forth between standardisation and deregulation in the past decades. Between 1970 and 2000 there was a trend towards greater standardisation of input, for example by introducing detailed attainment targets. In the period between 2000 and 2007, deregulation was the norm: the number of core objectives was reduced and they became less detailed. As of 2007, the education system has started moving in the direction of more standardisation again. Consider, for example, the introduction of reference levels as standardisation of input. Output is also being standardised more, e.g. by making central tests in primary and secondary education mandatory.

Quantitative studies into the outcomes of education systems

Another type of research concerned quantitative studies using mainly data from different countries (see Bol, Witschge, Van de Werfhorst, & Dronkers, 2014; Scheerens, Ravens, & Luyten, 2012). Education economists have also conducted a wealth of research in this field (see e.g. Hanushek, 2006; Woessmann, 2005). Although the results of these studies vary, there seems to be consensus on the fact that stratification leads to more inequality. It also appears that standardisation of output is related to higher educational achievements. As for vocational orientation, the results show that a significant share of vocational education and a strong involvement of the professional field are favourable for the transition from school to work and reducing youth unemployment. In terms of structuring vocational education, it appears that students following narrow, specialised – vocational – training programmes initially have better employment prospects than students with a general education (ROA, 2014). Hanushek and colleagues, on the other hand, argue that while this specialisation can result in a rapid transition to the labour market initially, it entails a higher risk of unemployment later on in life. It is precisely their specific set of skills that makes them inflexible (Hanushek, Woessman, & Zhang, 2011).

Finally, some education systems also have collective benefits: the aggregate individual skills acquired and their societal impact. For example, research shows that education leads to positive outcomes in areas such as individuals’ commitment to collective interests, social trust and the social bonding people experience with each other (Schulz, Ainley, Fraillon, Kerr & Losito, 2010). Higher educated people are healthier, live longer, have fewer unhealthy habits (smoking, drinking, drug use) and have less risk of disease (Conti, Heckman, & Urzua, 2010; Furnée, Groot, & Van den Brink, 2008; Pampel, Krueger, & Denney, 2010). With a high level of education, less tax money is needed to combat deviant behaviour or to pay for social security or health education. In the context of this chapter, this raises the question of the role education systems play in promoting collective benefits.
Mobility and over-education

It is important to find out if an education system that allows for the stacking of programmes has different outcomes than a more rigid education system. Stacking of programmes can lead to a larger number of highly educated professionals, which could result in displacement in the labour market. Sociological theories suggest that the expansion of education leads to credential inflation: the relative value of education decreases when there is too much supply and not enough demand. The economic literature refers to ‘over-educated’ employees (Groot & Maassen Van Den Brink, 2000; Leuven & Oosterbeek, 2011). Whether there are in fact too many highly educated people, and if this is the case, whether this surplus is growing, is not entirely clear.

New research

To get a better picture of how the Dutch education system is developing, more historical and interpretative research is required. Previous research can serve as a starting point for the outcome of stratification, standardisation and vocational orientation of the education system. New research could provide more insight into the relationship between mobility in the education system and the outcome for the labour market and society, for example. Finally, almost nothing is known about the influence of the education system on teachers. Examples of research questions are: in which direction is the Dutch education system developing? Are system characteristics related to learning outcomes in students? What characteristics of education systems promote the collective benefits of education? Are system characteristics related to inequality in terms of gender, social background and ethnicity? How are system characteristics related to the quality and performance of teachers?

7.4. Governance of education

The Dutch education policy is traditionally characterised by freedom of education and more recently by processes of deregulation and increasing autonomy. Governance from a single centre of power (government) is shifting to governance in which power is divided across several parties within but also outside education. As a result, the division of roles between government and education is not always immediately obvious, nor are the consequences of increasing autonomy and accountability for the quality, accessibility and effectiveness of education. In its opinion paper, Educational Policy after the Dijsselbloem Committee, the Education Council (Onderwijsraad, 2014) states that deregulation and increased autonomy have changed administrative relations: when making new policies, the government must take into account a larger number and variety of stakeholders. According to the council, education policy is no longer a linear, centrally managed process in which policy design and implementation succeed one another in time. It is much more a dynamic and cyclical process that requires a different role of the government.

Changing governance perspectives

Over the course of time, successive governance perspectives have been developed. These are generally referred to as traditional public management (public administration), new public management and new public governance (or public value management) (Osborne, 2010). Van der Steen et al (2014) outline four perspectives on the modern role of government: the legitimate
government; the performing government; the networking government; and the participatory government. They discuss two developments:
- From primary attention to basic principles such as good governance, legality and procedural care, to focus on achieving measurable results and organising performance.
- From governance initiated by the government and directed to the outside world to more involvement by the outside world in governance.

These perspectives and developments are also recognisable within the domain of OCW. As in other domains, the existing practice can be seen as a mixed model, in which views on governance from different periods exist alongside and next to each other, and occur concurrently in mixed forms.

At the level of the system as a whole, this raises questions about the role of government vis-à-vis other stakeholders, and in particular about effective forms of governance through networks of actors.

At the level of school boards, similar questions arise about effective forms of governance (e.g. Hooge et al., 2015). Given that schools are increasingly cooperating with other public and semi-public and private organisations (for example Integrated Child Centres, Centres for Innovative Expertise, Centres of Expertise), other pertinent questions are: what is the role of school boards vis-à-vis other stakeholders, what forms of governance are effective within networks, and how can these be developed?

**Consequences of (restricted) autonomy**

The Netherlands has a long tradition of freedom of education. In recent decades, schools have been given more freedom in the area of management (finances, accommodation and personnel), but there has been a restriction of autonomy in terms of educational content (Waslander, 2010). Research shows that schools and school boards in the Netherlands have a relatively high degree of autonomy in the international context (OECD, 2011).

Maintaining autonomy remains a central ambition in education policy (Honingh & Van Thiel, 2014). In practice, however, genuine autonomy for schools is limited partly as a result of soft governance by, for example, central government, local governments and school boards (Peeters, Hofman & Frissen, 2013). It is still largely unknown what the consequences of (restricted) autonomy are for the quality of education, social inequality and efficiency.

**New research**

Research needs to be conducted into the governance of education, in particular the role of the government in relation to the roles of other stakeholders. Research is also needed into the governance of education by school boards, particularly within (formalised) networks in which there is cooperation with other public, semi-public and private organisations. New research could also focus on the consequences of (restricted) autonomy for the quality of education, social inequality and efficiency.
Examples of research questions are: through which instruments and mechanisms can the government effectively use networks of actors in the governance of education? Through which instruments and mechanisms can school boards effectively use networks of actors in the governance of education? What are the consequences of (restricted) autonomy for the quality of education, efficiency and inequality in terms of gender, social background and ethnicity?

7.5. Governance in education

The trend towards more governance in education at the meso level, partly due to processes like increased autonomy and market competition, is not entirely without controversy. There have been a number of financial and administrative incidents at school boards (such as BOOR, Amarantis, ROC Leiden) as a result of which social and political questions have been raised concerning these new structures. Hooge (2013) argues that the question is whether these ‘incidents’ are actually incidents or should be seen as the tip of an iceberg. Naturally these developments go hand in hand with a growing interest by researchers in the mechanisms of self-governance, processes of accountability and supervision, and the characteristics inherent to ‘good governance’.

Research into school boards and supervisors

Descriptive research into the size of school boards in primary and secondary education shows that large school boards attach more importance to transparency and desire more autonomy. Small school boards, on the other hand, mainly emphasise less measurable criteria, believe that a good atmosphere at school is important and are moderate in their desire for autonomy (Turkenburg, 2008). It was also found that all school boards had only limited information about the internal operations of the school and rarely regarded teachers and students as a source of information.

As for the composition of school boards, research results show that the number of professional (paid) school directors has increased (Honig & Hooge, 2012). Members of school boards were found to be mainly ‘white’, highly educated middle-aged men. The more school boards believe they can contribute to improving the quality of education at ‘their’ school, the more they are aware of this quality (Honig & Hooge, 2012).

From the little research available on supervisors, it appears that supervisors believe they perform their tasks properly (Blokdijk & Goodijk, 2012). They also indicated to be proactive in their work and to be open to new knowledge and feedback. Room for task conflict and the use of knowledge and expertise, in particular, were found to be positively correlated with perceived effective task performance (Heemskerk, Heemskerk, & Wats, 2014). The size and complexity of the organisation, however, have no influence on the organisation’s effectiveness.

Social and human capital

Saatcioglu and Sargut (2014) adopted a social capital perspective to research the performance of school boards. Social capital refers to the relationships within the school board and between the board, school managers and teachers. The results of their research show that the mutual relationships are stronger if there is a shared vision of what the organisation wishes to achieve. It
was also found that when good internal relationships were combined with good external relationships among board members, authorities and other partners (e.g. the Inspectorate of Education (in Dutch: de Inspectie van het Onderwijs), parent organisations, and local socio-cultural organisations), the effectiveness of the organisation improved (Saatcioglu & Sargut, 2014). Recent research by Hooge, Janssen, Van Look, Moolenaar and Sleeegers (2015) looked at the performance of school boards in the Netherlands from a social capital perspective. The results showed that the more interested managers, administrative staff and school principals were in each other as discussion partners, the more confidence they had in each other and the more mutual relationships they engaged in.

In addition to looking at the social capital of school boards, it is also important to pay attention to the role of school boards in strengthening human capital. Consider, for instance, the role and effects of human resource management (HRM) within educational organisations – a topic that has for many years been high on the policy agenda. Although research dating back a number of years shows that HRM has hardly been implemented in schools (Runhaar & Sanders, 2007), research has been conducted into the effects of HRM in other organisations (Bowen & Ostroff, 2004). The results of these studies should be used to gain insight into ways in which human capital can be strengthened in a school organisation.

New research

As regards governance in education, the question is whether the subjective beliefs of managers and supervisors are actually related to students’ achievements. This correlation should be made clear in future research. Moreover, there is a need for research into the actual behaviour of managers. Examples of research questions are: how can school boards adapt to regulatory changes? What can school boards do to improve their administrative capacity? How can the relationships between the members of school boards and between school boards and their school managers and stakeholders be improved? How can managers and supervisors improve the quality of education at their school? What good practices exist in the field of HRM?

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Leren door doen. Overheidsparticipatie in een energieke samenleving. Den Haag: PBL / NSOB.

De school bestuurd. Schoolbesturen over goed bestuur en de maatschappelijke opdracht van de school. Den Haag: SCP.


Chapter 8: Education innovation and the role of research

8.1 Introduction

In recent decades, education and education research in the Netherlands has experienced a turbulent period. Many educational reforms were implemented top-down, which often led to frustration (Commissie Parlementair Onderzoek Onderwijsvernieuwing, 2008). This gave rise to a reconsideration of education policy in the Netherlands and the position of education research (Commissie Nationaal Plan Toekomst Onderwijswetenschappen, 2011; Onderwijsraad, 2014), in which it was proposed to strengthen the visibility and use of the results of scientific research. In its report ‘Towards a learning economy’ (2013), the WRR expressed its concern about the current innovation capacity of Dutch education in light of the changing economic landscape and international developments. As a result of these developments, the urgency of innovation in education is increasing. The WRR is in favour of a systematic approach to developing new insights and assessing their suitability and transferability.

A common thread in these policy debates is a broad consensus on the need to stimulate interaction between education and educational sciences. Accordingly, the role and function of education research for education innovation, which is central to these policy debates, is the main theme of this chapter. We will discuss the implementation of evidence-based, externally developed innovations in schools, where education is seen as a user of education research, and co-creation, where education is seen as a co-creator of education research.

8.2 Education as a user of education research

In discussions about education innovation and the role of education research, it is often assumed that improving the interaction between education and the educational sciences leads to school improvement and education innovation. Two perspectives that have dominated the research into school improvement and educational change (Sleegers & Leithwood, 2010) offer clues to analyse the interaction between research and practice in respect of education innovation. The first perspective, the so-called ‘outside’ perspective, focuses on the implementation of externally developed (evidence-based) innovations in schools. In this perspective, teaching professionals (teachers, school managers, etc.) are seen as users who ‘consume’ new programmes, beliefs and behaviour that have been conceived out of school by researchers and policymakers. The second perspective, the ‘inside’ perspective, focuses on the ability of schools to transform themselves into communities that support the instruction and innovation of teaching professionals. In this perspective, change and innovation are seen as part of a comprehensive process of collectively giving meaning to daily tasks and joint reflection on this. First we will elaborate further on the first perspective, in which education is seen as a user of education research.

Evidence-based education

The application of insights gained from scientific research from an ‘outside’ perspective has become indispensable in sectors like medicine, engineering and agriculture. According to Slavin (2002), randomised experiments, in particular, contribute to a solid knowledge base in these domains. Slavin therefore advocates an evidence-based approach to education and education innovation. Insights from
this type of research and the results of reviews contribute to knowledge and insights that can be potentially important for education innovation.

Gravemeijer and Kirschner (2007) argue that research aimed at education innovation should not focus on evidence of effectiveness (what works?) but on understanding the process (how does it work?). This is consistent with the results of research into the implementation of evidence-based programmes for school improvement. The results of this research show that only a limited number of these programmes have an impact on student learning and that most of the effects are not permanent (Borman, Hewes, Overman, & Brown, 2003;). Consequently, researchers have started to focus more on the conditions under which these designs are successfully implemented, the possibilities and limits of scaling up, and the sustainability of the changes (Coburn, 2003; Datnow, Hubbard & Mehan, 2002). These studies show that externally developed programmes or designs often have to be redesigned by teachers and school managers to tailor the different objectives, materials and requirements of such programmes to the local context (Klinger, Cramer & Harry, 2006). The success or failure of such external programmes is therefore highly dependent on the level of understanding that managers, in particular, have of the concrete issues their school faces and the degree to which they are able to tailor externally developed programmes for school improvement to their current school practice (Sleegers & Leithwood, 2010).

The way in which school managers interpret large-scale education innovations (diagnosis) and tailor these innovations (redesign) depends not only on their own beliefs about instruction, but is also influenced by the formal and informal organisation of the school where they perform their daily tasks (Burch & Spillane, 2003; Coburn, 2005). Furthermore, the results show that emphasis on standardised instruction, a high degree of monitoring, shared leadership, and sufficient time, money and support for the change from the school board are important conditions for successful implementation. The results also suggest that schools with a high capacity for innovation are better able to integrate externally developed changes in their existing practice than schools with a low capacity for innovation (Sleegers & Leithwood, 2010). It seems much easier to successfully 'seed' new practices in schools with a fertile 'ground' (Slavin, 1998).

New research

The results of research into the implementation of externally developed (evidence-based) programmes or designs suggest that the success of such education innovations depends on the meaning teaching professionals give to the innovation, the local context of the school and the school’s capacity for innovation. New research could provide more insight into the relationship between the way teaching professionals give meaning to external education innovations and the dissemination and sustainability of these innovations. Research is also needed into differences in the nature and progress of improvement projects at schools due to differences in innovative capacity, educational setting and their differential effects. Finally, very little is known about the role of intermediary organisations (e.g. school support services, education consultants, lectorates) in the sustainability and scaling up of education innovations initiated externally. Examples of research questions are: how do teaching professionals give meaning to education innovations and how is this related to their involvement in the implementation of these innovations? How is education innovation disseminated in schools and are there differences due to the innovative capacity of schools and the educational setting (early childhood, primary, secondary vocational education)? What are the effects of the way in which education innovation is implemented?
What role do intermediary organisations (e.g. school support services, educational consultants) play in the dissemination of education innovations? What factors contribute to the sustainable implementation of (lengthy) innovation projects?

8.3 Education as a creator of education research

Whereas the first theme focuses on stimulating and optimising the use of existing knowledge, the second perspective focuses on teachers and school managers as co-creators of knowledge. In this second perspective, the creation and use of knowledge arises in communities of teaching professionals and networks in which the members cooperate in bringing about innovations (co-creation).

Communities and networks

Co-creation of educational scientific knowledge can be promoted by creating communities of teachers, school managers, school boards and education scientists. Research could focus on the design of the cooperation (communities, networks) and their effectiveness. Points of departure for this could be sought in research conducted on school improvement and education innovation from an ‘inside’ perspective. This involves studies into the innovative capacity of schools, the school as a learning organisation and the school as a professional learning community (Sleegers & Leithwood, 2010). Results from these studies show that the learning of teachers is crucial to the improvement and innovation of instruction. It also appears that conditions at the meso level – such as shared vision, shared decision-making, peer cooperation, an open atmosphere, trust and leadership – promote the learning of teachers. In addition, several researchers have stressed the importance of a strong network of social relationships for sustainable school improvement (Coburn & Russell, 2008; Daly, Moolenaar, Bolivar, & Burke, 2010). Research also shows that the internal and external networks of school managers and the quality of these networks are related to the innovative capacity of a school (Moolenaar & Sleegers, 2015).

Although these results show that professional cooperation and knowledge sharing in social networks are important conditions for the success of educational innovation, relatively little is known about the cooperation and knowledge sharing in networks between teachers, school managers and researchers. An example of such research is design research (McKenney & Reeves, 2013; Penuel et al., 2011) in which teachers, school managers and researchers cooperate in developing education. Another example is cooperation between teachers, school managers and researchers to systematically collect and analyse available data on students in order to improve education (Schildkamp, Lai, & Earl, 2013). The little research that is carried out in this field mainly takes place in secondary education, however. Moreover, this research focuses predominantly on the dynamics of the interaction between professionals from practice and education researchers and much less on the potential effects of such interaction.

It is likely that new forms of cooperation will take place within so-called academic or knowledge workplaces (Kenniswerkplaatsen, KWPs), as proposed by the Education Council (Onderwijsraad, 2010, 2011), the WRR (2013) and the Educational Sciences Sectoral Plan Committee (Commissie Sectorplan Onderwijswetenschappen, 2014) with the aim of boosting a demand-driven approach in education research and promoting cooperation between research and practice. Whether and how such KWPs will function depends not only on the financial and organisational space they will be given to fulfil these
ambitions, but also on the formal and informal relationships that arise within and outside these KWPs between teachers, school managers, school boards, developers and researchers.

New research

Although previous research into school improvement provides points of departure for research into the interaction between practice and research, there is still relatively little known about the cooperation between teachers, school managers and researchers. More research is therefore needed into the nature and dynamics of this cooperation at various educational levels (vwe, po, vo,mbo, hbo - early childhood, primary, secondary, secondary vocational and higher vocational education). Research is also needed into the effects of co-creating new knowledge in networks of teachers, school managers and researchers on the teacher as well as into how this co-creation is related to the quality of education and sustainable school improvement. Finally, there is little systematic empirical research into the attitudes and beliefs of teachers in relation to educational innovation and the extent to which this influences their involvement and actions. Examples of research questions are: how can teachers, schools and educational institutes – in collaboration with researchers – analyse and improve their own practice based on research? Can this be done by specifically building capacity at the individual and at the organisational level, and what are the effects on the quality of education and sustainability of school improvement? How do teachers’ attitudes to education innovation influence their commitment to innovations and how do these relationships change during the implementation of these innovations?

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Appendix 1: Composition of the Steering Group and the NRO Programme Councils

**Steering Group**

1. Chair: Prof. M.J.M. (Marc) Vermeulen
2. Fundamental research member: Prof J.J.G. (Jeroen) van Merriënboer (Vice-chair)
3. Teaching practice (primary) member: *drs.* M.T.C. (Marja) Blom
4. Teaching practice (secondary) member: *drs.* A. (Arjan) Kastelein MSc
5. Policy research member: *drs.* A. (Annemarie) Sipkes
7. Practice-oriented research member: Dr. S.M. (Sanneke) Bolhuis

**Programme Council for Fundamental Research (PROO)**

1. Prof. Th. (Theo) Wubbels (Utrecht University, Faculty of Social Sciences, Pedagogical and Educational Sciences) (Chair)
2. Dr. I.M. (Ilse) van Eekelen (Revius Lyceum)
3. Dr. S. (Saskia) Schenning (The Hague Schools, Foundation for primary and special public education)
4. Prof. T.A.J.M. (Tamara) van Gog (Utrecht University, Faculty of Social Sciences, Education & Pedagogy) (Vice-Chair)
5. Prof. W.J.C.M. (Wim) van de Grift (University of Groningen, Faculty of Behavioural and Social Sciences)
6. Prof. H.G. (Herman) van de Werfhorst (University of Amsterdam, Amsterdam Institute for Social Science Research (AISSR)
7. Prof. P.J.C. (Peter) Sleegers (University of Twente, Faculty of Behavioural Sciences, Educational Organisation and Management)
8. Prof. P. (Peter) Van Petegem (University of Antwerp, Institute of Education and Information Sciences)
9. Dr. J. (Jasper) Jans (Knowledge Directorate, Policy Adviser, Ministry of Education, Culture and Science)

**Programme Council for Policy-Oriented Research (ProBO)**

1. Prof. H.P.J.M. (Hetty) Dekkers (Radboud University, Faculty of Social Sciences) (Chair)
2. Prof. A. (Andries) de Grip (Maastricht University Research Centre for Education and Labour Market) (Vice-Chair)
3. Prof. S. (Sietske) Waslander (Tilburg University, TiasNimbas School for Business and Society)
4. *meester* S. (Steven) Datema (Ministry of Education, Culture and Science, Knowledge Directorate)
5. *drs.* M.J.F. (Marian) Hulshof (Inspectorate of Education)
6. *drs.* J. (Jeanette) Noordijk (Koning Willem I College)
Programme Council for Practice-oriented Research (PPO)

1. Practice, Secondary Education (SE) M.M.P. (Maartje) Buijs-Germs MSc, history teacher at the Liemers College (SE) and Research Coordinator at Quadraam
2. Practice, Primary Education (PE) W.S.J. (Wim) Folker, school board Delta Arnhem
3. Practice, Secondary Vocational Education Drs. R.W.F. (René) van Schalkwyk MSc BA, Executive Board Member ROC Horizon College
4. Researcher: Prof. S. (Sjoerd) Karsten, Extraordinary Professor of Policy and Organisation of vocational training, adult education and lifelong learning at the UvA
5. Researcher: Dr. ir. Q.H. (Quinta) Kools, lecturer at Fontys (Chair)
6. Researcher: Dr. M.C.L. (Miranda) Timmermans, lecturer Pabo Avans University (Vice Chair)

Overarching Programme Council for Education Research (OPRO)

1. Chair: Prof. Th. (Theo) Wubbels, Chair of PROO
2. Prof. H.P.J.M. (Hetty) Dekkers, Chair of ProBO
3. Dr. ir. Q.H. (Quinta) Kools, Chair of PPO
4. Prof. P.J.C. (Peter) Sleeegers, member of PROO
5. meester S. (Steven) Datema, member of ProBO
6. M.M.P. (Maartje) Buijs-Germs MSc, member of PPO
Appendix 2: NRO Calls for Proposals to be published

At this time, the NRO expects to publish the following calls (the scheduled publication dates and amounts are tentative):

1. **Short-term practice-oriented research:**
   Projects from €50,000 to €100,000 to be carried out by consortia of educational institutes, research institutes and possibly third parties.
   Budget for each call: €1.4 million.
   Publication of call for proposals scheduled for June 2017 and June 2018

2. **Three-year practice-oriented research:**
   Projects up to €750,000 to be carried out by consortia of educational institutes, research institutes and possibly third parties.
   Budget for each call: €13.8 million.
   Publication of Call for Proposals scheduled for September 2017

3. **Policy-oriented research**
   Projects up to €450,000 to be carried out by consortia of research institutes.
   Budget for each call: €1.9 million.
   Publication of Call for Proposals scheduled for February/March 2016 and June 2017.

4. **Fundamental research: coherent research projects**
   Coherent research projects with a total volume between €400,000 and €600,000 to be carried out by research institutes and where the main applicant is a researcher at a university.
   Budget for each call: Between €3 and 3.5 million.
   Publication of Call for Proposals scheduled for February/March 2016 and October/November 2017.

5. **Overview studies**
   An overview study provides insight into the results of research. A maximum of €50,000 can be requested for each study. The NRO Programme Councils can propose other topics for an overview study besides topics covered by this programme, or leave the choice of topic up to the researchers.
   Budget for each call: €0.8 million.
   Publication of Call for Proposals scheduled for December 2016 and December 2018.

6. **Overarching calls**
   It may be decided, based on the description of the topics in this programme, to combine questions from the policy-oriented, practice-oriented and/or fundamental perspectives.

The Calls for Proposals to be published starting in 2017 may introduce new topics besides the themes covered by this programme; it is also possible that the above-mentioned calls will be organised differently.
Appendix 3: List of abbreviations

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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>COOL 5-18</td>
<td>Educational Careers Cohort Survey 5- to 18-year-olds</td>
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<td>CPB</td>
<td>Bureau for Economic Policy Analysis</td>
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<tr>
<td>HBO</td>
<td>Higher vocational education</td>
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<tr>
<td>HRM</td>
<td>Human Resource Management</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
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<tr>
<td>KWP</td>
<td>Knowledge Workplaces (<em>Kenniswerkplaatsen</em>)</td>
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<tr>
<td>KNAW</td>
<td>The Royal Netherlands Academy of Arts and Sciences</td>
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<td>MBO</td>
<td>Secondary vocational education</td>
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<td>NIBC</td>
<td>National Initiative for Brain and Cognition</td>
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<td>NRO</td>
<td>Netherlands Initiative for Education Research</td>
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<tr>
<td>NWO</td>
<td>Netherlands Organisation for Scientific Research</td>
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<tr>
<td>OCW</td>
<td>Dutch Ministry of Education, Culture and Science</td>
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<tr>
<td>OECD</td>
<td>The Organisation for Economic Cooperation and Development</td>
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<td>OPRO</td>
<td>Overarching Programme Council for Education Research</td>
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<tr>
<td>PIRLS</td>
<td>Progress in International Reading Literacy Study</td>
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<tr>
<td>PO</td>
<td>Primary Education (PE)</td>
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<tr>
<td>PPO</td>
<td>Programme Council for Practice-oriented Education Research</td>
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<tr>
<td>ProBO</td>
<td>Programme Council for Policy-oriented Education Research</td>
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<tr>
<td>PROO</td>
<td>Programme Council for Fundamental Education Research</td>
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<tr>
<td>ROA</td>
<td>Research Centre for Education and the Labour Market</td>
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<tr>
<td>ROC</td>
<td>Regional Education Centre</td>
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<tr>
<td>TIMSS</td>
<td>Trends in International Mathematics and Science Study</td>
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<td>TPACK</td>
<td>Technological Pedagogical Content Knowledge</td>
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<tr>
<td>VO</td>
<td>Secondary Education (SE)</td>
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<tr>
<td>VMBO</td>
<td>Basic vocational education</td>
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<td>VSNU</td>
<td>Association of universities in the Netherlands</td>
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<tr>
<td>VVE</td>
<td>Early childhood education</td>
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<tr>
<td>WRR</td>
<td>Scientific Council for Government Policy</td>
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