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Edited by Erik Helldén

Digital Education in the EU

Going from knowledge
to competence



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Digital Education in the EU Going from Knowledge to Competence

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FORES

Digital Education in the EU

Going from Knowledge
to Competence

Starting the discussion on how to build education systems
for the digital age.

Edited by Erik Helldén

Texts by Jan Hylén, Robin Vetter and Erik Helldén

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Education in the Digital Age

Introduction

Robin Vetter & Erik Helldén

At the start of 2019, most European policy professionals agreed that there was an itch that needed to be scratched. Amid all the discussion about what was going on with migration, climate change and the future of work, something was hovering above it all: digitalisation.

Digitalisation is a buzzword of sorts and, the google searches for the word are

continually increasing. But, beyond being a buzzword, it is a way to put a searchable tag on drastic, societal development. Digitalisation is nothing in itself – you cannot digitalise nothing – but rather, a change that is more or less considered to be happening to other things.

Another search term that is rising in parallel with digitalisation is "digitalisation meaning". Though superficially paradoxical, it is quite interesting: to use Google to search for the meaning of digitalisation requires an understanding of digitalisation in itself. It is also symptomatic: digitalisation has no ubiquitous meaning, making the google search at hand more relevant than it may seem.

Navigating the digital society might seem like a basic task for some of us. People born after 1990 are generally considered to be digital natives, who do not require specific education to make use of digital

tools and aspects of society. However, Millennials and post-Millennials (zoomers) are still a minority in the EU and far from a completely homogenous and digitally savvy group.

The digitalisation of society nonetheless presents new demands and challenges for us to meet and handle.

In our collective past, any societal changes on this scale have had a simple solution: education. More, better and cheaper. We have considered it the panacea for all problems related to information and participation. Education has been considered a fundamental part of shaping good democracies and inspiring development.

But, as discussed in a workshop hosted as a part of this project, the role of education could be viewed as always having been at least threefold:

- Education should shape citizens to be a part of society.
- Education should give those citizens the skills to develop our societies.
- Education should teach citizens the facts and techniques that are required to work.

At the start of the 20th century, schools were shaped according to the society around them. The skills being taught and the methods being used were geared towards a society of industrial production – manual labour was common, and work was done according to the orders of a central figure in the workplace.

Today, the demands being made on participants in our societies are different. Manual labour is still present, but increasingly as a pastime. The central figure in the workplace, issuing orders regarding what is to be achieved, is increasingly being replaced by self-management and

innovative prowess.

This is reflected (as will be more thoroughly discussed in consequent chapters) in policy on EU and national levels. Syllabi and curricula are being updated and replaced to accommodate the need for digital skills, and strategies call for a focus on skills related to processing information, media and information literacy.

Throughout 2019, we have been gathering input on what is happening in educational policy in and around the EU, in member states, and within the European Commission. We quickly realised that our original ambition to explain all that was going on would require a longer timeframe and a more narrow frame of focus, so instead we focused on what seemed to be common issues between legislations, countries and societal actors.

In a series of workshops and discussions,

along with the input from members of the European Liberal Forum network, we have arrived at a set of questions that we think need to be addressed, swiftly. In this publication, we have endeavoured to outline these questions and to put them into a relevant, political context.

In the chapter **Shifting Policy and the Need for Coordination**, we will provide a brief overview of how we got to where we are, and why education policy is complicated.

In **What does the Labour Market Want?** **Jan Hylén** will go through how the future of work is affecting education today.

In **Political Ambitions**, a brief description on what is being done on European policy level will be provided by **Robin Vetter**, especially with regards to Ursula von der Leyen and her ambitions as president of the European Commission.

After this, Jan Hylén discusses the relationship between what we know and what we are good at in **Competence v. Knowledge**, followed by an inventory of how competence is measured in an EU context in **European Frameworks for Competence**, before we get to the summary and recommendations on where to go from here.

Shifting Policy and the Need for Coordination

Robin Vetter & Erik Helldén

In a series of workshops conducted as a part of this project, we found that the questions being asked did not seamlessly line up with the heading of current European policy. Instead, the questions being asked were of a much more progressive kind, perhaps missing some of the concrete obstacles.

Throughout the workshops, one of the main threads was the question of how to divide the elements of education between school, home and employers. Traditionally, schools have not been responsible for teaching certain soft skills, i.e. how to be a “good person”. Some basic competences have also been assigned to various social circles, such as religious congregations, family, and sports teams.

In a time when knowledge is ubiquitous, and complex sets of competences are required for work and life, how can schools change to accommodate this new need? Since schools have long been responsible for the quality of our children's education, how can they then assert that quality if the content of the education is not in line with what is being "tested" by reality? Lastly, why should they do it?

As it is today, most education systems can be described as consisting of a few major elements:

- Preschool.
- Primary school.
- Secondary school.
- Higher education.
- Lifelong learning.

These parts are mostly separated from one another, except for the possibility of transferring results from one to the next, at

least on a national level. They also require a certain hierarchy to function: you cannot learn the ideas behind the literature in secondary school, if you have not learned to read in primary school; you cannot uncover previously unknown results in higher education, if you have not learned to manage your studies in secondary school, and so on. This means that they could be considered a “path” to what comes after education, most often work.

But, this also presents the problem with knowledge and competence described above: in each step on the path to work, the knowledge is becoming more and more accessible outside of education systems, making it harder to discern what should be taught where, while the authority to measure and grade performance remains with educators making extracurricular education compete with school at a disadvantage.

Even if it is not prohibited as it is today, or even discouraged, the lacking possibilities to quantify the results (e.g. grading) outside the traditional educators' domain in a manner that plugs into the rest of the education system makes it difficult to motivate taking time to learn outside of school (at least for other reasons than pure enjoyment), even if it is beneficial for the individual student.

This could also be considered from a perspective of efficiency: using the education system for what it is exclusively able to provide and letting the other parts of students' lives take care of that which it might be better suited for.

Take the case of learning a new language as an example: using a training app could give most students basic knowledge of a language in a few months. But, since that knowledge is just that – knowledge – there is also a need to build competence. That

training of competence could possibly be easier for the educator to provide, by enabling exchange courses or semesters, or simply by letting students practise conversation. The part of this learning process which the education system has a better chance of providing is the competence part – not the knowledge.

But, leaving it there would be a mistake. We cannot design systems for the best-case scenario, where students actually have the means, the opportunity and the will to acquire knowledge to build competence. For those who already have that ability and drive, protective measures are not needed. It is, however, needed for those who don't.

The changes being made are in some ways a reflection of the reactions to the printing press; for example, when scholars and clerics feared that the population would be lost to information overload and deceitful mis-informants, suddenly in control of a

powerful tool for disseminating ideas: the mass-printed book. The book eventually gave us democratised education and an overall increase in wealth and productivity, as did the factory line, the railway and the car.

Much of the same ruckus was heard when radio was first introduced, and then again when TV came around. Then came the internet.

With the internet, some of our worst fears have been realised: politics are combating influencers with heinous motives; stress and mental health problems are increasingly afflicting our young; and the mechanisms for public scrutiny are being overtaken by public judgment.

At the same time, the benefits are immense: higher education has never been more accessible to more people; commercial markets that were once far

away are suddenly within reach; and the possibility for exchange of knowledge and experiences goes further beyond our borders than ever before. The tool that TV, radio, the printing press and everything in between was thought to be is incorporated into the abstract, global structure that we still (perhaps erroneously¹) call the Internet.

With this power to communicate comes the power to act in ways that either benefit or damage our societies, but the scale is much bigger, and the pace of change is much greater. Making policy in the same ways that we have before is suddenly not quick enough. Regulating the (mis-)

1. It has been argued that the term *Internet* is generally referring to the *Web*, which is basically any website using the “www.” prefix. Since the mid 2000’s, usage of the *Web* has been in steady decline, gradually replaced by other types of communication, such as *peer-to-peer*.

use and moderating the content of social media can scarcely keep up with the increase in available content (especially not when automation plays a part). This is noticeable in many aspects of society, not least in educational policy.

In many respects, these issues are important regardless of political standpoint: it doesn't matter if you're a liberal or conservative – you will face the same changes and have to deal with them. What differs is the focal point, and how you wish to see these issues solved; and most importantly: to what end.

Ideology as a Guide

At this point, we need to start thinking about whether education should be mainly a normative or supporting function. A way to outline this issue is to discuss the position of the individual being brought through the system. To them, none of

how it is put together matters, as long as it works as it should.

But, the design of the system will differ depending on who shapes it. A conservative or authoritarian-leaning system will probably move towards the normative end of the scale. In this case, education will be a much more active part in shaping the ideas that people carry with them. Values and ideals may be imposed on individuals to a larger extent.

Considering that most Europeans are in contact with education in one form or another for many years, educational systems are a formidable tool for changing direction for the union, and the possibility for doing so is there: when systems are in flux, they are more easily replaced or changed.

Therefore, a liberal approach to reshaping education is important. Education has

to be shaped in a way that establishes liberal core values² provides the possibility for people to obtain the tools and skills needed to act in our societies, as early as possible, and with as little else as possible beyond that. But we also need to accept the fact that individual actors (nations, schools, political entities) cannot solve this single-handedly: it needs to be done on many fronts, simultaneously.

At the same time, we cannot allow the change to leave people without the possibility to gain access to society. We therefore need to decide how we value education: either we see it mainly as an individual gain or as a societal gain, or a combination thereof.

This can also be considered in light of what we want to achieve by rethinking education in the digital age: if the goal is

2. Such as free democracy, human rights and equality, among many others.

to update the competence of citizens to make them more “useful” to our societies, it is not necessarily in our interests to see that everyone receives education equally. We merely have to find a way to make sure that enough people are educated sufficiently to drive the development of society. If education is considered to be beneficial for the individual, the education of a single person has an intrinsic value and is therefore worth protection and support.

So, regardless of the method we choose in this potential rethinking, we must remember that it is the system that needs to be controlled and regulated to the extent that we can sufficiently trust that people being educated are free to choose how to do it, without the risk of being left out because of technicalities. Basically, we need to make sure that any holes in the safety nets are educator-sized, not student-sized.

Start with the Y

Discussing education without first defining what is happening in the rest of the world is difficult, since education is nothing without a society around it. To avoid this, we will briefly go through the changes that are happening in the labour market, where digitalisation is both a promise and a threat: we seem to fear automation and how it might “take our jobs”, but at the same time, companies and states alike are excited about the potential of new technologies.

Going on from how we look at the connection between jobs and digitalisation, we will address the question of competence. Our societies are moving away from knowledge and towards competence, where the latter includes abilities required to apply knowledge in practical situations. As noted in the session notes from the OECD Going Digital summit in 2019:

Today, the world no longer rewards people just for what they know – Google knows everything – but for what they can do with what they know. The more knowledge that technology allows people to search and access, the more important becomes deep understanding and the capacity to navigate ambiguity and make sense out of content. Understanding involves knowledge and information, concepts and ideas, practical skills and intuitions. But fundamentally, it involves bringing them together, integrating and applying them.³

3. OECD (2019). Going Digital Summit agenda

It is also clear that the labour market is increasingly demanding “soft skills”: the ability to work in groups or to manage one’s own workload, for example. While this is not reflected in education policies today, some national curricula are beginning to take this shift into account. Finland is a notable example, where competence and soft skills have been explicitly added to the education agenda since 2016, which will also be discussed here.

What Does the Labour Market Want?

Jan Hylén

In education, digital competence has often been treated independently, as an ability in itself. But sometimes it needs to be put into context. Looking at the future of the labour market, digital skills will often be woven into other skills, such as problem solving, collaboration, and management skills.

Studies of this emerging labour market also indicate that demand will increase for skills of this kind – these are the kinds of skill that people need to develop in order to find a place and compete in a labour market characterised by automation, robotisation and artificial intelligence. Our education systems need to adapt to these changing demands, in order to best

prepare our children and young people for the growing social and working life.

The Emerging Labour Market

The labour market and the economy are changing. Two important reasons for the changes are digitalisation, including in the form of automation and robotisation, and globalisation. These trends reinforce each other. Digitisation makes it easier for companies to operate globally and, at the same time, global competition drives the pace of technological development.

Europe is likely not facing mass unemployment as a result of automation, but it is facing major changes.⁴ This applies both to what jobs are available and to the skills needed to manage the jobs. An important insight that has emerged from the past 15 years of economic research is that technological

4. Nedelkoska & Quintini (2018)

developments since the 1980s appear not to have replaced primarily the simplest tasks, but rather tasks in the middle layer of the distribution of wages.⁵

In the past, it was believed that the jobs requiring the least education or knowledge would be the ones to disappear. It was mentioned that the technical development was knowledge-oriented. However, it has been found that it is actually the technical advances that are task-oriented. Thus, it is not primarily the level of education that dictates whether a worker is replaced, but what the role of the worker entails.

In order for computers to be able to complete a task, the task should, to a large extent, be regular and predictable, i.e. routine. If the situations to be handled can be clearly described in advance, or if they can be handled according to certain rules, it is much easier to programme a computer

5. Nedelkoska & Quintini (2018).

or robot to perform the task. In other words, it is about the level of abstraction of the tasks, their routine and service content.

Many of the jobs that have a high level of abstraction and are less routine often require higher education than other jobs, but it is the nature of the tasks that is crucial to understand, not the level of education required. Accounting work is abstract and requires a lot of training, but since accounting largely follows a regulatory framework, accounting programmes can more or less replace tasks previously performed by financial assistants. However, hairdressers or carpenters are more difficult to replace with robots.

It is also evident that there is a polarisation of the labour market underway, which means that the number of jobs requiring high skills and yielding high income is increasing, while middle-income jobs requiring medium skills are declining.

The jobs that require the lowest level of expertise and provide the lowest salary are increasing, but minimally.⁶ The OECD has recently published a report showing that the middle class is declining in most of its 30+ member countries.⁷

At the same time, not everyone who has been in the educational and monetary middle class can or wants to further educate themselves to take on more demanding and better-paid work. The new jobs that are created usually require other, often more advanced, skills than the jobs that have disappeared. In other words, it is not always possible for an individual who becomes unemployed, when a robot makes the job faster and cheaper, to quickly take up a new job in the same sector. Training and restructuring

6. McKinsey & Company (2017).

7. OECD (2019). Under pressure: The squeezed middle class.

may be required to find a new job. Some have the opportunity and are willing to invest in more education; others do not. As a result, competition for jobs requiring low education has increased. Many of those who previously considered themselves to be overqualified for low-wage jobs have no choice but to compete for such jobs.

The tendency for job polarisation is reinforced by the opportunity to relocate or outsource, that is, to place certain jobs in countries with lower wages. This development will likely put the education sector under strong pressure. In order for as many people as possible to apply for the new jobs that are emerging, opportunities for good basic education are needed for all, but reskilling and upskilling will be equally important. What has been talked about for many years as lifelong learning will have to become a reality.

Adult education systems, vocational college education and higher education are likely to come into the social and political limelight in a way that has not previously been the case. Primary and secondary schools are also likely to be affected. But, an awareness that education makes a difference will not suffice; it is also about how education is conducted. For example, the OECD's Director for the Directorate of Education and Skills, Andreas Schleicher, warns that there is a risk that education will focus on too simple knowledge and skills, as these are easier to teach and above all to test.⁸ And, it is precisely these skills that are easy to digitise, automate and relocalise. Thus, if it is true that today's schools focus too much on simple knowledge and skills, they may need to change fundamentally.

8. OECD, Schleicher (2019). The case for 21st-century learning

Two Forecasts

An OECD study entitled Automation, skills use and training⁹ comprises data from 32 of the 36 member countries in the organisation. The study tones down concerns about mass unemployment due to automation. The researchers have tried to calculate the probability that different types of jobs will be automated, and believe that on average in these countries, about 14 percent of the jobs have more than 70 percent probability of disappearing. A further 32 percent of today's jobs have a probability of between 50 and 70 percent disappearing.

The approach of the OECD researchers is slightly different from that of the noted study by Frey and Osborn (2013), who predict that about 50 percent of current jobs in the US job market will be gone in 20 years. But, where Frey and Osborne believe that entire occupational groups

9. Nedelkoska & Quintini (2018).

will disappear, the OECD makes a more nuanced assessment and tries to assess how many jobs in each occupational category will disappear by 2030. For example, the OECD report points out that, although many jobs in logistics could disappear due to self-driving vehicles, not all drivers and warehouse workers will disappear. However, many of them will see their roles change.

According to the OECD (2018), the situation differs between the countries in the study, depending on the private sector structure, general educational level, and the degree to which automation has already begun. OECD researchers believe that, in a country like Slovakia, 33 percent of jobs are at risk, while the corresponding figures in Norway and Sweden are 6 percent and about 8 percent respectively. Nedelkoska and Quintini (2018) also point out that these are just estimates and that the figures can change both upwards and downwards.

A surprising result of the OECD's investigation is that youth jobs are the most at risk of being automated. This means that higher youth unemployment may be the result, rather than excluding older individuals from the labour market. The reason why young people's jobs are at risk of disappearing is that – compared with older people – they often have simple jobs in agriculture, industry and trade: jobs that are more easily automated.

Adult education is held up as the single most important factor in increasing the opportunities for people who have lost their jobs to find new ones. However, according to the study, those who are most at risk of losing a job are also those who already participated in reskilling or upskilling efforts. They usually also have a weaker basic education than other individuals in the labour market, so they can experience an uphill struggle.

Another important report is entitled the future of jobs report 2018 and was produced by the World Economic Forum (WEF), commenting on the period 2018-2022. The report has a global perspective and is based on a survey conducted with a considerable number of leading companies in various industries and regions. In the 2018 report, 313 companies with over 15 million employees participated.

The main technical changes that are highlighted by the authors of the report in the period from 2019 to 2022 are: mobile internet that is ubiquitous and available at high speed (referred to as 5G), artificial intelligence (AI) and the extensive use of big data. Eighty-five percent of companies participating in the study say that they are likely to have expanded their use of user data and big data by 2022. Similarly, a large portion of companies believe that they will have more of the Internet of Things, apps, e-commerce and cloud-based

services. There also appear to be plans for significant investment in machine learning, augmented reality (AR) and virtual reality (VR).

These technologies are believed to interact with socioeconomic trends, such as continued economic growth, an expansion of the education system, and a growth of the middle class, especially in developing economies. It is also believed that a transition to a greener global economy will happen because of new energy technologies – a change predicted to have a positive impact on economic growth.

Of the respondents, 59 percent say that by 2022 they will have significantly changed how they produce and distribute their goods and services and almost half of the companies believe that they will have relocated geographically. Three-quarters indicate that proximity to skilled labour force is the most important factor for their

location: this is much more important than the labour market laws of different countries or proximity to various other commodities. In other words, the study concludes that the main bottleneck or obstacle to a company's expansion currently lies in the lack of skilled labourers.

Machines' Share Increases

The companies that participated in the WEF survey believe that the balance between the amount of the work done by humans and the amount done by machines will change over the next three to four years. Diagram 1 shows how companies believe that the distribution of work between man and machine will change over the next three to four years, among a number of tasks.

As can be seen in the diagram on the next page, relatively big changes are expected

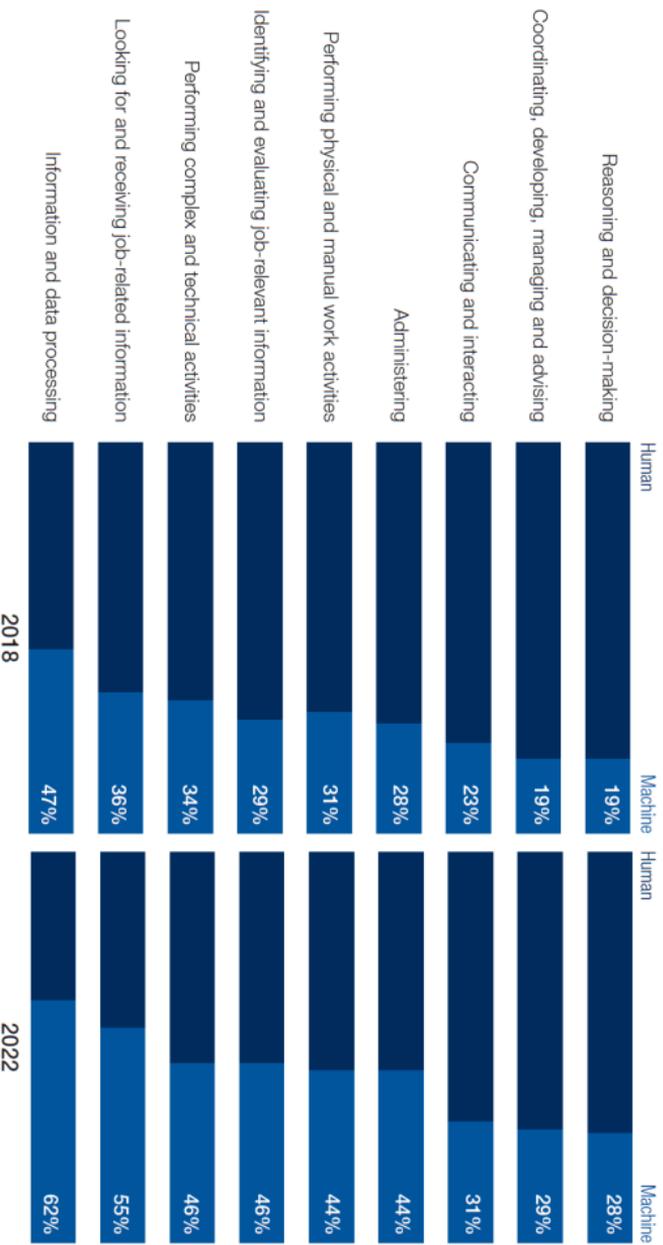
to occur within the relatively short period of four years. It is perhaps not surprising that the companies in the study believe that information and data processing will be increasingly automated. More noteworthy is their estimate that almost 30 percent of reasoning, decision-making, coordination, management and counselling will be done automatically. Thus, we are approaching the question of what skills will be demanded in the future labour market.

A summary of the assumptions made in several studies¹⁰ suggest three broad categories:

- technical skills;
- social skills and;
- combinations of technical and social skills.

10. Such as Nedelkoska & Quintini (2018), WEF (2018), and Bakhshi et al. (2017), McKinsey Global Institute (2017) and Hawkworth, Berriman & Cameron (2018)

Figure 5: Ratio of human-machine working hours, 2018 vs. 2022 (projected)



Source: Future of Jobs Survey 2018, World Economic Forum.

Political Ambitions

Robin Vetter

The shift that is happening in the labour market is visible not only in research, but also in politics. When Ursula von der Leyen launched her agenda for the European Commission of 2019-2024, she was clear on the issue of education for the digital age:

The best investment in our future is the investment in our people. Skills and education drive Europe's competitiveness and innovation. But Europe is not yet fully ready. I will ensure that we use all the tools and funds at our disposal to redress this balance.¹¹

11. EC, von der Leyen (2019). A Union that strives for more – My agenda for Europe

She also announced her intention to update the Digital education action plan¹², an 11-part plan on how to develop technology and digital competence in learning. The action plan is in itself part of the ambition for sustaining and strengthening the European Education Area¹³.

All of the above point to the same development: the world is transforming into a digital society, and Europe needs to catch up. Von der Leyen also refers to the term hyperscalers¹⁴:

It may be too late to replicate

12. EC (2019). The Digital Education Action Plan.

13. EC (2019). Towards a European Education Area.

14. *Hyperscalers* is a general term used to describe “hyperscale computing”, meaning cloud computing and big data-dependent systems. In von der Leyen’s communication, it is used to describe rapidly growing tech-companies and their economies and systems.

hyperscalers, but it is not too late to achieve technological sovereignty in some critical technology areas.

Von der Leyen's ambition¹⁵, is a stronger Digital Single Market, and a European Union, at least on par with the rest of the world, in terms of digital transformation. And, she does well to address the question of digital competence and digital education, since it is pointed out by the European Commission itself as an area in which the EU is not doing well enough:

Currently, however, 44% of European citizens do not have basic digital skills. 37% of people in the labour force – farmers, bank employees, and

15. Which, as of December 2019 is yet to become reality

factory workers alike – also lack sufficient digital skills, despite the increasing need for such skills in all jobs.¹⁶

Another European Commission initiative is the Digital Economy and Society Index, or DESI¹⁷. Its 2019 edition pointed to the fact that:

...approximately 10 percent of the European labour force has no digital skills, and 35 percent do not reach the level of basic digital skills, despite the fact that basic digital skills are now required for most jobs.¹⁸

16. EC (2019). The Digital Skills and Jobs Coalition.

17. EC (2019). The Digital Economy and Society Index.

18. EC (2019). DESI 2019: Human Capital – Digital Inclusion and Skills.

An increased focus on digital education and digital skills is arguably a necessity. The labour market is changing towards one driven by skills and competence, rather than knowledge; and at the same time, parts of the European labour force do not have the skills required to participate in the labour market of the future. However, there is an even more interesting part of von der Leyen's agenda for the Commission:

We need to move from “need to know” to “need to share”.

Looking at the numbers in the 2019 DESI report, it is clear that not all members of the union are in the same situation. For example, the numbers regarding digital skills for the work force in the Nordic countries and the Netherlands do not reflect the numbers for the rest on the union: the figures are closer to 90 percent than 10 percent, almost inverting the ratio.

So, beyond a need for digital education and digital skills, there is also a pressing need for collaboration and the transfer of best practice. One of the ways in which the Commission has been addressing this is the Digital Skills and Jobs Coalition. Started as a “flagship” initiative in 2016, it aims to bring European actors together around the topic of digital competence, under four sub-categories:

Digital skills for all

developing digital skills to enable all citizens to be active in our digital society.

Digital skills for the labour force

developing digital skills for the digital economy, e.g. upskilling and reskilling workers, jobseekers; actions on career advice and guidance.

Digital skills for ICT professionals

developing high level digital skills for ICT professionals in all industry sectors.

Digital skills in education

transforming teaching and learning of digital skills in a lifelong learning perspective, including the training of teachers.¹⁹

19. EC (2019). The Digital Skills and Jobs Coalition.

Competence v. Knowledge

Jan Hylén

At the center of all the initiatives above, there is a question to be answered: namely, the question of what skills are actually needed in the future and how we can clearly address them in order to specifically teach and learn them. To manage this, the Commission has gone through its own process of defining competence, but there are more perspectives to be considered.

On Competences

Competence is a broader concept than knowledge, and in the labour market, the former is more important than the latter. Traditionally, education has focused more on knowledge than competence. A simple analogy to addressing the difference

between the concept of knowledge that the school is working with and the concept of working life can be seen in the difference between being able to answer the questions in a driving test and actually driving in metropolitan traffic. Mere knowledge of what to do is insufficient: the driver needs to be able to actually assess their own speed (and that of others); think about lane changes; pay attention to pedestrians; and more.

The concepts of competences and skills are central to the future studies and scenarios indicated by Nedelkoska and Quintini (2018) and Bakhshi et al. (2017). There are two main arguments behind the interest in competences over knowledge. One is the rate of change that quickly makes profession-specific knowledge redundant. The education systems are facing increasing difficulty in keeping up with the changes, and therefore the actors of the labour market are likely to take

on greater responsibilities for teaching specific vocational skills, while the education systems need to concentrate on basic knowledge and skills as well as some transversal skills. The second argument is that AI is expected to fundamentally affect working life and take over many tasks previously performed by humans. What people then need to do is focus on what the machines cannot do – intrinsically human skills.

EU work on key competences for lifelong learning²⁰ defines competence as a combination of knowledge, skills and attitudes, where:

- Knowledge consists of already established facts, figures, concepts, ideas and theories that facilitate the understanding of a particular area or subject.

20. European Union (2018), p. 7.

- Skills are defined as the ability and capacity to perform processes and use existing knowledge to achieve results.
- Attitudes refer to the propensity and attitude to act or react to ideas, people or situations.

In 2018, the key competences were revised, and now comprise the following list.²¹

- Reading and writing skills.
- Multilingualism.
- Mathematical competence and competence in science and technology.
- Digital competence.
- Personal and social competence as well as the competence to learn to learn.
- Citizenship Competence.
- Entrepreneurial competence.
- Competence in the area of cultural awareness and cultural expression.

21. European Union (2018).

As already mentioned, competence is different from knowledge in several ways. Competence is a broader, more comprehensive concept than knowledge. Knowledge is required to have competence, but one can have knowledge without being competent. Additionally, where knowledge is abstract, competence is about performing actions in concrete situations by applying knowledge.

An international research group which studied competences on behalf of the OECD emphasises that competence can only be observed through practical action.²² Competences are manifested through the actions of an individual in a specific situation or context. According to this research group, competences simply do not exist as internal conceptions or independent of action. This is an important observation, which has major implications

22. Rychen & Salganik-Hersch (2003).

for how one can test whether or not a person is competent in a certain respect. A knowledge test (such as the theory test for a driving licence) is not enough to measure competence: it also requires some form of practical test (like driving).

In other words, the concept of competence contains both aspects that are “hard”, that is, possible to measure and quantify, for example through tests, and “soft” aspects, where there are no measuring instruments or agreements on modes or scales of measurement.

The Soft Values of Competence

There several values within the concept of competence that are based on attitudes, values and behaviours – things that are usually called soft or non-cognitive abilities, as opposed to reasoning or reason-based abilities, which are usually

called cognitive. The fact that they are called “soft” is largely to do with the fact that they are, or at least have been, difficult to measure. Is there, then, any evidence that soft or non-cognitive abilities have any value in the labour market? In recent years, extensive empirical research has been conducted on the characteristics or abilities of young individuals who succeed later in life, especially in their work.²³

The large-scale international knowledge surveys, such as PISA, TIMSS and PIRLS, measure different cognitive abilities. Over the years, a certain consensus has emerged regarding measurement of this type of knowledge. Although research has long shown that non-cognitive abilities can be just as important for an individual and for society, it is not at all clear how they should be defined or measured. They are

23. See, for example, OECD (2015), Chernyshenko, Kankaraš & Drasgow (2018) and Durlak et al. (2017)

often considered more complex in nature and the methodology for measuring them is far from being equally developed. Non-cognitive abilities are generally about the attitudes, behaviours and social-emotional aspects of individuals. They can include such things as self-perception, motivation, cooperative ability, self-discipline, or “how to behave”.

Social and emotional skills play an important role both for success in working life and for the general wellbeing of individuals. This is evident, for example, in a longitudinal analysis conducted by the OECD²⁴ across nine countries and a comprehensive meta-analysis²⁵ of 213 studies involving more than 270,000 children, pupils and students from preschool to college, who have

24. OECD (2015). Skills for social progress: The power of social and emotional skills.

25. Durlak et al. (2011).

participated in various forms of education to promote their social and emotional skills. In a follow-up study conducted six years later²⁶, the students who received such education showed better school results, fewer emotional problems, and fewer drug problems.

In recent years, these skills have been gathered under the term socio-emotional learning (SEL). This is how UNESCO summarises the organisation's view of SEL on its website:

[Social and emotional learning is about:] Learning how to manage feelings and relationships with others. This includes ways to also recognize emotions and to maintain positive relationships in developing

26. Durlak et al. (2017).

*sympathy and empathy. It involves the acquisition of knowledge, skills and attitudes that learners need to create positive relationships, build resilience, handle challenging situations, make appropriate decisions and care for others. Commonly it focuses on skills such as self-awareness, self-management, social awareness, relationship skills and responsible decision-making.*²⁷

In 2017, the OECD initiated a study on SEL that is set to continue until 2020. The theoretical and empirical basis for the study's starting points and design is

27. Social and emotional learning as defined by the International Bureau of Education in 2019: www.ibe.unesco.org/en/glossary-curriculum-terminology/s/social-and-emotional-learning-sel

described in Chernyshenko, Kankaraš and Drasgow (2018). The study is based on a number of character traits which, in a broad research tradition, have proved to be of great importance for both study success and success in professional life. These characteristics are usually summarised in the phrase “the Big Five” and are described as follows:

Conscientiousness refers, on the one hand, to the tendency of individuals for self-controlled, organised, and cautiously planned behaviour; and on the other, ambitious, persistent and dedicated effort in achieving personal goals.

Extraversion represents the tendency to seek the

company of others, to initiate and maintain connections, and to feel comfortable in the presence of others. Extroverted individuals are also more likely to show assertiveness in social situations and provide leadership. They are often characterised by high levels of energy and zest for life.

If extraversion partly refers to the quantity of interpersonal relations, agreeableness refers to their quality. Agreeable individuals tend to be more cooperative, maintaining positive relations and minimising interpersonal conflict. They are more likely to show active concern for the wellbeing of others and

to hold positive beliefs about people in general.

Emotional stability represents the degree to which individuals are able to control their emotional responses and moods, as well as the quality of their emotional states in general. People with high degrees of emotional stability will show more resilience in stressful situations, will be less likely to experience anger, irritation or sudden changes of mood, and will tend to have a better view of the world and outlook of the future.

Openness to experience is reflected in two main aspects.

One involves the degree to which people are open to intellectual stimulation in general, as reflected in their intellectual curiosity, imagination, creativity, preference for novelty and variation. The other aspect is shown in the degree to which people prefer experiential stimulation, as represented in their appreciation of art, aesthetic experiences, self-reflection and self-exploration.²⁸

A central point of the OECD's reasoning is that these abilities are not (just) natural, that is, people either have them or lack them, but they can be learned and practiced.

28. OECD (2018). Social and emotional skills for student success and well-being, p.11

SEL

In 2016, the OECD initiated a study²⁹ on how social and emotional skills affect the learning and wellbeing of students. It is the first of its kind in the sense that it is implemented in many countries in parallel, and that it aims not only to measure the level of skills of the participating 10-year-olds and 15-year-olds, but also to identify factors that stimulate and improve pupils' social and emotional development and potential barriers to such development. The questions that the OECD hopes to answer include:³⁰

- What socio-emotional skills can be used to predict children's cognitive, educational and social outcomes as well as their general wellbeing?
- How do different family contexts

29. Chernyshenko, Kankaraš & Drasgow (2018).

30. Chernyshenko, Kankaraš & Drasgow (2018).

affect children's social and emotional development?

- What school situations, such as teaching materials or type of teaching methods, affect children's social and emotional development?
- What other contexts such as participation in sports or cultural activities or experiences of safety and security affect children's social and emotional development?
- What social and emotional differences based on children's gender and socioeconomic background can be identified, and what are their probable causes?

In the Anglo-Saxon world, the importance of SEL has received increasing attention. Since 2015, it has been part of the newschool regulation in the United States: the Every Student Succeeds Act (ESSA). There are a

number of initiatives in this area.³¹ The WEF has raised the issue in two reports.³² The reports highlight a number of pedagogical methods, such as project-based, experimental, inquiry-based and adaptive learning methods, which are considered to promote the required competences. They also point out that today's methods and programmes for developing and practising these competences usually leave digital technology aside, despite the great potential that exists in digital tools precisely regarding SEL.

In the reports, the authors also consider what is holding back the adoption of SEL thinking – why are education systems so slow to change, despite the strong evidence for the importance of SEL? Their conclusion is that there are several factors that work together in slowing it down:

31. For example, CASEL and BeYou.

32. World Economic Forum (2015 & 2016).

- a lack of knowledge of what SEL is and means;
- a lack of prioritisation of these elements in teaching; a lack of tools and consensus on how to measure SEL;
- a lack of funding to develop new tools; and too few adequate teaching materials and training products.

WEF believes that their reviews show that digital (and often game-based) products are highly suitable for training SEL skills. Therefore, the report authors strongly advocate that digital learning materials should include such elements, which today is practised on an extremely limited scale. WEF also believes that it is time to take the next step and expand the repertoire by using the latest technology with, for example, portable sensors, VR and advanced apps, as well as AI and machine learning.

Practising and Measuring Competences

There are two reasons for the wide use of digital tools and digital content in schoolwork. The first is that the competences that need to be taught and measured can often be more effectively taught and measured digitally. The second is that the school needs to provide examples: when students leave school, they will face a social and working life that is considerably more digitalised than it is today. In order to prepare them for this eventuality, the school needs to become more digital in its work.

The importance of competences of various kinds (not least socio-emotional) in the emerging labour market is highlighted in all the studies cited here. But, for schools to start systemic work with competences, a number of measures will be required:

- Competences need to be more clearly defined so that there is no doubt what the different competences entail.
- Methods must be developed to work with the skills – we need to know how to work to teach, for example, collaboration or problem solving in groups.
- it is important to describe a progression for the various competences. It must be clear to teachers and students what it means to gradually develop, for example, their collaborative ability or critical thinking.
- We need to develop measurement methods to determine if students are actually developing their abilities. Thus, teachers need to be able to assess, or in some sense measure, whether the students are developing in the right direction. Otherwise, the training methods may need to be changed.

Is it then possible to measure complex competences, such as collaborative ability, creativity or critical thinking? The example that will be discussed below is the ability to cooperate. It is a particularly interesting skill to try to measure, because it involves several people. One cannot cooperate alone, so in order to measure Person A's ability to cooperate, he or she must cooperate with Person B. At the same time, A's possible lack of ability to cooperate should not lower the assessment of B's ability to cooperate.

Furthermore, the progression needs to be described: what does it mean that an individual has become better at working with others, for example, to solve problems in groups? And, how can this improvement be described? These are questions that must be answered, in order to be able to measure, or in any way determine, if the ability to cooperate increases.

An early attempt to assess students' socio-emotional competence was made in the 2015 PISA study, in which one of the sub-tests was about students' ability to solve problems in a group. The results of the survey, which included 52 countries or parts of countries, showed that pupils from Singapore performed the tasks best, followed by Japanese pupils.³³

Throughout, the results were weak: it seems that the students had a harder time solving the problems than had been predicted. However, the study has subsequently been subjected to research criticism for methodological reasons. Concepts and survey methods were not considered sufficiently elaborated for us to rely on the results of the study.³⁴

33. OECD (2015). Skills for social progress: The power of social and emotional skills.

34. Nouri et al. (2017); Luckin et al. (2017).

European Frameworks for Competence

Robin Vetter

Given the move from a knowledge-centric approach to education to a competence-centric one, the need for universal rules of evaluation and measurement is pressing. From the direction of the European Union, there are a few examples of such frameworks, each addressing a different aspect of education.

DIGCOMP

In 2019, the European Commission released a set of practical cases to help in applying the DIGCOMP framework – a set of rules and definitions for measuring and

testing digital competence.³⁵ It contains sets of skills and competences that are deemed necessary to live in the European Union of the digital era.

It is a structured approach to inform and measure practical skills required to participate in the digital society, targeted specifically at citizens. Basing most of its conclusions on scientific studies, it is quite practical in its definition of digital skills: they are described by use of scenarios, such as employment and school assignments. DIGCOMP was also created in response to the need for transferrable methods of measuring competence. Part of this demand is from the Commission itself: to better understand what is happening with the labour market, the datapoints used need to vary as little as possible from

35. EC (2019). DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use.

member state to member state.

The studies underpinning the framework were initiated in 2005, with the aim of providing “evidence-based policy support to the European Commission and the Member States on harnessing the potential of digital technologies to innovate education and training practices”. The latest version is DIGCOMP 2.1, published in 2017, where concrete practice cases are presented. Since it is an open framework, it has also been made interactive, for example by the Danish Association for Digital Literacy in the Digital Competency Wheel.³⁶

In itself, the DIGCOMP framework represents an attempt to grasp what digital competence means and how to handle it. However, it is also part of a larger trend within the European Commission, where

36. The Digital Competency Wheel, Digital Dannelses, 2019: <https://digcomp.digital-competence.eu>

the focus is on how to bring European citizens up to speed with the society we have constructed together.

A year before the updated DIGCOMP framework, the European Commission also adopted a Digital Education Action Plan, which outlines challenges and opportunities related to the digitalisation of society and education. It also points to three prioritised topics that need to be addressed:

1. Making better use of digital technology for teaching and learning.
2. Developing relevant digital competences and skills for the digital transformation.
3. Improving education through better data analysis and foresight.

Under these prioritised areas, it also lists concrete points of action that can be used to guide initiatives and legislation towards

better compatibility between a digital society and education.

However, as of 2019, DIGCOMP has yet to be used in a “live” case by the Commission itself. Rather, it has been offered as a free tool for anyone wishing to use it, with little practical effect.

A very “real” example of how measured competence can affect the lives of individuals is made clear in the ESCO framework. At its core, ESCO is a framework for “translating” CVs into a universal language, breaking them up into combinations of competences, to facilitate pan-European mobility in the labour market.³⁷ The ESCO framework has been used in, for example, the eSkillsMatch project³⁸, making it closer to a reality-tested framework for measuring digital competence than DIGCOMP.

37. EC (2019). What is ESCO?

38. EC (2019). About e-Skills Match.

But, ESCO is explicitly targeting the question of matching skills with jobs. The eSkillsMatch framework is explicitly using it to help individuals to find the right education for their career, and the DIGCOMP framework is not actively being discussed as a tool in designing education. So, how do we make sure that education systems are handing out the competences needed for the future?

Competence-centric Curricula

Though many education systems apply curricula based on knowledge, there are examples in which a shift towards a competence-centric curriculum has been adopted.

One of them is Finland. Since the autumn of 2016, Finnish elementary schools have had a curriculum with seven competencies that permeate the teaching. These are:

- Ability to think and learn.
- Competence in culture and communication.
- Every-day competence.
- Digital competence.
- Multi-literacy.
- Competence for work and entrepreneurship.
- Ability to participate, influence and contribute to a sustainable future.

The idea is that, in addition to gaining knowledge in various subjects, the student should get to know their own strengths and development opportunities, and value themselves, collectively, which is referred to as “versatile competence.” This is explained as follows:

A whole that consists of knowledge and skills, values, attitudes and will. Competence also means the ability to use

their knowledge and skills in the way the situation requires. The students' values, attitudes and willingness to act affect the students' ways of applying their knowledge and skills. The need for versatile skills arises from the changes that are happening in the surrounding world. Growing as a human being, studying and working as well as working as a citizen of the community presupposes, both now and in the future, a broad competence that transcends and unites different fields of science.³⁹

The Finnish curriculum also states that the core values, the attitude towards learning and the culture of the organisation make

39. ePerusteet (2019). Tavoitteena laaja-alainen osaaminen.

the foundation for the development of competence. Each subject builds competence by providing opportunities for students to apply the content and methods relevant to the field of science. How the competence develops depends on the topics in question and, in particular, how the teachers work, and how the communication between the students and the environment around them is conducted. The feedback that the students receive, as well as the guidance and support for learning, mainly affect the attitudes, motivation and willingness to act.

The seven sub-areas of versatile competence have several points of contact with each other. Their common goal is in line with the mission of basic education; and with regard to the age of the pupils, they all aim to support development as a human being and to promote competence required for participation in a democratic

society and a sustainable lifestyle. Especially important is the fact that students are encouraged to get to know themselves and their personalities, their strengths and development opportunities, and to value themselves.

To Sum up...

Jan Hylén and Robin Vetter

As previously stated, digital learning and digital competence should not be considered in isolation, but rather as part of a changed focus in education. Digitalisation is fundamentally changing how we live and work together, and education needs to reflect this change in broader and deeper respects than focusing solely on students' digital skills. This is to prepare our children and young people for the emerging society and labour market.

Work, assessment and grading in schools today focus on knowledge arranged into subjects and topics. The skills that have been highlighted above as essential are not actively developed or trained in schools. The extensive economic research that shows how opportunities for individuals

increase when they are allowed to exercise their social and emotional skills is largely ignored.

It is also clear from the research that, unless these competences are highlighted and trained, it is largely the extracurricular environment of the pupils that determines how well equipped they are to meet the demands of the labour market and society in these respects. Family relationships and socioeconomic factors will then play an even more decisive role than today, potentially increasing the prospect of segregation.

The risk of increased inequality is also aggravated by the polarisation of the labour market, resulting in increased wage differences between people with high skills and high-paid jobs and those with lower skills and lower-paid jobs, respectively. A concluding advice from Andreas Schleicher, responsible for the OECD

education department and PISA General, is to be visionary in shaping the future of schools, in order to create a school for our children's future - not our past (Schleicher 2019).

So while there is no simple solution to any of the above, there are a few things to consider when shaping policy for the future of education:

Do not focus on the technology – it will follow. You probably wouldn't design a house with a hammer in mind, the hammer will be required when building the house. Policy for education can't be built around the tools, the tools have to come second.

Focus on competence rather than knowledge. In the past, education has been measured by testing levels of knowledge. Knowledge is becoming more and more ubiquitous, hence competence will be the new key to success.

In shaping new policy, the latter has to be properly addressed and handled, otherwise the policy will not last.

And lastly:

Move fast, but don't break things.

While the need for new ideas in educational policy is pressing, it is also important to remember the people who will be affected by the changes. In a time of increasing polarization and division, misguided or destructive policy will only feed the trolls. Humility and openness to the fact that these issues are complicated are key to keeping the trust on required levels, and that trust is in turn required for policies to last.

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Appendix: Discussions around the Union

When going around the European Union to ask what obstacles were present, we found that the answers varied.

During a workshop in Prague, the discussions focused mainly on what role the teacher should have – and the lack of funds to effectively manage the required reskilling and upskilling of teachers. It was also pointed out that while teachers can act at the grassroots level, change is required from both the top and the bottom, simultaneously.

Beyond that, there was a consensus that it cannot be done without a mutual understanding of the problems at hand. Politicians cannot successfully incite change among teachers, and teachers

cannot be expected to make policy.

During a workshop in Sofia, Bulgaria, the focus was different. With representatives from both Greece and Estonia present, the discussion revolved, to some extent, around the issue of making technology available to all, in a manner that inspires extended use, rather than it being hampered.

In Greece, this is especially pressing, since the penetration of technology in the general population is lower than that of other European member states, and this is especially apparent in schools. Using technology for education becomes difficult if the technology is not available.

In Estonia, on the other hand, there is abundant digital infrastructure, and digital services are available to citizens from the moment they are born. Schools are practically paperless and PISA results are moving upwards.

Common to both countries is the focus on technological infrastructure, and its availability as a primary enabler for digital education and competence. Bulgaria shared some of the same ideas, but also pointed to a lack of political leadership and funds.

In an attempt to synthesise some direction from the previous workshops, a third workshop was arranged towards the end of the project in Stockholm, Sweden. Building on the topics from the previous workshops, the conclusions can be summarised in two main points:

- There is a need to define what education should be, what it shouldn't, and why. Without a goal, it is difficult to figure out the means.
- Coordination and collaboration are both needed and perilous – we cannot assume that something that

works in one member state will work in the next, but at the same time we might learn something.

For example, Sweden boasts one of the highest levels of digital competence and internet usage in the union but is still falling behind in development of open data and PISA results. Much of the reason for this is a lack of leadership in digital transformation and political uncertainty, making it complicated for Swedish educators to disseminate experience throughout the system.

Similarly, the learnings from the Finnish reform of 2016 are mostly unexploited in an international context, or even a Scandinavian one.

To get to this issue, some choices have to be made. The problem that needs to be addressed is the division of responsibility for providing the tools required to

participate in our societies. Take, for example, the case of lifelong learning. It has been around as an idea since long before we started to consider digitalisation one of the main shifts of our history, but it is only now becoming tangible, necessary and possible. It entails an idea of teaching the ability to learn and providing tools for further education.

Our conventional institutions for education all have designated areas of responsibility, across all European member states. However, other parts of communities are rarely included in the scheme of responsibility, other than implicit ways: we expect families and parents to educate their children in the basic use of a native language; we expect friends to help each other to develop basic social skills; and we expect team sports and other activities to help children to develop skills required for teamwork and group exercises.

But, before this can happen, we need to address the question of why we are doing any of this. Without a compass, it is hard to know where to turn for political or financial support.

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How is education reacting to the digitalisation of society?

From frameworks for digital competence to the coining of the term "EdTech" – digitalisation is currently influencing education on all levels.

This report will discuss some of the trends forcing education to change, where they might be going and what can be done to help educators keep up.

