Long-term Course of Action
2019 - 2022

Contents

The front page is a representation of increasing cooperation in education for the professional use of ict: This is one of the most important starting points for this Long-term Course of Action.

Introduction

Kennisnet wants to contribute to good education through making the professional use of ict possible. In this Long-term Course of Action, we describe how we will give this substance in the coming years. In doing so, we build on the results achieved in the past years, and we make the connection with developments inside and outside education.

Good education: building for the future

Good education lays the foundation for living, learning and working and challenges pupils and students to get the best out of themselves. That demands education that responds to social, economic and technological developments. For example, schools must know how to cope with increasing teacher shortages, with how education can offer the right preparation for an unpredictable labour market, but also with new ethical issues as a consequence of digitisation.

Within this complex context, education has formulated ambitions for further improving the quality of education:
- A contemporary educational content: preparation for living, learning and working.
- Focus on opportunities: combat inequality.
- The pupil at the centre: set up education more flexibly.
- Coping with change: focus on learning and innovative capacities.
- Professionalisation of the organisation: the organisation's management requirements.
- Dealing with ethical issues: education and digitisation.

Ict in education: improving learning

Technology has become part and parcel of education. It is now a matter of taking the next step and increasing positive effects through professional use. Ict is an important tool for improving and changing processes, e.g. in administration, or in making lessons more flexible. Moreover, ict offers education new possibilities in terms of the primary process: teaching and learning. If schools want to exploit these opportunities, then we must use ict properly. Moreover, the use of technology and increasing digitisation in society is presenting schools with new challenges and questions, to which they will have to relate. The professional use of ict assumes a constant need for improvement for the effective and responsible use of ict. This means making choices at a management level, e.g. by setting up preconditions, such as a good Internet connection and secure data handling. Making choices at a management level also means: knowing what you as management have to solve and are able to solve yourself, and what it would be better to arrange in supra-administrative cooperation. School boards could achieve more with ict in education through cooperation and the pooling of resources. It is also important to choose a form of cooperation that would ensure that the ownership and influence of the school board itself continues to be sufficiently safeguarded.

Kennisnet: guide and builder of the ict foundation

Since 2001, in collaboration with many other parties, Kennisnet is committed to the proper use of ict in primary education, secondary education and secondary vocational education (mbo). The concrete implementation of our activities and the development of our portfolio follow from the collective needs that we gather from the sectoral councils, from saMBO-ICT and from the Ministry of Education, Culture and Science. At the same time, in the coming period we will be making a firm commitment in supporting school boards, which, influenced by the increasing complexity, are seeking cooperation in the field of ict. The SIVON initiative, a cooperative of cooperating school boards in the field of ict, is a good example of such a partnership. A cooperative is also being set up in senior secondary vocational education in order to arrange joint facilities.

In the coming period, Kennisnet will fulfil the function of guide and builder of the ict foundation. From our guide function, we help school boards and schools further with knowledge about what works with ict in education. We make the knowledge offered practically applicable, so that our guide function also really does lead to the professional use of ict in education. Apart from guide, we are also builder of the public ict foundation. We ensure a firm foundation for the simple, safe and reliable use of ict in education. To this end, we build different public facilities. Kennisnet supports education in the professional use of ict. We are also ambitious in this respect. At the same time, we realise that in delivering on our ambitions, we are dependent on many parties, from school boards to market parties and other public organisations. However, because we will be focusing more in the coming years on school boards that strengthen their position in the market with coope-ration, we are less dependent on this sphere of influence than before.

In the coming years, we will commit to four themes:
• Well thought-out use of ict.
• (Digital) teaching materials and learning environments appropriate to the educational needs.
• The improvement of information management and the use of data.
• A robust ict infrastructure: reliable, safe and focused on the future.

The next step: making professional use of ict in education possible

Education is increasingly aware of the contribution that ict can make in realising its ambitions and consciously commits itself to this. It is no longer a question of whether education wants to use ict, and often no longer exactly which form that ict should take. The question now is, how best to use ict. Kennisnet moves along with this develop-ment. Our focus here is on making knowledge directly applicable and setting up an ict foundation on which education can build and rely. Thus Kennisnet can have an impact. The advice is and continues to be: to engage closely with education. In this way, we make the next step possible and let ict work for education.

The Long-term Course of Action describes the activities of Kennisnet for primary, secondary and senior vocational education. These sectors each have their own terminology, such as pupil, student, course participant or educational participant, schoolmaster, teacher or lecturer. For readability, we have chosen not to include all these terms in the texts.

1.

Good education: building for the future

The chapter describes, on the basis of an analysis of trends and developments, the ambitions of education that are relevant from the perspective of education and ict.

1.1 Education: foundation for living, learning and working

Good education lays the foundation for living, learning and working and gives people the opportunity for personal development. It is important for pupils and students to be seen, that they feel safe and that they are challenged. A meaningful relationship between pupils and teachers gives pupils real room for personal development. This demands schools where talent and professionalism – of pupils, but also of teachers – is cherished and developed, where learning is (also) fun and takes place in a pleasant environment. This contributes to pupil motivation and teacher pride. Education also continues to be important after school. In the future, lifelong development will become increasingly the norm, so that everyone can keep up sufficiently with changes in the labour market and in society.

What is the condition of education?

Various different international comparisons show that Dutch education is in a good condition. The basis is in order if we look at cognitive learning performance, student progression to higher educational levels and the connection on the labour market. At the same time, we can point out clear points for improvement. This good starting point (certainly in an international context) conceals education's restricted innovative power and limited capability of adapting to changing circumstances.

Moreover, there is differing performance between schools with comparable pupil populations. There are also concerns about the inequality of opportunity in education and about the fall in motivation of pupils *(Inspectorate of Education 2017, 2018)*. Moreover, teachers and other staff do not always experience enough appreciation and there is a high workload and teacher shortages. The challenge schools face is to address these issues in order to prepare every pupil for a good life in the future society.

Influence of trends and developments in society

Education occupies a central place in society and is influenced by what is going on in society. Education operates in a complex and highly dynamic context. In order to obtain a picture of the societal trends and developments faced by education, we use a DESTEP analysis: what are the relevant trends at the demographic, ecological, socio-cultural, technological, economic and political-legal levels? We have visualised these trends in the following figure. The description is included in *appendix 1*.

Demographic
Shrinkage & growth
Population ageing & teacher shortages

Ecological
Climate change & attention for sustainability

Socio-cultural
Increasing (chances of) inequality
Digitisation affects contact, confidence and communication

Political-legal
GDPR
Stimulation, but also more regulation in the digital domain

Economical
International (technology) companies obtain increasingly more influence
The labour market is becoming less predictable

Technical
Artificial intelligence development is based on data
Safe & responsible use of technology

Figure 1: trends and developments that influence education and ict

1.2 Ambitions for good education

The various different trends and developments have an impact on education. There are certainly differences between primary, secondary and senior vocational education. This is also revealed by the strategic agendas and school board agreements, which formulate ambitions for the coming years.[1] Ict is a tool for realising these ambitions. And sometimes, ict even provides additional complexity. In this paragraph, we describe the most important ambitions, as also indicated in the figure below, in relation to the Long-term Course of Action of Kennisnet.

Contemporary educational content: preparation for living, learning and working

Focus on opportunities: combat inequality

The pupil at the centre: set up education more flexibly

Coping with change: focus on learning and innovative capacities

Professionalisation of the organisation: organisation's management requirements

Dealing with ethical issues: education and digitisation

Figure 2: the ambitions of education

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[1] *Appendix 1 contains the most important ambitions as described in the different strategic agendas and school board agreements.*

Contemporary educational content: preparation for living, learning and working

Ict has become part and parcel of everyday life and being able to handle technology is a precondition for being able to lead a good life in society and to be successful on the labour market. In Curriculum.nu, teachers and school leaders from primary and secondary education work on a more contemporary curriculum, of which digital literacy will also form a part. In secondary vocational education, educational institutions and companies work together to help match the content of education with the developments in the professional field and society. There is also attention for digital citizenship.

Focus on opportunities: combat inequality

Education is seen as the place where everyone receives opportunities for developing talent, regardless of someone's background. This does not seem to be successful at the moment: pupils with a migrant background and children from low-skilled parents have less chance of a high level of education than do their peers. Not everyone receives the best possible support and sometimes talent is insufficiently appreciated *(Inspectorate of Education 2018)*. Differences in educational results are normal, but how does one offer everyone the opportunity of getting the best out of him or herself? In the field of digital literacy, we also see that it matters which level of education parents have; up to now, the school has only proved to be partly able to bridge this difference *(Kennisnet 2017a)*. According to the inspectorate, education, government bodies and other sectors will have to join forces to turn the tide of increasing inequality. The use of ict has an effect on equality of opportunities, consider for example the availability of devices or how adaptive teaching materials are used.

The challenge is to ensure that this has a positive effect.

The pupil and the student at the centre: set up education more flexibly

The labour market is changing faster than it used to. In order to be able to participate in the changing labour market, people have to continue learning during their working life: lifelong or permanent development. This demands flexible education: education that can be offered in different places and at different times (both inside and outside the educational institution), to people with different backgrounds and preliminary education and whereby the content can be adjusted to the requirements of pupils, students and employers. This poses substantive and organizational challenges to educational organisations: it is not without reason that there is an increasing amount of attention for educational logistics.

We must arrange education differently in order to cope with the shrinkage of the pupil population, with growth in a number of large cities, with the workload and with the increasing teacher shortage. Moreover, flexible education fits in with the ambition of many schools and school boards to put the pupil and the student more at the centre: it is not the timetable or location that is leading in education, but the pupil's learning demand, interests and learning route.

In order to make education more flexible, we notice that schools and institutions cooperate increasingly inside and outside education. Integral child centres (IKCs) are being created at different places and secondary vocational education institutes are implementing learning in collaboration with companies. Students, and also those who are already working (or who have already worked in the past) are given more room in secondary vocational education to compile their own

programme through flexible intake moments and certificates for skills already gained. Ict offers schools various different options for making their education more flexible, e.g. with a well thought-out digital learning and working environment or with a digital educational catalogue. Open teaching materials also contribute to more flexible education. Open teaching materials are free teaching materials available online that are usually developed by teachers and that can be adapted and shared again by other teachers. Open teaching materials give teachers additional variation possibilities to supplement the methods, so that they can compile a mixture of teaching materials that matches the learning route of the pupil or student. The required flexibility of the content of education and the requirement of being able to respond to the current trends also mean that there is more attention for open teaching materials: free teaching materials available online that are usually developed by teachers and that can be adapted and shared again by other teachers. Open teaching materials give teachers additional variation possibilities to supplement the methods.

Coping with change: focus on learning and innovative capacities

Innovation is not only essential in terms of a complex and changing context and for exploiting new opportunities, but also in keeping education affordable. Education is labour-intensive and the educational processes are not easy to automate, and moreover, it is not always desirable to do so.

We see that a number of schools have arranged education differently, this also poses challenges to the ict setup within these institutions. This demands solutions for current issues in education, such as the

increasing teacher shortages, the fall in motivation of pupils and the high workload. At the same time, it is this very teacher shortage and workload that makes it difficult to free up time for changes in the organisation of education. Moreover, it is important to pay attention to healthy market forces, also with the use of digital teaching materials and applications. In some areas, only a few market parties are active, which often fulfil several roles at the same time. This can give rise to undesirable dependencies and restrict freedom of choice. Schools and school boards will have to organise themselves even better in the future in order to move along with a rapidly changing environment and to strengthen the position of education with respect to other parties.

Professionalisation of the organisation: the organisation's management requirements

Education is faced with a complex context that sets high requirements to the organisation and management of schools and school boards. Schools are becoming more dependent on the technology used and on (international) parties that supply that technology. Moreover, with the increased use of technology, the values and choices made by commercial parties are gaining more influence in the classroom, something which school boards find it difficult to counter on their own. 'Green' ict is another topic that deserves attention: the growing use of ict means increasing CO_2 emissions, among other things through power consumption and through the production and discharge of devices. Some things in the area of ict are not easy for a small school board to organise themselves, such as the proper arrangement of information security, arranging professional information management and a

properly working ict infrastructure. Central organisation and (supra-administrative) cooperation can provide a solution here, e.g. arranging good and reliable connections, hiring experts or making agreements with market parties.

Dealing with new ethical issues: education and digitisation
Society is becoming more and more digital and that gives rise to new ethical issues. According to the Rathenau Institute, the digitized society demands new human rights, including the right not to be measured *(Rathenau 2017a)*. This discussion is also relevant to education. The use of digital teaching materials means that pupils are increasingly being measured, profiled and predictions are made about them. How far may data collection about pupils and teachers go in serving educational goals? Privacy is a fundamental right. The coming into force of the General Data Protection Regulation (GDPR) makes it clear that attention for privacy is particularly necessary in times of digitisation. Apart from privacy, other issues also demand attention. Does the aim for personalised learning with technology indeed increase the chances of all pupils to the same extent? Is there any bias in algorithms? How do private (but also international) organisations influence the public domain? Apart from the right to not be measured, the Rathenau Institute also mentions the right to human contact. This also affects education. What balance is for example appropriate between the technology as the 'assistant' and

the human (the teacher and/or pupil)? It is a good thing to conduct the discussion about these ethical issues: and if education makes informed choices in this area, e.g. concerning the question as to where schools want to give room for innovation and where it is better to hold their position in the matter.

1.3 Ict and the ambitions of education

Ict plays a part in different ways in the ambitions of education. On the one hand, ict offers new opportunities for shaping education more flexibly, to improve pupils' learning and to let them work more at their own level *(Kennisnet 2016) (SURF 2016)*. On the other hand, with ethical issues, demands on the educational content and on the management, the digitisation of society delivers a complex context for education, and education needs to find a good way of dealing with this. In the next chapter we describe how education can tackle this properly.

2.

Ict in education: improving learning

This chapter discusses the state of affairs in the field of education and ict, the ambitions of education in this area, and what we needed in order to realise these ambitions.

2.1 Ict in education: state of affairs

All Dutch schools make more or less use of ict. This concerns:

- **Ict in the content of education (what we teach):**
  It is important that schools prepare pupils for life in a digital society. Not only does this concern being able to work with digital resources, but also the ability to interpret the digital world properly, to be able to find one's way in that world and to be able to present one's self in it. In secondary vocational education (mbo) and preparatory middle-level vocational education (vmbo), the challenge facing educational courses is to prepare students for professions that make full use of (new) technology.

- **Ict in the classroom (how we learn):**
  Technology offers alternative and new opportunities for learning. Existing educational concepts, such as personalised learning (customisation) are getting an impulse from technology: adaptive teaching materials mean that pupils can learn certain subjects better at their own level.

- **Ict in the organisation of education (how teaching is organised):**
  The organisation of education cannot do without ict. From administration to communication with parents, and from timetabling to obtaining an insight into pupil progress. A clever use of ict can support processes, and thus contribute to a reduction in staff workload. Moreover, ict offers new opportunities for registration, measurement and evaluation.

The use of ict has become self-evident

In the past years, the use of ict in education has become self-evident, both in the classroom and in management. That does not mean that ict is used in the same way everywhere. Some schools choose to make large-scale use of adaptive teaching materials, other schools focus on digital literacy and there are also schools that have reservations because they think that pupils should not have to spend too much time behind a screen.

In any case, all teachers make more or less use of ict applications. However, there is a strong difference among teachers in the extent to which they use ict applications and in their competence in doing so. These differences are not only reflected between different schools, but also even within schools themselves *(Kennisnet 2017b)*. Ict is also used in the organisation of education.

Ambition: let ict work for education

The possibilities and power of technology have increased rapidly in the past years and in all sorts of sectors, the use of ict has given rise to changes in organisations and processes. However, in education we do not yet see a real breakthrough in the use of ict. Full use is made of new technologies, but the effects on educational results or the organisation of education are still limited for the time being. Secondary school pupils and secondary vocational education students indicate that they would like to work more with ict and digital teaching materials than they now do.

Many schools would like to arrange their education more flexibly and customised with ict, or to automate processes with ict. In the coming years, school leaders and governors will strive for a significant increase in the use of ict in education *(Kennisnet 2017b)*. The challenge is that the use of ict will also lead to an actual improvement of education.

'Digital Netherlands: It's possible here. It happens here.'

The government also focuses on the possibilities of ict in education. In its Dutch Digitalisation Strategy, the cabinet has defined the target of making the Netherlands the digital leader of Europe.

In order to achieve this target, companies, consumers and public authorities must respond quicker and with more innovation on the high pace of digitisation of society and the economy. For education, the cabinet formulates a number of clear ambitions: a renewed curriculum of which digital skills form a part, teachers who use modern teaching materials and the use of educational technology that creates higher quality in education. In this way, the cabinet will give an impulse to attractive education that meets the learning needs and talents of pupils better *(Ministry of Economic Affairs and Climate et al. 2018)*.

2.2 Towards professional use of ict

The professional use of ict is essential for lifting the use of ict in education to a higher level. We distinguish four components for professional use: a constant need for improvement, use ict effectively and responsibly, make choices at a management level and cooperation and pooling of resources.

A constant need for improvement
The challenge in being able to also guarantee good education in the coming years is the continuous improvement of education. This demands an investigative attitude within educational institutions, a reflection on where you stand and a focus on opportunities and (new)

possibilities. This affects everyone in education: teachers' teams, school leaders and governors but also ict administrators and information managers. In order to obtain a return on investment, the use of ict must form an integral part of an approach that is focused on improvement through learning and innovation.

Use ict effectively and responsibly
Ict offers education benefits and opportunities. At the same time, there are risks and threats that education must take into account. Increased possibilities for registration, measurement and evaluation offer an insight at all sorts of levels, but can also give rise to work-

Know what works with ict
Ict can work better for education if it is used based on scientific insights. Ict can be a powerful aid in the classroom, but only when used correctly: properly, focused and sparingly. The Four in balance model shows that the use of ict in education is especially effective if that use is clearly linked to the educational visions of schools or school boards *(Kennisnet 2017b)*. The vision, staff competence, the content and applications used as well as the infrastructure must be mutually in balance in order to let ict work properly for education.

Various different surveys on education and ict show that as a stand-alone resource, ict has no clear positive effects on education. The teacher plays an essential part in the successful use of ict. This concerns the interplay between the pupil's characteristics, the teacher's characteristics, the educational content and the resources used by the teacher. The factors for effective education fall within these spheres of influence. So teachers must know what works for different pupils in different contexts, with different teaching materials and applications.

load and performance pressure. Digital applications in education offer new opportunities for improving pupils' learning, but not every use of ict delivers positive effects. Teachers, school leaders and governors can use scientific insights to benefit more from the possibilities offered to education by technology. We mentioned above the ethical issues that deserve attention. It is also a good thing to keep an eye on themes such as cyber bullying, the relationship between increased screen use at and outside school, obesity, poor visibility among young people, a safe digital climate at schools and the effects of the use of ict on concentration and memory *(Education Council 2017)*. The use of ict in education is always about creating a good balance. No schools whatsoever will aim to let pupils work solely with digital resources. The teacher is still important, just as are other forms of learning.

Make choices at a management level

It is the responsibility of school boards to arrange properly the necessary preconditions for the proper use of ict in education. That may concern a good Internet connection, safeguarding the privacy of pupils and staff, or data security. Governors also have the responsibility to make choices as far as the desired use of ict in education in their schools is concerned. At the same time, many school boards are aware that they do not always have sufficient expertise, time and/or resources for lifting ict in education to the next level.

So making choices at a management level also means: knowing what you as management have to solve and are able to solve yourself, and what it would be better to arrange in supra-administrative cooperation. And in this context to choose a form of cooperation that would ensure that the ownership and influence of the school board itself continues to be sufficiently safeguarded.

Cooperation and pooling of resources

In order to retain control on the developments, and to be able to safeguard public values such as privacy and accessibility in times of digitisation, cooperation and pooling of resources is essential. Joining forces from a shared vision is also important in order to deal with undesirable developments in the market. School boards are increasingly aware of the risks arising from large market concentrations and the dependence they involve. This has consequences for the choices they make as a customer and leads to more cooperation. School boards in primary, secondary and senior vocational education, the sectoral councils, the government and public authorities also act accordingly. The Breakthrough Project Education & ICT started in 2013. This project had the objective of removing barriers standing in the way of the proper use of ict. It paid a great deal of attention to increasing the ownership of school boards as to the use of ict in education. At the end of 2017, school boards in primary and secondary education took the initiative of setting up the SIVON cooperative, based on the idea that if they do it together, school boards will be better able to organise their ict, will be able to make cheaper purchases and provide better quality. There is also intensive cooperation in secondary vocational education (mbo): virtually all institutions are members of saMBO-ict and most institutions are members of SURF. The strategic agenda for the digitisation of the mbo 2018 - 2022 shows a clear direction of the activities of saMBO-ICT, Kennisnet and SURF *(saMBO-ICT et al. 2018)*.

2.3 Good education through the professional use of ict

In the previous chapter, we described how various trends in society give rise to a complex context for education and to different ambitions. Provided it is properly used, ict can fulfil an important role, and it already does so in many places. In order to really let ict work for education and to reach the next level, it is essential to use ict professionally.

All this has consequences for what education expects and requires of Kennisnet. We will elaborate on this in the next chapter.
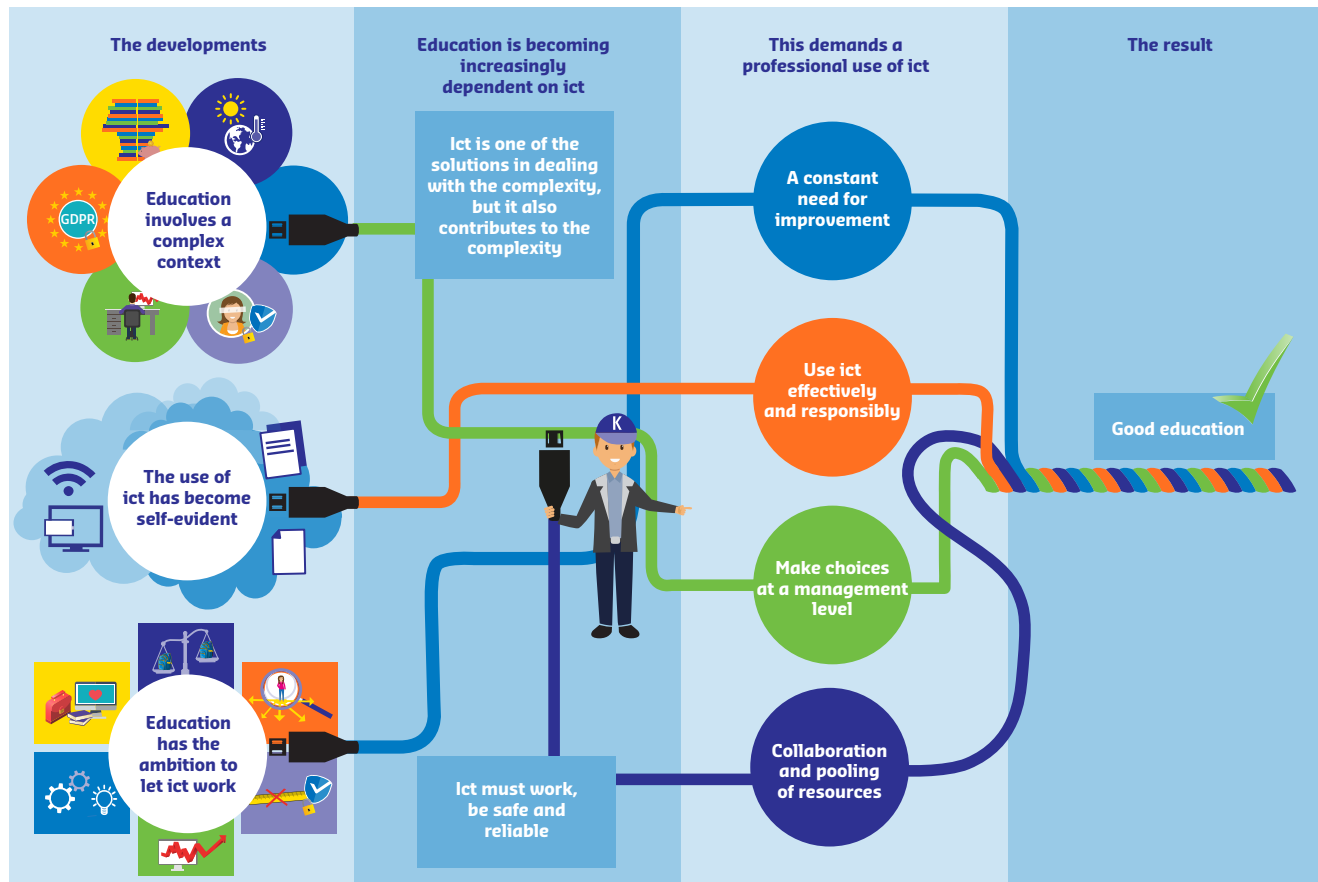

Figure 3: good education through the professional use of ict

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3.

Kennisnet: guide and builder of the ict foundation

The first part of this chapter describes how Kennisnet contributes to the professional use of ict. The second part of the chapter discusses governance, organisation and budget.

3.1 Making professional use of ict possible

Since 2001, Kennisnet is committed to letting ict work for education. As a foundation, we are financed by the Ministry of Education, Culture and Science to support primary, secondary and senior vocational education. Our activities are focused on safeguarding public interests, increasing the effectiveness and efficiency of investments and on strengthening the position of education.

Long-term Course of Action 2015-2018: a reflection

In its Long-term Course of Action of 2015-2018, Kennisnet has made sharp choices in a context of significant cost cutting. We shifted the focus towards activities that serve the collective interest. We departed from services for pupils (e.g. the kids portal) and activities focused on supporting individual institutes. Governors became our primary target group, with the different sectoral councils to represent their interests. We have formulated concrete activities in year plans from three functions: the creation of a nationwide ict infrastructure, the provision of strategic advice and the offering of expertise. We have achieved good results in this respect.

The Kennisnet facilities are reliable and are used a lot. The public facility Entree Federatie provides users safe and simple access to educational services. Wikiwijs is the place for finding and sharing open teaching materials. And Vensters - implemented on the basis of specific agreements with the PO Council and the VO Council (primary and secondary education councils resp.) - helps school boards and their schools to be transparent and account for their education.

The expertise offered is of a high quality and visible. The Four in balance model and the Technologiekompas (Technology Compass) give direction to schools in the development of a long-term ICT strategy. The IBP Approach (Information Security and Privacy Approach) helps schools to regulate IBP and schools can use the Digital Literacy Manual to work on digital literacy. These and other publications and tools are available to everyone on the Kennisnet.nl website.

The past years have seen a significant commitment on cooperation. This has delivered good results. With the PO Council, the VO Council and the Ministries of Education, Culture and Science and Economic Affairs in the Breakthrough Project Education & ICT and the resulting programmes Smarter Learning with ict and Pupil 2020. In the public platform Edu-K with public and private parties in the teaching materials chain. With saMBO-ICT and SURF in secondary vocational education. And also with parties such as NRO (to make survey results accessible) and SLO in detailing the digital literacy theme and the translation of core objectives into educational metadata.

And yet, as has been described in the previous chapter, the use of ict has not given rise everywhere to the desired results and in many places, benefits can still be obtained through a well thought-out approach.

Course 2019-2022

The goal of education is that pupils and students receive good education in the Netherlands. Education that responds to social, economic and technological developments. It is not easy to realise this, as is also evidenced by the ambitions described above. Ict can play a good role in many of these ambitions, provided effective use is made of them. That does demand a professional approach, which is something in which education wants to take a next step.

The challenge for Kennisnet is to contribute to this next step and to support education with a proper implementation. The professional use of ict demands cooperation and the pooling of resources within education. Kennisnet makes a contribution in this respect. For example, by advising sectoral councils in fulfilling their role in representing interests and with sector development. As a guide, we develop reliable knowledge and we ensure its proper application. At the same time, we are the builder of the ict foundation and thus we provide essential public preconditions in education. Supporting national initiatives of cooperating school boards in the field of ict also fits in with the shift towards a focus on implementation.

3.2 Portfolio: guide and builder of the ict foundation

Kennisnet makes professional use of ict possible. In this way, we contribute to good education for all pupils. We are a reliable guide and builder of the public ict foundation. From these functions, we strengthen the position of education by advising the sectoral councils with sector development and on representing interests and through the development and management of a number of sectoral facilities. The implementation of activities and the portfolio follow from the collective needs that are presented by the sectoral councils, saMBO-ICT, the Ministry of Education, Culture and Science, practical experience of school boards and analyses of relevant trends and developments.

In order to really make the difference, we focus on seeking the connection with other organisations. We work together with all sorts of parties in order to improve the operation of the ict services used by education, e.g. in order to facilitate simple and reliable access to digital teaching materials or the safe exchange of data. Knowledge of teaching practice is essential in order to be effective and to gain an insight into the use and improvement options of and for (our) services. In cooperation with educational institutions, we translate generic concepts into knowledge that can be used with specific implementation issues.
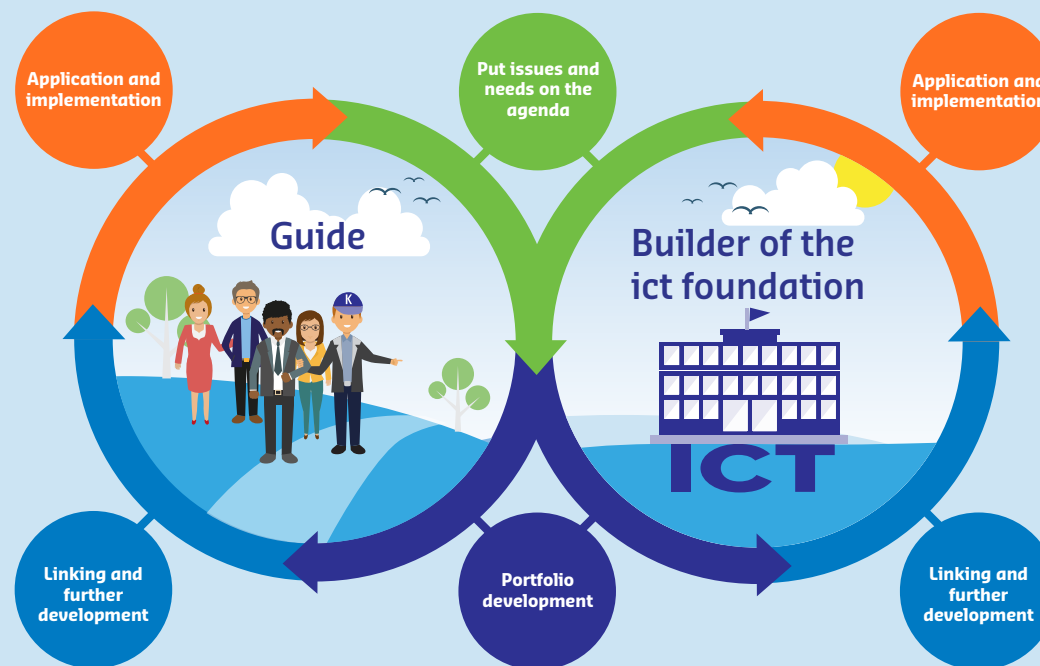

Figure 4:
Kennisnet portfolio

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Reliable guide

The professional use of ict demands making well thought-out choices. It is therefore important that everyone in education has access to reliable information about technology and its application in education. That means that there are no commercial interests, but that everything revolves around education. Governors, school leaders, ict administrators and teachers who want to improve their education with ict can rely on Kennisnet. For them, Kennisnet is a guide that offers information that matches their knowledge needs, based on educational issues. Kennisnet makes thorough analyses of technological developments and the possibilities these offer to education, it has an insight into market developments, an eye for ethical issues, and uses the (scientific) insights about the effective and efficient use of technology. In cooperation with educational institutions, we develop high quality knowledge products that match well with teaching practice. To ensure their widespread use, we make a connection with other (public) organisations.

Builder of the ict foundation

A national ict infrastructure is essential if ict is to work effectively and efficiently in education. It is important to arrange the national ict facilities infrastructure collectively and publicly. For example, because with public facilities it is possible to guarantee safety and privacy, because the facilities contribute to healthy market forces, or because it is much more efficient to organise ict facilities once for the entire education sector. These facilities are available to everyone and are usually used by several sectors. Other organisations apart from Kennisnet, such as SURF and SBB, also develop public services. Cooperation creates a

solid basis that education can make good use of. Kennisnet's creates its portfolio based on the collective needs as expressed by the sectoral councils and the Ministry of Education, Culture and Science. In order to ensure that the portfolio matches the users' needs, they are involved where possible in the further development.

Kennisnet administers these ict facilities for education and provides the (further) development in order to continue to connect with the needs of education. A connection is made with (supra-) sectoral policy priorities. This involves the development and administration of:

- The **Architecture** and **matching standards**: agreements used by different parties to make their services work together properly.
- **Chain facilities**: technical facilities that ensure that chains can operate properly with services of public and private parties, e.g. when this concerns access to digital teaching materials (such as the Entree Federatie and the Number allocation [personal ID number for pupils]), or the exchange of pupil data when transferring from primary to secondary education (OSO, the *Overstapservice Onderwijs* [school system transfer service]) and increasing the transparency of education (Vensters).
- **Platform services**: online platforms that are used in the school, such as Wikiwijs for finding, creating and sharing teaching materials.

Apart from administration and (further) development, we also stimulate the use of these ict facilities by schools and the parties with which schools work.

3.3 Substantive themes 2019 - 2022

Good education that responds to social, economic and technological developments. Kennisnet contributes to this through making professional use of ict possible. In this respect, we focus on four themes. Of course, these themes are interconnected and there are overlaps: if we leave out one of the themes, then we will not be able to achieve our objectives on the other themes either. Within the themes, apart from the primary process (the teaching process itself), we also focus on the organisational and information-tion processes of schools and the necessary ict infrastructure.
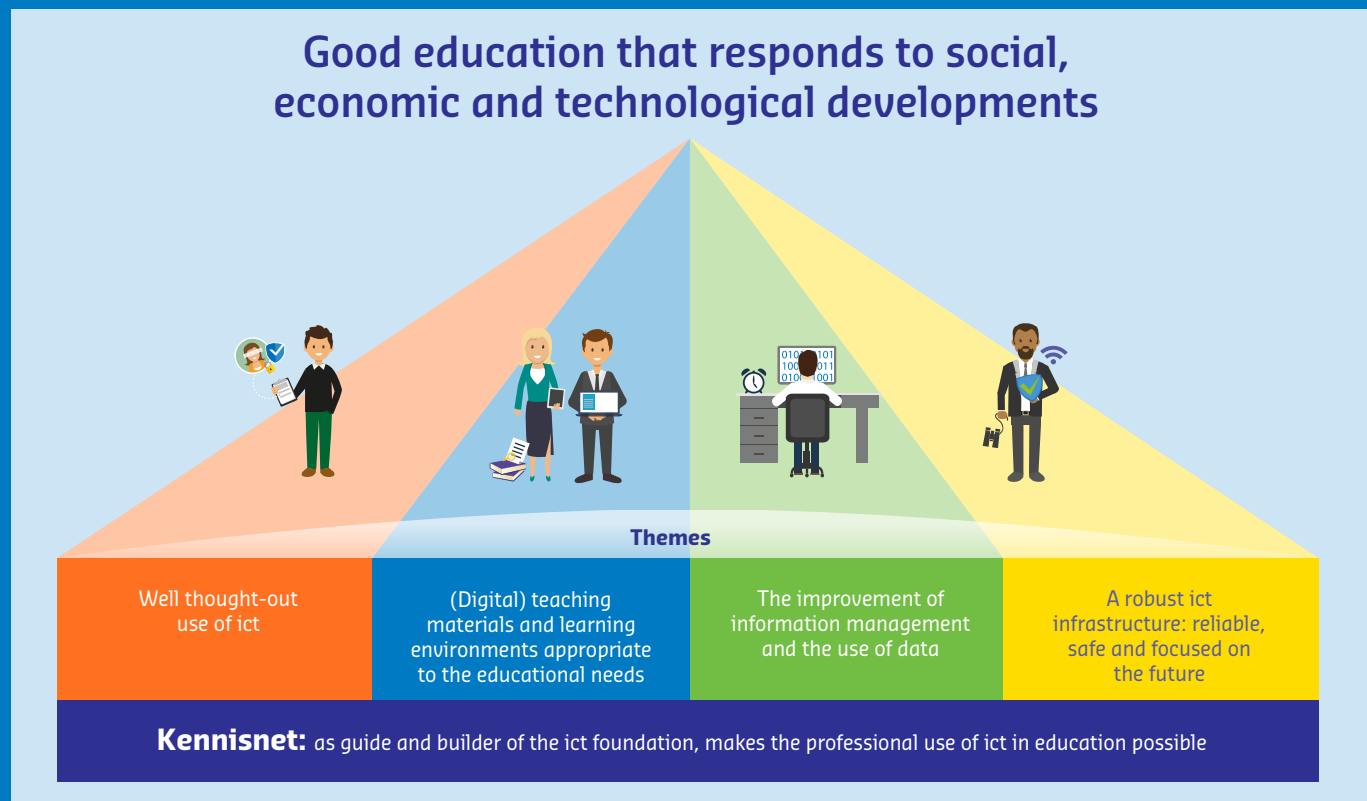

Figure 5: themes and ambitions of Kennisnet

Well thought-out use of ict

The well thought-out use of ict contributes to an improvement in the quality of education. Kennisnet enables governors, school leaders and others to make better considered choices and to assess the consequences. Kennisnet advises on a number of (supra-) sectoral issues that follow from the ambitions of education and thus contribute to the professionalism of the sector.

Authoritative publications and tools offer education tools for making professional use of ict possible. Moreover, Kennisnet provides management cooperation and we make a substantive contribution to knowledge networks in order to increase the connection with education and to make the generic concepts applicable to resolving concrete implementation issues.

This is what Kennisnet does:

- We make reliable and applicable knowledge available by means of authoritative publications and tools, which are based on relevant knowledge from surveys, from practice and thorough explorations of new technology.
- We make substantive contributions to large-scale knowledge networks and support managerial cooperation, while also making the connection to other parties, such as advisory services and teacher training courses.
- We support the sectors in establishing shared frameworks, e.g. when it concerns the ict competence of teachers, the digital literacy of pupils and how to safeguard privacy.
- We map the most important ethical issues in the field of digitisation and education, e.g. when it concerns increased possibilities for assessing pupils or the neutrality of algorithms. Kennisnet uses this

as a basis for stimulating the professional dialogue about ethics in education.

(Digital) teaching materials and learning environments appropriate to the educational needs

The selection of digital teaching materials and the composition of a digital learning environment have a very direct effect on the learning process. Schools want to use good (digital) teaching materials (including tests) that are available at the right time for the right user. The learning process is supported in this respect by a carefully set up digital learning environment, with functions that are also tuned to the concrete needs of both learners and teachers. It is therefore also important that institutions are able to make considered choices, which match their educational vision.

Under the motto 'a better choice from a wider range', Kennisnet supports the selection process of school boards and schools, with a proper approach for the selection process and with substantive information about what is on offer and about market developments.

Being able to select the right teaching materials demands a properly functioning market with a varied and rich range of – open and closed – teaching materials and learning environments. A properly functioning educational chain is an essential condition here, which ensures that teachers and pupils have simple access to the required teaching materials from the learning environment. As the builder of the ict foundation, we deliver platform facilities which strengthen public interests in the educational chain.

This is what Kennisnet does:
- Support the selection process of school boards and schools, both in the field of (open) teaching materials and learning environments, focused on their acquisition as well as their use.
- Offer an insight into the market of – open and closed – teaching materials and learning environments, and promote transparency about market parties, products and services.
- Strengthen the position of education in the market through increasing understanding, stimulating demand articulation and demand aggregation.
- Promote a properly functioning educational chain through strengthening the public-private dialogue and advising school boards on their role in the chain.
- Stimulate the use of (open) standards and the delivery of platform facilities that promote the freedom of choice, healthy market forces and innovation.
- Promote the availability and use of open materials through the use of open licences for teaching materials and by stimulating standards and ensuring that open teaching materials are available and retrievable online.

The improvement of information management and the use of data

Through the digitisation of education, an increasing amount of data is becoming available and new possibilities are being created for learning, steering, organising and accountability. Properly arranged infor-mation management is therefore important. Properly arranged information processes help governors, school leaders and teachers to realise their objectives. They can use data to improve the quality of education and to organise education more intelligently.

Kennisnet increases the insight into information processes and issues, e.g. through the development of a reference architecture (an overview of the building blocks of the information and application management in an educational institution). This enables school boards to fulfil their role better as a professional client of the different suppliers and to steer on desired developments.

A properly arranged application landscape at an institution level enables school boards to make substantive choices that match the vision and support the desired working method of the school board. As the builder of the ict foundation, we also offer a number of services that are used in education for the safe and responsible exchange of data.

This is what Kennisnet does:
- Support school boards in the professionalisation of information management and the use of data, through offering – in cooperation with various networks – knowledge products about information management issues and supporting managerial cooperation focused on using data.
- Managing and, in consultation with education, (further) developing services and facilities that make reliable and safe information exchange in various chains possible.

A robust ict infrastructure: reliable, safe and focused on the future

Schools make increasing use of ict in education. There are an increasing number of (personal) devices, so that large groups of pupils can use digital teaching materials and cloud services simultaneously. The teaching process may not be disrupted by a faltering ict infrastructure. This demands a professional arrangement. The ict infrastructure must be safe, reliable and focused on the future; this applies to both the arrangement within schools and the connection to the outside world. In order to set up the infrastructure professionally, it is important that school boards make the step from the consumer market to business solutions with adequate guarantees in terms of safety and availability and with unambiguous agreements about the desired support. Ict infrastructure that is focused on the future is also arranged sustainably.

Kennisnet ensures that essential, up to date knowledge is available and properly applicable, so that schools can make considered choices when setting up and using the ict infrastructure.

This is what Kennisnet does:
- Support school boards in making properly substantiated choices in setting up a safe, reliable and future-proof ict infrastructure. Kennisnet develops knowledge products and aids that make clear the functional requirements for a robust infrastructure.
- Provide an insight into how to (sustainably) arrange and purchase 'green' ict.
- Detailing a national network infrastructure. Kennisnet supports cooperating school boards in shaping a safe, fast and properly functioning Internet facility.
- The delivery of services and facilities with which institutions can obtain safe and reliable access to the Internet and specific applications for education.

3.4 Positioning and governance of education

Positioning

In this Long-term Course of Action, we lay down our agenda for the period 2019 - 2022. We continue and expand the line taken in the Long-term Course of Action 2015 - 2018. The professional use of ict demands cooperation and the pooling of resources within education. Kennisnet strengthens this development.

Sector development
Kennisnet sticks to the strategy, which was taken a number of years ago, of strong cooperation with the PO Council, the VO Council and the MBO Council in combination with saMBO-ICT. After all, they represent the different sectors and thus have an insight into the collective issues that their members formulate. In primary and secondary education, these largely follow from the school board agreements and strategic agendas, and in the mbo from the school board agreement and the digitisation agenda. The year plans that Kennisnet has drawn up reflect all of this, in connection with this Long-term Course of Action.

Kennisnet supports and advises the PO Council, the VO Council, the MBO Council and saMBO-ICT in fulfilling their role in representing interests and with sector development. That means that Kennisnet contributes relevant ict expertise and insights from practice. This enables the sectoral councils to give direction to the desired developments. For example, when it concerns exerting control over market parties and participating in public-private partnerships. But also with obtaining a picture of the consequences of certain policy measures or implementation issues. As a builder of the ict foundation, Kennisnet also has the responsibility for a number of sectoral facilities.

Cooperation, pooling resources and ownership
An increasing number of school boards see the advantages and necessity of cooperation and the pooling of resources. The sectoral councils and the Ministry of Education, Culture and Science support this movement. This has consequences for Kennisnet's role. A portfolio is expected of Kennisnet that interprets the concrete needs of these cooperating school boards. A portfolio in which school boards immediately see the added value for their schools. The fact that this will concern services on which school boards will be largely dependent, such as a reliable connection with the Internet, sets high requirements for the robustness of the services. But school boards also want more ownership, so that they themselves can steer on the development of their portfolio.

A number of school boards in primary and secondary education have set up the SIVON cooperative. Cooperation agreements have been made between Kennisnet and SIVON for the development of public ict services. In this way, Kennisnet can contribute a greater impact on the necessary boundary conditions for all primary and secondary schools. The long-term ambition is to form a partnership in a similar organisation to SURF in higher education and secondary vocational education (mbo). The ownership will then be with the school boards. In seeking the right form, we will also continue to safeguard the Kennisnet services for the mbo sector. Mbo boards have also taken the initiative in setting up a cooperative in order to arrange a number of facilities jointly. Depending on the further developments and needs, Kennisnet might also play a part in this.

Governance

The Kennisnet Foundation is organised in accordance with a supervisory board model. The integral supervision of the management policy and the general state of affairs in the foundation has been vested in the supervisory board. Education is in the driving seat of Kennisnet. This is also expressed in the governance. The sectoral councils appoint three members in the supervisory council and the Long-term Course of Action and associated budget is submitted to the administrative board of the sectoral councils.

The supervisory board operates as an advisor and sounding board for the administrative board. The supervisory board monitors a careful decision-making process within the foundation, so that the strategy and associated activities of the foundation connect with the policy agendas of the sectoral councils. The supervisory board verifies whether there is a proper dialogue with the sectoral councils in developing the Long-term Course of Action. The supervisory board must also approve the Long-term Course of Action, the year plan, the budget and the annual report.

The supervisory board consists of five members and an independent chairperson. The supervisory board consists of:

- Cathy van Beek, Strategic Regional Advisor for Sustainability and former management member of the Radboud UMC (independent chairperson).
- Ewald van Vliet, chairman of the Executive Board of Stichting Lucas Onderwijs (appointed by the PO Council).
- Nico de Jong, general manager/director of the Calscollege (appointed by the VO Council).
- Bert Beun, chairman of the executive board of Deltion College (appointed by the MBO Council in accordance with the AOC Council).

- Geri Bonhof, independent entrepreneur (Bonhof Toezicht & Advies), formerly chairman of the executive board of Hogeschool Utrecht.
- Jan van der Vliet, Chief Information Officer De Nederlandsche Bank.

The Ministry of Education, Culture and Science subsidises Kennisnet. A subsidy application is submitted annually, based on the year plan. This is assessed by the Ministry of Education, Culture and Science. Attention is paid to how the activities connect with the (collective) issues of education, the extent to which the activities connect with the public tasks of Kennisnet and the effectiveness of the expenses is also included. Accountability takes place on the basis of the annual report.

Transparent accountability

The added value for education takes central place in the Kennisnet accountability: how has Kennisnet contributed to the professional use of ict? And how are the activities on the different themes appreciated? Ultimately, the education sector defines the added value of Kennisnet. To this end, discussions are held on an annual basis between the supervisory board and the sectoral councils and the Ministry of Education, Culture and Science.

We also ask stakeholders, both public and private, how they value Kennisnet and how they evaluate the contribution to the different themes. We also pose these questions to school boards, school leaders and ict administrators.

With events and digital publications, the impact is also defined properly by monitoring the numbers of visitors and where possible asking for their evaluation.

The impact for a number of services is defined based on use (statistics) and quality (e.g. the number of affiliated parties). Of course, the reliability is assessed based on the delivered performance.

3.5 Organisation and financing: a long-term perspective

Organisation

It is expected of Kennisnet that the portfolio connects with the developments and needs in education. This makes demands on the staff and arrangement of the organisation. Kennisnet must be sufficiently flexible in order to respond adequately to new developments and issues, it must be reliable and serve education. Strategic advisors contribute to sector development, they identify relevant developments and make clear how education can respond to this. There are two substantive departments at Kennisnet: Facilities and Expertise. Staff at Facilities are responsible for the (further) development of the ict infrastructure administration. Expertise has advisors who support the education sector with relevant advice and a communication team that ensures that knowledge products connect with teaching practice. The staff departments Business Operations & Control and Strategy & External relations support the organisation in its activities.

The management team – consisting of the general manager/director, the Operations manager (also responsible for the Facilities and Business Operations & Control departments) and the manager of the departments Expertise and Strategy & External relations – provide direction to the required organizational development and define the substantive frameworks.

As of January 2019, the size of the organisation will be ca. 95 FTE. About 105 people in all work at Kennisnet. Compared with the Long-term Course of Action 2015 - 2018, the formation has expanded in the past years, so that we have more knowledge in-house and are able to carry out more activities ourselves. We will retain the achievements of the Breakthrough Project Education & ICT as much as possible and carry them out as part of our basic activities. For example, when it concerns the connection with the issues and developments within (innovative) educational institutions. In this way, we can continue to use tested approaches sustainably in order to connect our portfolio as much as possible to teaching practice.

In the coming years, we expect that cooperating school boards, e.g. in connection with SIVON, will demand different types of services from Kennisnet. This concerns e.g. the joint offering of services in terms of external connectivity and security. The delivery of new services also has consequences for the arrangement of the organisation and the associated formation. The constitution of the formation will change under the influence of the expansion of the portfolio as far as size and composition is concerned. We expect a limited growth in the number of staff in 2019 in order to meet this new form of public provision of services.

Values and working method: responsible towards the future

The underlying values of the work of Kennisnet are: expert, service-oriented, reliable and focused on education. Moreover, we attach importance to the responsible and safe use of technology and we contribute to social issues, such as sustainability and inclusiveness. Our values provide an overall direction to our activities: not necessarily more ict, but a good, focused and measured commitment. In this respect, we always reason based on insights from scientific research. From this focus, we are able to contribute to ict making a positive difference in education.

Safe and responsible: proper handling of personal data

The coming onto force of the GDPR legislation in 2018 has significantly increased the awareness of the importance of privacy and the careful handling of personal data in education. Kennisnet has made a contribution to this in various different ways, e.g. by making information available to school boards, and by facilitating agreements between sectors and suppliers. As an organisation, we are also involved with this on a daily basis; Kennisnet is ISO certified since 2016 (27001: 2013). In all our activities, we are conscious of the responsibility and obligation to handle the data of pupils and others with care. This applies to our IT services and facilities, and also to our knowledge products.

Social responsibility: sustainability and inclusiveness

Building for the future also means focusing on sustainability and inclusiveness. Kennisnet contributes to a responsible use of technology in education, but as a public organisation, it also makes a contribution to realising social objectives. For 2030, we have the target of operating 'climate neutral' and we focus on a more inclusive workforce. Specifically:

- In the development of knowledge products and in advice to education, we take account of sustainability and inclusiveness. Consider in this respect the possibilities of 'green' ict, but also the accessibility of digital information for the disabled.
- In the development and the administration of our ict services and facilities, we take account of energy use. We use sustainable power as much as possible.
- As an organisation, we work on sustainability, e.g. when it concerns the use of our office building, and sustainability is also a criterion in the selection of locations for events and when purchasing services.
- We focus on a more varied workforce by taking account of this in the recruitment process, we also offer traineeships to newcomers and other groups that find it difficult to gain relevant work experience.

Finances

A budget is drawn up annually, based on the year plan. The budget indicated below concerns the activities that are financed from the basic subsidy that was applied for from the Ministry of Education, Culture and Science[2]. We describe these (basic) activities in the year plan.

Apart from the basic subsidy, there are also a number of activities for which there are separate financing flows. In order to support school boards in their accountability and to increase transparency, we work together with the PO Council and the VO Council, they make a financial contribution to the (further) development of these information facilities. The Ministry of Education, Culture and Science makes additional subsidies available in order to achieve a specific (policy) target. The staffing for these activities is charged. This makes it possible for us to employ sufficient staff for carrying out our basic activities.

		2019	2020	2021	2022
Guide	1. Knowledge development and distribution 2. Sector development and support of administrative cooperation	€ 3,736,000 € 592,000	€ 3,736,000 € 592,000	€ 3,736,000 € 592,000	€ 3,736,000 € 592,000
		€ 4,328,000	**€ 4,328,000**	**€ 4,328,000**	**€ 4,328,000**
Builder of the ict foundation	3. Tools 4. Teaching materials 5. Information products 6. Access and distribution 7. Generic infrastructure 8. Standards and architecture	€ 296,000 € 1,108,000 € 1,693,000 € 964,000 € 1,085,000 € 1,439,000	€ 296,000 € 1,108,000 € 1,693,000 € 964,000 € 1,085,000 € 1,439,000	€ 296,000 € 1,108,000 € 1,693,000 € 964,000 € 1,085,000 € 1,439,000	€ 296,000 € 1,108,000 € 1,693,000 € 964,000 € 1,085,000 € 1,439,000
		€ 6,585,000	**€ 6,585,000**	**€ 6,585,000**	**€ 6,585,000**
Organisation		**€ 1,347,000**	**€ 1,347,000**	**€ 1,347,000**	**€ 1,347,000**
		€ 12,260,000	**€ 12,260,000**	**€ 12,260,000**	**€ 12,260,000**

[2] *No wage and price adjustments have been included in the budget yet.*

Appendix 1:
Trends that influence education

In this appendix, we will discuss in more detail the trends and developments that are relevant to the ambitions of education (either directly or indirectly) for the relationship between education and ict. For this we will use a DESTEP analysis: we consider technological, economic, socio-cultural, political-legal, ecological and demographic trends. We have identified the described trends based on various different sources and discussions about education and social developments, and these are relevant for all the educational sectors on which Kennisnet focuses (primary, secondary and secondary vocational education).

Demographic

Population shrinkage and growth in the large urban areas

What is this about?

The composition of Dutch society is undergoing change. Various different regions in the Netherlands are experiencing a strong shrinkage in population, while on the other hand some urban areas are experiencing growth, among other things, through the influence of migration. The differences between the rural areas and the city are getting bigger. Young people are moving to the city and have children there, while the rural municipalities are ageing. Most of the shrinkage is in the smaller municipalities at the edge of the country.

What this means for education:

The number of pupils in primary, secondary and also secondary vocational education is falling. Schools in shrinkage areas find it difficult to provide fully-fledged education, and pupils have to travel further. Many primary schools in rural areas have to close due to shrinkage. On the other hand, some large cities are seeing new schools emerging, because the number of pupils there is rising through internal migration. Moreover, education has to adjust to changing migratory movement. World conflicts can result in a sudden increase in the number of immigrants with schoolgoing children. Education has to be able to anticipate on these migratory movements.

Population ageing and teacher shortages

What is this about?

Population ageing has a big effect on society. The 'grey pressure' (the proportion of 20 - 65 year-old people and those aged 65 or more) is increasing. Because many people are reaching retirement, there are shortages on the labour market and a small group of working people will have to bear the burden for a large group of non-workers. Due to the ageing population, fewer children are being born. The number of children at primary school age is falling *(CBS 2018) (PBL 2018)*.

What this means for education:

Population ageing results in a teacher shortage, in spite of the fall in pupil numbers. Many teachers, who are now standing in front of the class, will be retiring in the coming years: one in five teachers in primary education is aged over 55 *(CBS 2018)*. Moreover, the number of students at teacher training courses is falling, not everyone who follows teacher training for primary education (PABO) actually chooses a job in education, and many young teachers stop after working for a number of years in education. Shortages are also predicted for specific subjects in higher education and secondary education *(Education Council 2018)*. For the time being, there is no teacher shortage in the shrinkage areas, but here too, in the coming years many teachers will be reaching retirement age.

Ecological

Climate change and attention for sustainability
What is this about?
Sustainability has a firm place on the societal and political agendas. Global warming, influenced by greenhouses gas emissions, is forcing society to find other ways of living and working. With the Paris Agreement (2015), 195 countries committed themselves to limiting the temperature increase to well below two degrees centigrade, and to strive for a rise of no more than one and a half degrees. The Netherlands has also joined the (legally binding) agreement. An increasing number of companies and organisations are paying explicit attention to corporate social responsibility. Working as sustainably as possible is part of this. Under the influence of the climate issue, we see the creation of new ways of thinking about consumption: experiments are being made with new building methods with maximum use of degradable material (circular construction) and many initiatives are being created for sharing and reuse.

What this means for education:
Schools can also take account of sustainability, e.g. by paying explicit attention to sustainability in the lessons, but also by a sustainable organisation of education. In this respect, the use of ict deserves attention. The growing use of ict means increasing CO_2 emissions, among other things through power consumption and through the production and discharge of devices. How can education take account of sustainability when organising ict? And how can ict be implemented in education in such a way that it even supports sustainable working? ict can have a positive effect on the environment. For example, intelligent technology can control energy flows in such a way that they are only used when absolutely necessary. Ict in education can take big strides in both forms of 'green' ict.

Socio-cultural

Increasing (chances of) inequality
What is this about?
In its report *'De toekomst tegemoet'* [facing the future] (2016), the Dutch Social and Cultural Planning Office (SCP) predicts a shift in society from 'haves' and 'have nots' to 'cans' and 'cannots": a society with winners and losers. Society is becoming more demanding and dynamic. Many tasks that used to be with the government, are now shifting to society and existing connections are becoming looser. Those who are able to fend for themselves and can cope with flexibility are at an advantage, those who cannot cope will stay behind. The digitisation of society, also of e.g. government services, may have a reinforcing effect on this growing inequality: those who lack digital literacy will not be able to come along and will benefit less from opportunities *(SCP 2016) (SCP 2017)*.

Segregation in society is increasing. Different groups live more often in different neighbourhoods, go to different schools and have fewer contacts with each other. More and more often, it is not someone's talent, but someone's background that defines his or her chances of success in education and thus society. The differences between children with lower and higher educated parents are increasing *(Inspectorate of Education 2018)*.

What this means for education:
According to the Inspectorate of Education (2018), existing unequal opportunities in education are threatening to be strengthened by school differences and the increasing socio-economic segregation. Education is faced with the challenge of in any event not increasing unequal opportunities and where possible, to promote equal opportunities.

However, creating more equal opportunity in education does not automatically mean that we have solved inequality in society. In a society in which performance is becoming more important and which is usually organised by those with a higher education, the group with less talent cannot come along well, so that the inequality even increases. This is a wider societal problem *(Vuyk 2017)*.

Digitisation affects contact, confidence and communication

What is this about?
Thanks to the Internet, information is becoming available to an increasing number of people more and more often. Citizens can easily join the public debate on social media and find many different opinions from other people. Internet and social media offer people all sorts of new possibilities for informing themselves and of contacting each other. The existing frameworks in society are undergoing change under the influence of this widespread use. Discussions on social media seem to strengthen rather than resolve contrasts between groups in society. The traditional authority of news media, governments and the scientific community has become less self-evident. New confidence mechanisms are being created, consider online user reviews and peer-to-peer networks, but also technologies such as encryption (locking digital data), 'pseudonymisation' (rending data anonymous so that it cannot be traced to an individual) and blockchain (decentralised, distributed and transparent registration of transactions based on secure encryption to replace a central authority).

What this means for education:
More than ever, education has the task of educating pupils for a world in which the existing frameworks seem to be fluid. Religion, the government and science act less clearly as an authority and social relationships are also becoming looser. Pupils must have enough knowledge, skills and critical capacities in order to hold their ground in society. Media literacy is an essential part of this: this is for instance about recognising fake news, understanding how the digital society is organised, interacting with each other properly in the digital space etc. The digital space is also becoming part of the social climate of the school. A safe school environment also increasingly means: a safe digital climate, which is the subject of active dialogue and into which the school has a certain degree of insight.

Technological

Artificial intelligence development is based on data
What is this about?

Technology is no longer only competing with human muscle power, but also with human intellectual power and creativity *(Kirschner 2017)* *(Harari 2016)*. Whereas people can only process a limited amount of input (data), computer systems are able to recognise patterns on the basis of large quantities of data and take decisions accordingly. Artificial intelligence (AI) is the ability of a computer system to solve problems for which humans use their intelligence. Algorithms are developed to enable computers to do this. An algorithm is a set of rules that define what a computer system should do based on a given input. Computers have now learned to develop their own algorithms, to test them and improve them using data sets. This offers new and unknown possibilities in many different fields. Moreover, there is a rapidly increasing development of artificial intelligence. The computational power of microprocessors is increasing exponentially, more data is becoming available and technology can use this as a basis for further development, in ways that could well fundamentally change societ, *(Harari 2016)*.

What this means for education:

In education too, artificial intelligence is expected to play a greater part. This happens now through the use of 'adaptive teaching materials': teaching materials that adapt themselves to the level of the pupil based on the answers the pupil gives. These types of adaptive materials allow pupils to practice more and with more focus at their own level. It is also effective for the learning process, because it offers the pupil a continuous cycle of instruction, practice and feedback. The artificial intelligence applied with these systems is still fairly simple. Adaptive teaching materials are now used for subjects such as language and arithmetic, whereby answers are more often either true or false, unlike other subjects.

The application of AI in education evokes ethical questions to which schools will have to relate. To what extent should teachers comprehend, interpret and combine the data that these digital teaching materials present? Does not the use of digital systems mean that pupil performance is excessively measured? Can we assume that the data on which the system bases itself is correct and neutral? What is the desirable balance between learning through human contact and learning with the help of technology?

The growing importance of the safe and responsible use of technology

What is this about?

People use digital resources for an increasing number of aspects of their life. A great deal of information is released in this process. Companies use data about users for an increasing number of marketing purposes. This also makes the data more valuable: users use the data to pay for using services. However, this compromises their privacy. Digitisation creates increasing complexity and dynamics in connections between people, organisations and systems, whereby it is easier to obtain and exchange data *(Gartner, 2017)*. This makes it increasingly important to secure technology properly and to guarantee users' privacy. Under the new GDPR legislation (General Data Protection Regulation), it is mandatory to have a data protection policy for the processing of personal data.

What this means for education:

The importance of attention for information security in education not only applies to the use of digital teaching materials, but also e.g. for information systems or how the Wi-Fi is organised. To provide maximum protection to pupil privacy, the education sector is working on encryption and 'pseudonymisation' of pupil data. It is also necessary for schools to know how to deal with hacks and cyber attacks. Because humans are often the weakest link in the information security chain (consider data breaches through the loss of passwords or USB sticks), it is important in this respect to focus on staff awareness in the field of privacy and information security.

Economic

The labour market is becoming less predictable

What is this about?

Digitisation influences the labour market: existing jobs are disappearing and new jobs are being created and that is happening at an increasing pace. Most employees encounter ict at work and also have to learn to deal with it. Simple work is being automated and the work that remains is becoming more complex: there will be fewer jobs that consist of one single clearly described and simple task *(Kirschner 2017)*. In this way, society is making a bigger claim on general competences, and in particular the competences flexibility, (digital) literacy and learning capacity. Especially people with literacy problems, those who cannot learn well and computer illiterates will in the future not be able to come along so well *(SCP 2016) (SCP 2017)*.

What this means for education:

There is now a good connection of education with the labour market and there are few unemployed young people *(Inspectorate of Education 2018)*. At the same time, students must be given enough expertise in order to hold their ground in a very dynamic labour market. The increasing (chances of) inequality in society make this point even more urgent. In this context, it is even more relevant to focus on 'lifelong development' (whereby even in the weekends, people will regularly participate in courses or training programmes or even simply follow education for a certain period) *(saMBO-ict et al. 2018)*. A contemporary curriculum takes account of the developments in the labour market. In Curriculum.nu, development teams of teachers talk about how the current curriculum of primary and secondary education can be brought up to date.

International technology companies are gaining more influence

What is this about?

These days, successful companies are ict companies. They are also called online platforms: digital environments that continuous adapt their services based on data and algorithms. This creates countless new technological possibilities: apps and applications that many users employ on a daily basis. The companies behind these applications use large quantities of data to identify specific target groups with increasingly more accurate profiles and link these to selective advertising or other forms of influence. These platform companies often no longer operate within one single country and they focus less clearly on one single product or service. This fits in the trends of internationalisation, scaling-up and clustering on the economic market. Many Dutch public sectors depend for some of their services on international platform companies. This means that the influence of companies will increasingly determine the shape of Dutch society *(Van Dijck 2016)*.

What this means for education:

In the Netherlands, the learning materials are for the most part organised at a national level, but the underlying technology of the learning materials is becoming more international. Consider systems in which teachers and pupils access and retrieve their learning materials, the technology used by a publisher to create learning materials or the technology used by schools to organise the logistics of their education. Different suppliers offer a solution that unburdens teachers, systems such as learning materials and student tracking systems fit in with each other as seamlessly as possible. The drawback of this unburdening is a great dependence on these parties.

Most large technology companies therefore also focus on education or on the learning market. That delivers good new educational applications. At the same time, it is a good thing if education is conscious of the influence of commercial parties and defines how far this influence may go. It is also important to define the educational values that may not be lost sight of in times of digitisation *(Rathenau 2017b)*.

Political-legal

Stimulation, but also more regulation in the digital domain
What is this about?
Digitisation, including the development of artificial intelligence, offers many opportunities for innovation. At the same time, questions arise about privacy, safety and liability with digitisation. The European and the national government are clearly committed to stimulating innovation through digitisation (see for example the Dutch Digitalisation Strategy of 2018), but they are also working on more regulations in this area. Whereas the Internet has seemed for a long time to have been a refuge without clear rules and regulations, now the digital domain is more clearly seen as part of society, in which enforcement should have a place. For example, the European Commission is committed to more solid procedures in order to remove illegal content from the Internet. Since 2016, there is a European Directive for the digital accessibility of government websites. Citizen privacy is better protected with the General Data Protection Regulation (GDPR) legislation: companies that process data must clearly indicate how and why they do so and must give privacy a deliberate place in their company. Companies outside Europe that operate in the Netherlands must also comply with this legislation.

What this means for education:
The new GDPR legislation demands that many schools make a structural shift in how they deal with personal data. In the processing of personal data, schools must apply 'privacy by design' and 'privacy by default'. That means that privacy is the starting point: this is taken into account when setting up the systems, and when making choices about personal data, the choice that takes most account of privacy is the default choice. Schools must take this into account when using digital systems, but e.g. also in making agreements with publishers and suppliers of digital materials. Schools also have a responsibility in making digital information and teaching materials accessible. Is the digital learning material for example accessible to blind and visually impaired pupils? Is school information communicated to all parents in comprehensible language?

The strategic ambitions of education

The most important ambitions for the coming years are formulated per sector in the strategic agendas and school board agreements. Important ambitions are:

- Promoting equal opportunities: who you are or where you come from may not influence the chances you get.
- A more solid position for the teacher: enough good people in education and a sustainable deployment of staff.
- More cooperation within education and with parties around education. For example, with other parties, such as child welfare or day care and in mbo, with companies or other partners in the area.
- A good connection with further education, continuous development pathways and from the mbo, a good connection with the labour market and between different forms of learning.
- The flexibility of the educational system and of education itself, to enable better cooperation with other parties in society, and to be able to respond to the needs of the pupil (customisation), on societal developments and (in particular for the mbo) develop-ments on the labour market.
- More control of personal quality, steering on education quality with transparent quality standards. Working on the professionalisation of school boards and schools.
- Innovation to improve education and to offer challenging contemporary education. Making use of contemporary facilities and exploiting the possibilities offered by ict. The mbo also sets itself the target of contributing to innovation in different economic sectors with innovation in education.

In connection with the mbo management agreement, a strategic agenda on digitisation has been drawn up for the mbo. This agenda has three main objectives: to adjust educational content, to realise flexibility of education and to facilitate the digitisation of education. This agenda gives direction to the long-term plans and courses of action of saMBO-ICT, SURF and Kennisnet.

Appendix 2:
Sources and
discussion

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- Jente Koopmans, board member of LAKS.
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- Monique Vogelzang, inspector-general of education.

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- Conrad Berghoef, ROC Friese Poort in Drachten.
- Tjeerd van den Elsen, Basisschool De Vijf Hoeven in Tilburg (by telephone).
- Didy Pijpker, Eemsdeltacollege in Siddeburen.
- Christa Rietberg, Aventurijn in Almere (special education).

Stakeholders

Spoken with the stakeholders in the orientation phase (April/May). In July and August, we conducted further discussions on the draft Long-term Course of Action (July) and the total set of documents (August). The discussion partners were:

- PO Council: Anko Hoepen, Anouk Folstar, Nienke van der Steeg.
- VO Council: Hein van Asseldonk, Joop Vlaanderen, Roel van Hulten.
- MBO Council: Paul Oomens.
- saMBO-ICT: Ben Geerdink, Jan Bartling.
- Ministry of Education, Culture and Science:
    - PO, partly on behalf of VO: Ria Westendorp, Jaco van Rijn, Robin Mulder.
    - MBO: René Loep, Katja Meijers, Jeroen van Mierlo.
    - Knowledge: Fons Dingelstad, Tom Leenders, Bram Gaakeer.

Kennisnet

- Supervisory board.
- Kennisnet strategic advisors.
- Contributing think tank (consisting of 14 staff).
- Working conferences (open to all staff).
- Works council.

Colophon

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Long-term Course of Action 2019 - 2022

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Good education lays the foundation for living, learning and working and challenges pupils and students to get the best out of themselves. That demands education that responds to social, economic and technological developments. Kennisnet supports school boards in primary education (po), secondary education (vo) and secondary vocational education (mbo) in the professional use of ict and is the guide and builder of the ict foundation for schools.

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