OIVALLUS

Final report

Confederation of Finnish Industries

SUMMARY

One objective of the education system has historically been to prepare people for the requirements of an industrial society – for jobs that had strictly defined tasks, allocated in advance. Employees worked largely separately from each other and learning one skill was sufficient for a long time.

We have been moving towards an information society or an experiential society for a while now. What is becoming crucial is the capacity to work in a new way to achieve new or improved solutions. To rise to the challenge, companies are changing the way in which work is performed. Mechanical thinking by the book will seldom be the case in the future. Strict instructions are being replaced by guidelines and the goals of work are becoming more and more vague. People have to define the content and the rules of their work on their own or together with others.

In order to prepare for the aforementioned future, promoting creativity will become the foundation of all education. Creativity should be understood as divergent thinking: imagining alternative solutions to problems. Education that promotes creativity adopts methods from work life: experimenting with others without the fear of making a mistake will be encouraged. This is why future education will focus on skills in addition to knowledge and working in groups instead of working in isolation.

Adopting a broad range of learning methods prepares students for work that is performed in a variety of ways. We will move away from a fragmented curriculum towards learning that is based on problems and phenomena. This enables us to handle more and more complex environments. Learning expands as schools are opening up to the society that surrounds them. Structures of education will support collaborative teaching — at the end, teachers are the ones who enable the change towards education that promotes creativity. The way in which learning is assessed is at the core of the change. What is assessed will be taught and learnt.

TIIVISTELMÄ

Koulutusjärjestelmän yhtenä tavoitteena on ollut valmistaa ihmisiä teollisen yhteiskunnan palvelukseen eli töihin, joissa täsmällisesti määritellyt tehtävät oli jaettu etukäteen. Teollisen yhteiskunnan työntekijät työskentelivät pitkälti erillään toisistaan ja yhden taidon oppiminen riitti pitkäksi aikaa.

Teollisuusyhteiskunnasta on siirrytty kohti tietoyhteiskuntaa tai kokeiluyhteiskuntaa. Keskeiseksi on noussut se, osataanko työskennellä uudella tavalla ja siten saada aikaan uudistettuja tai uusia ratkaisuja. Haasteeseen vastatakseen yritykset muuttavat työn tekemisen tapojaan. Mekaaninen ajattelu, ”by the book”, on valttia yhä harvemmin. Tarkat ohjeet korvautuvat suuntaviivoilla ja tavoitteiden abstraktiotaso kasvaa. Työn sisällöt ja säännöt määritellään usein itse tai yhdessä muiden kanssa.

Tulevaisuuskuvaan vastataan nostamalla luovuuden edistäminen kaiken koulutuksen läpileikkaavaksi teemaksi. Luovuus tarkoittaa mahdollisuusajattelua ja vaihtoehtoisiin toimintatapoihin tarttumista. Luovuutta edistävä koulutus lähenee menetelmiltään työelämää: koulutus kannustaa kokeilemaan virheitä pelkäämättä ja tekemään yhdessä. Siksi koulutuksessa pitäisi tästä eteenpäin panostaa taitoihin tietojen rinnalla ja yhdessä tekemiseen yksilösuorittamisen sijaan.

Oppimismenetelmien vaihteleminen valmentaa vaihtelevien työtapojen tehtäviin. Sirpaleisista oppisisällöistä siirrytään kohti ilmiöitä ja ongelmia, mikä edesauttaa monimutkaisessa toimintaympäristössä luovimista. Koulujen avatessa oviaan yhä rohkeammin ympärilleen oppimista tapahtuu kaikkialla. Rakenteet korjataan tukemaan yhteisöllistä opettajuutta, joka viime kädessä mahdollistaa luovuutta edistävän oppimiskulttuurin toteutumisen. Oppimisen arviointi on keskeinen väline muutosten toteutumiseksi. Sitä opitaan, mitä arvioidaan.

What is Oivallus?

During the past three years, the Oivallus project has been getting to grips with the competence needs of businesses and the way in which they should be developed. Our working hypothesis is that in the 2020's business life will be even more networked than it is now.

The project has seeked answers to the following questions: what kind of competencies will be required for work that is done in networks? What will the future professionals be like? How will competences arise and develop? What kind of education will prepare people for work in the 2020's?

The objective is to deliver a message from businesses to education policymakers concerning competence needs and education for the future.

Oivallus, or "Competence needs of learning networks in tomorrow's Finland" was launched in 2008 and will finish in August 2011. The project is coordinated by the Confederation of Finnish Industries and it is financed by the European Social Fund, the Finnish National Board of Education and the Confederation of Finnish Industries.

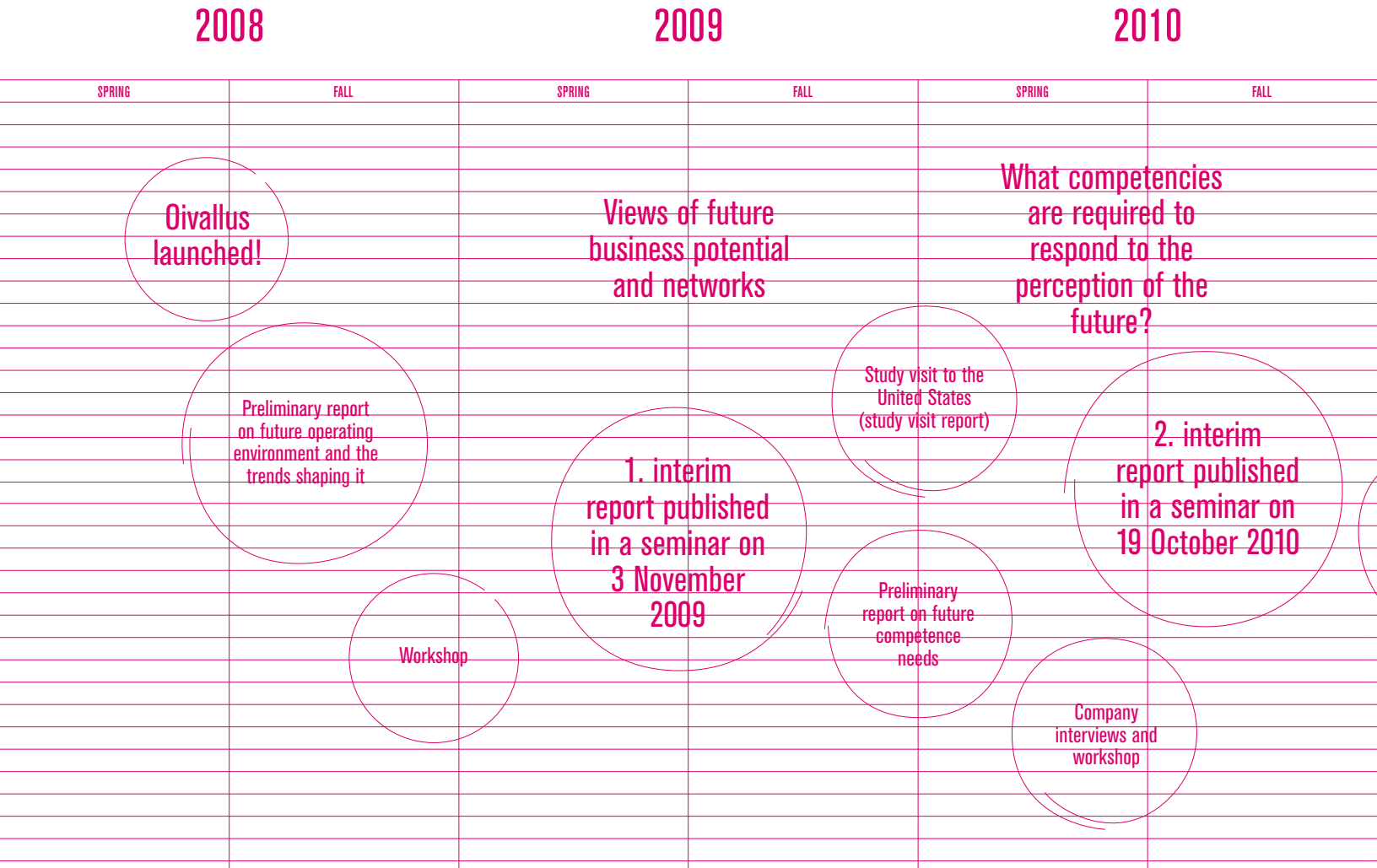
Two interim reports summed up the views on the future of work

Dozens of companies, academics, teachers and other experts have taken part in our deliberations on future work life. Together with them we have detected faint signals and formed views, opinions and wishes on the future of education. This process is referred to as expert processing.

Another procedural principle has been to characterise the future by identifying the practices of trailblazers. After all, it has been said that the future is already here – it's just not evenly distributed.

The trailblazers have been identified with the help of the experts who have participated in the project. Intuition has had a role to play as well. A central criteria for a trailblazer was so called "divergent thinking and doing" as well as a network-like way of operating.

The first interim report of Oivallus, published in November 2009, dealt with trends affecting the future of businesses. The report described a view on the changes of the operating environment and the dynamics of learning networks.



The central question was, what kind of business potential will the changes bring about?

In October 2010 the second interim report was published. Its focus was on the changes in the ways of working and changing competence needs of businesses. The move away from the so called 'by the book jobs' was identified as the main force changing the competence needs. Competences that generate competitiveness are described in detail in the second interim report.

The final report addresses learning and education

This final report focuses on learning and education. How should we bring about and develop the skills and the knowledge that are needed in the future? What kind of education will prepare people for the kind of work life envisioned?

The final report sums up the results of the three year anticipating project and brings out views on education that prepares for future work life.

Interviews with academics helped us gain understanding on the development of competences and the future of education. The themes were also discussed in workshops, discussion papers for the project and a company questionnaire. The people who have played a role in the anticipating of the Oivallus project are listed at the end of this report.

The project's study visit to Shanghai expanded our thoughts on learning and teaching. The participants visited local companies and educational organisations as well as met with Finnish business experts living in Shanghai. A report on the study visit is available (in Finnish) on the project website www.ek.fi/oivallus.

In addition to the aforementioned people, a number of reports, blogs, columns, videos etc. have inspired the Oivallus project's work. You can find out more about them on the Oivallus website.

2011

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Three discussion papers on the future of education

What are the implications for the educational system?

Interviews with researchers and visits in educational institutions

Publication of the final report in a seminar on 24 May 2011

Project ends

Workshop on future curriculum 11 January

Study visit to Shanghai 7–13 March (study visit report)

Communication continues

Workshop on future learning environments 9 February

Workshop on assessment of learning 23 March

Oivallus is a three-year project, ending in August 2011. Oivallus seeks to influence education policies.

Contents

Visit the Oivallus website!
All the publications and materials related to the project can be found on the website. It also provides a summary of the data that have inspired our discussions on the future.

www.ek.fi/oivallus/en

To the reader

Three years have passed since the start of the Oivallus project. During these years, as part of the global economy, Finnish business life has experienced a financial crisis and the impact of the recession that followed. Uncertainty is partly still persisting. In many sectors, unpredictable changes have occurred and the same element of surprise is seen in other areas of society in Finland and the rest of the world. The old saying about the difficulty of predicting the future has been confirmed.

The viewpoint of Oivallus, stressing the increasing significance of networks in the future, has, regardless of these changes – or perhaps because of them – proven to be correct. Future competence must be built based on the needs of learning networks. We must seek trailblazer position by networking. That creates the prerequisite to act in a world where competences and utilising them are a condition for the success of businesses and the entire society.

You are now holding the final report of the project. It summarises the central thoughts of the three-year project focusing especially on the third year theme; how competence needs should be reflected in teaching and learning. We do not hope to present foolproof truths or give strict recommendations. Instead, we want to encourage different actors to think about the changes in work life and learning, and about what they mean in the life-long process in which learning is necessary, continuous and at the same time fascinating.

The report has been written by Project Manager Kirsi Juva and Project Researcher Anna Hynynen from the Confederation of Finnish Industries. Visual communication has been designed by OK Do and Tsto.

In addition to them, I want to thank the project steering group and all those who have participated in implementing our project at its different stages. We also want to thank the financiers of the project: European Social Fund, Ministry of Education and Confederation of Finnish Industries.

Helsinki, 24 May 2011
Timo Kekkonen
Steering Group Chairman

PS.

In Oivallus project, the future was anticipated from the viewpoint of learning networks. As the work progressed, the view on learning networks evolved. In the beginning, the goal was to recognise learning networks between different business sectors and fields. However, the further the work progressed, the more strongly the complexity of networks and their operation was underlined.

Companies form networks with other companies, research institutions, educational institutions and other organisations. Systematic networking is also a natural part of the diverged division of work. However, networking produces the strongest change in competence needs in the individual level.

What does a company's network-like way of operating mean from the individual's point of view? Networking is not a system managed from the top of the organisation or an organisation diagram that can be drawn; it is part of the way everyone works. That is why an example of networking in business can be found in every company and in every job description. Everyone works in a network, some more systematically than others and some with more self-guidance than others.

1

WHAT KIND OF JOBS ARE THERE IN COMPANIES IN THE 2020'S?

"Considering the features of Finnish society and the stage of its economic development, we should increasingly shift toward an "experimental society" [...]. It is not only about establishing new companies [...], but also about a community that is more widely seeking the new and not fearing mistakes.

Pajarinen, Rouvinen, Ylä-Anttila (2010): Missä arvo syntyy? Suomi globaalissa taloudessa (Where is Value Generated? Finland in the Global Economy).

One of the goals of the education system has been to prepare people for the service of an industrial society, i.e. for jobs in which specifically defined tasks had been allocated in advance. The employees of the industrial society were mostly working separately. Learning one competence was enough for a long time, often even for the duration of the entire working career.

Depending on who is interpreting, we either have shifted or are now in full speed shifting from an industrial society toward an information society. There is also talk about an adventure society and an experimental society. In the information society, the earnings logic of companies is to an ever greater extent based on innovation. Knowing how to work in a new way and achieving reformed or new solutions becomes central. Mechanical thinking 'by the book' is ever more seldom an asset.

In order to prepare for the aforementioned future, companies change their ways of operating. Today work is already done in projects, with varying combinations of skills and in the future this trend will be enhanced. Specific instructions are replaced by guidelines and the level of abstraction of goals increases. That is why merely following rules set by others and performing specifically defined tasks is no longer enough. More and more, people themselves need to define the content and the rules of work, or they need to do it together with others.

Is our current education system based on the needs of the industrial era? Are we educating people for strictly defined tasks requiring solitary efforts although work life is changing in a different direction?

In future work, the methods and goals are specified along the way

What is business life like in Finland in the 2020s? What kind of businesses do we have and what do the businesses do? We can approach these questions from two different directions: by thinking about *the structures* i.e. future players and their business sectors, or by anticipating this from the point of view of the companies' *ways of operating*. We believe that the most perceptive image of the future and the competences required is obtained by observing the latter i.e. the *nature of work*.

In Oivallus, two dimensions have been used in defining the nature of work; one of them is related to the goal of work (end result) and the other in work methods. From this classification, three types of work emerge:

- In some work both the goal of work and the methods used to reach it have been pre-determined. Goal(s) and method(s) are partly or completely standardized.
- In some work, the goal has been defined but the methods and ways to reach the goal the way the work is done are not carved in stone. The ways can be very open indeed.
- In some cases both the goal and methods of work are open; the desired end result is clarified or determined wholly as the work is being done.

FUTURE WORK LIFE RESEMBLES JAZZ IMPROVISATION

Oivallus project has described the future of work using the metaphor of jazz improvisation: work in the future and jazz share the same features. Wikipedia has this to say about jazz:

… It is music that includes qualities such as "swinging", improvising, group interaction, developing an "individual voice" and being "open" to different musical possibilities. (en.wikipedia.org/wiki/Jazz)

This metaphor was later made more precise through 'wiki principle'. Those involved in the project deepened our understanding of the future of work (and jazz) in the following way:

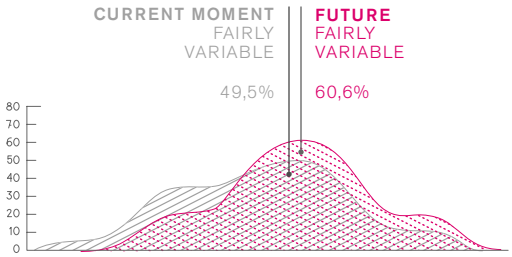
The metaphor depicts how more and more work is being detached from routines. Tasks are not strictly defined. The goal is known but there are no specific instructions on how to reach it. Having no specific instructions does not mean leaving people on their own. What is required is pulling in the same direction, trusting one another and sparring others. The end result can be reached in various different ways. That is why improvisation, creativity and sailing by the wind are daily tools and requirements for success. Using these skills is nearly impossible without strong basic know-how and knowledge of theory.

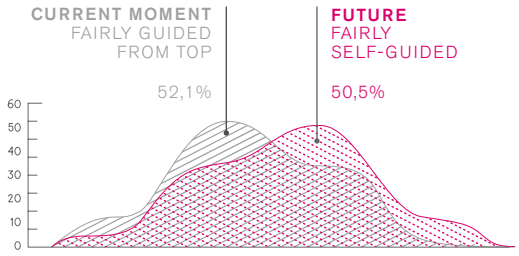
It is vital to develop one's individual 'voice' – competence –, but competence is built in relation to others and it is used as part of a whole. Fewer and fewer jobs are done in isolation. Work life is based on teams that work together to solve a problem or to create something new. A good team does not come about without hard work. In a good team, working methods have been thought about; they have been agreed on and practiced. Even a jazz band agrees on certain things, such as the key, before it can play together. Mutual communication is crucial both in organisations and in jazz bands. Multiple skills are the sum of a team's competences. The role of the leader may vary depending on the situation, project or special competence just like in jazz where leadership typically is changed on the fly.

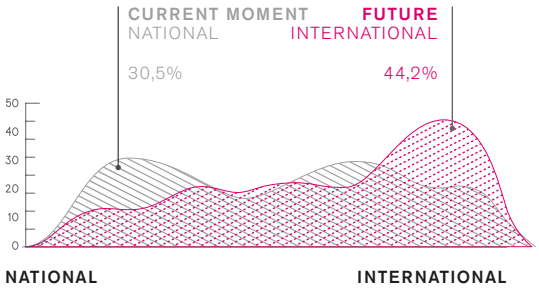
Image 1

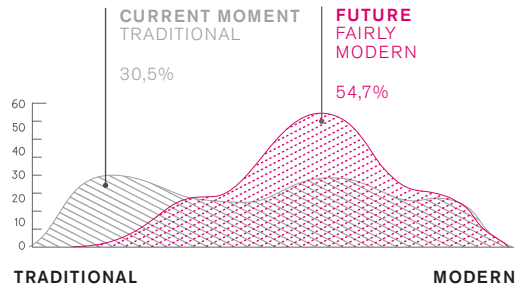
Ways of working now and in the future

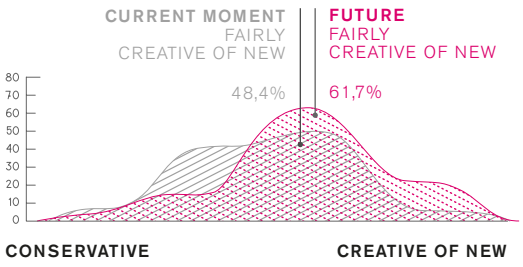
In the beginning of the year 2011, Oivallus asked companies about the ways of working now and 5-10 years from now. Of the randomly selected member companies of the Confederation of Finnish Industries, a total of 100 companies answered the questionnaire. The respondent companies employ a total of 60,000 persons.

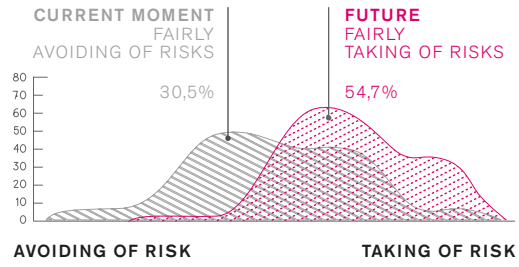


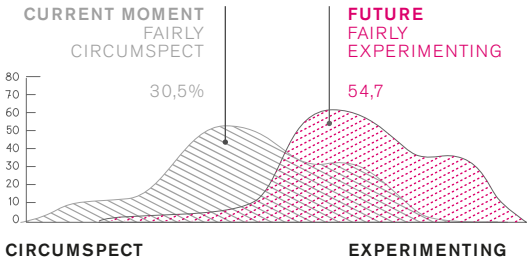












FIVE MOST IMPORTANT MEASURES FOR FURTHERING CHANGE

63%
Recruiting new kinds of employees

57%
Using job rotation systematically

55%
Corporate management guides change with its example

47%
Cooperation with external actors increases

46%
Change is accelerated with incentives

Working in a new way is a prerequisite for innovation

Factors that further innovation-based growth have been discussed quite amply in literature. Based on research by professors in the MIT and Harvard Business School for example, Pekka Himanen (2007) divides innovations into five types:

- Technological innovation
- Business innovation
- Design innovation
- Product / Service innovation
- Cultural innovation

Technological innovation refers to the ability to create new technologies but also to the ability to apply technology developed by others. Business innovation refers to creating business models and brands as well as marketing competence. Design innovation refers to creative and usable design in an economy where experiences are being sold ever more. The significance of service innovations is growing. Cultural innovation that refers to the renewal of organisational or work culture is the basis of all other innovation.

The future competence needs described in Oivallus' second interim report are in line with this division. Technology competence, business competence and design competence form the larger outline of the competence needs of future companies. Cultural innovation, i.e. reforming the way work is done, is the starting point of the entire innovation-based economy.

Manuel Castells, researcher of information society, emphasises that the renewal of work culture is the key factor for achieving other types of innovation. That is why the way work is done is a central factor impacting competitiveness.

There will always be jobs belonging to the first category and they will surely be needed in the future. However, the share of jobs with open methods and even open goals has increased and this increase is enhancing. The goal of such jobs is the (continuous) reform or creation of something new instead of repeating the old. By creating new we mean new or reformed services, products or earnings logics. We claim that reform requires change in the way work is being done. So-called divergent thinking and doing, searching for and applying alternative ways of operating are not the exclusive privilege of the creative industry, but rather a direction for all businesses.

Competition between companies is the driving force of doing things with the goal of creating something new. Oivallus' first interim report described how the competitive edge in a nutshell is based on three things. The first alternative is making things at a lower price than others. The second option is making things at the same price as others, but better. The third alternative is innovation-based competition: doing something that nobody else is doing and cannot do.

Although innovation activity is not an exclusive right of Finland and other western countries, Oivallus' excursion to Shanghai clearly demonstrated that Finland's succeeding in price competition (alternatives 1 & 2) is ever more difficult. That is why it is most appropriate to invest in creating new i.e. innovation-based competition.

"Well that sounds nice but surely it does not apply to all jobs?"

The message on the increase of not-by-the-book jobs and the need of new ways of working is based on a few dozen corporate interviews, among others, made in the winter 2010. Leadership of trailblazer companies were selected for the interviews. Are these companies with their messages exceptions? Do the changes in the ways of working only concern expert level and management level jobs? "Well that sounds nice but surely it does not apply to all jobs" was a comment that was often heard.

In February and March 2011 the views of these trailblazers were tested with a wider questionnaire. Figure 1 presents the views of a hundred companies about the current and future ways of working.

"You only need to look back ten years to notice how much things have changed – on all levels. So why wouldn't this also happen in the future?"

Respondent to company questionnaire

Many of the respondents estimated that the ways of working will become more modern, varied, autonomous, more creative, bolder in risk-taking and more experimental within the next few years. Work was also characterised as more international than before.

In the open questions of the questionnaire, the respondents emphasized that the change really must happen. The majority of the respondents believed that the changes also apply to the so-called worker level.

Companies were also asked what measures were needed to really change the ways in which work is done. Of the given alternatives, the corporate respondents stressed the importance of recruiting new people, increasing job rotation and the example of the leadership in guiding the change.

Competence areas linking with each other

The second interim report of Oivallus described the bigger picture of competence needs of businesses in the 2020s. The desire and the ability to do work in a new way are the basis on which other competences and their combinations are built. Other important competences are:

- Network skills
- Global skills
- Business competence
- Technology competence
- Environmental competence
- Service competence
- Design thinking

Network skills culminate in the ways of utilising information. The ability and the desire to operate with information require being alert and curious about whatever is happening at a particular moment. It requires interaction with other members of the network. Only when these things are achieved can we speak of network skills.

Global skills are a natural part of any business in the future, and apart from network skills it requires the ability and desire to think and act globally. In addition to these abilities there is need of knowledge of different market areas and their cultures, international business competence and language skills.

Business competence was seen as a central competence need in Oivallus' business interviews. Good ideas are not implemented without business competence. The fruits of innovative development can only be harvested when the company has the competence to generate, produce, manufacture, bring to market and sell. There is also need for understanding the operating environment and consumer habits that is at the core of service competence.

Ever greater numbers of Finnish companies are in practice service companies although they are defined as industrial companies. Traditionally, technology competence has been Finland's strength. In the future, we need to put the same effort to applying technology and generating service ideas as once was put into developing technology.

"The answer to a new competence need for example in the construction field is that the needed competence area must be added to the construction engineer's degree requirements. Why not hiring someone other than an engineer?"

Vice rector in charge of university education

Environmental business is one of the central fields of application of technology in the future. Understanding the relationship between one's business and the environment is beneficial in all sectors, but in some areas it is a necessity.

The direction of the future in any field is to become more user-oriented. Companies need method-level competence that aims at understanding the customer's environment, needs and hidden desires. Design thinking is a method of working and it also links to other competences listed above. The methods of design thinking include prototypes, experimenting and testing, often also on the so-called common sense.

Wow, what a list!

The lists of competences needed in the future are often interpreted from the point of view of the individual. Speaking of competence needs of the future easily creates an image of a super individual of the work life. However, one person does not need to know everything – not even in the future. Instead, the group and the network must have wide and deep competence. In the future it is crucial to combine various competences through networks.

Combinations of competences are needed because ideas are typically refined in groups. Somebody comes up with the original idea, but usually people with different competences are needed to refine the idea into a commercial solution. How well different people work together is crucial for success.

Working in groups, learning from others and refining the ideas of others are skills that need practicing. They are not our current strengths in Finland. That is why they need to be emphasised in educational institutions more systematically than is currently being done.

2

PROMOTING CREATIVITY AS BASIS OF ALL EDUCATION

This chapter discusses the kind of education that would coach people for work in the 2020s. From the point of view of not-by-the-book jobs, primarily two factors that are linked together should be advocated in future education: creativity and entrepreneurship. Working in groups pushes forward both of these.

"Does the Confederation of Finnish Industries think that companies are successful when people mess around?"

The question about whether people should mess around in companies to further success has been asked many times when speaking about future not-by-the-book jobs. The lack of strict instructions may give an impression of chaos. That is not the case.

According to current thinking, creativity rather refers to divergent thinking: the ability to approach issues from different angles and the ability to see alternative solutions to problems. Creativity is not related only to arts subjects or the so-called creative fields.

Creativity can also be originality or being different and surprising. It is noteworthy, however, that creativity also means the so-called everyday creativity, i.e. seeing alternatives and adopting them in everyday situations.

The core of entrepreneurship is in daring to try

Creativity as concept is close to an entrepreneurial attitude. The motto heard in Team Academy[1] represents both a creative and an entrepreneurial approach: "When you run out of ways, you turn to using means."

Commissioned by the Nordic Ministerial Council, the collegial body of researchers in Norwegian Norland University studied creativity, innovation and entrepreneurship in Nordic schools.[2] One of the central findings of the study was that a so-called systemic change is required to further them: entrepreneurial attitude should be the pervasive basis in all education. Entrepreneurship must not be understood merely as raising students to become entrepreneurs, nor does it refer to individual courses or subjects, but rather supporting an entrepreneurial attitude or a mindset throughout education.[3]

"The core of entrepreneurship and entrepreneurship education is in daring to try", says **Pertti Parpala**, director of Ritaharju community centre in Oulu. We need to change the ways of learning so that they encourage experimenting and testing and even require them.

Creativity and collaborativity instigate learning

Approaching learning as a creative process is based on the concept that learning is about creating information, not just adopting it. Creative learning emphasises the significance of imagination and divergent thinking.

According to InnoSchool[4] project that has studied and developed the school of

1 Team Academy is the centre of excellence of entrepreneurship of the Jyväskylä University of Applied Sciences JAMK. Studying in team Academy is based on business projects. Oivallus visited Team Academy in March 2011.

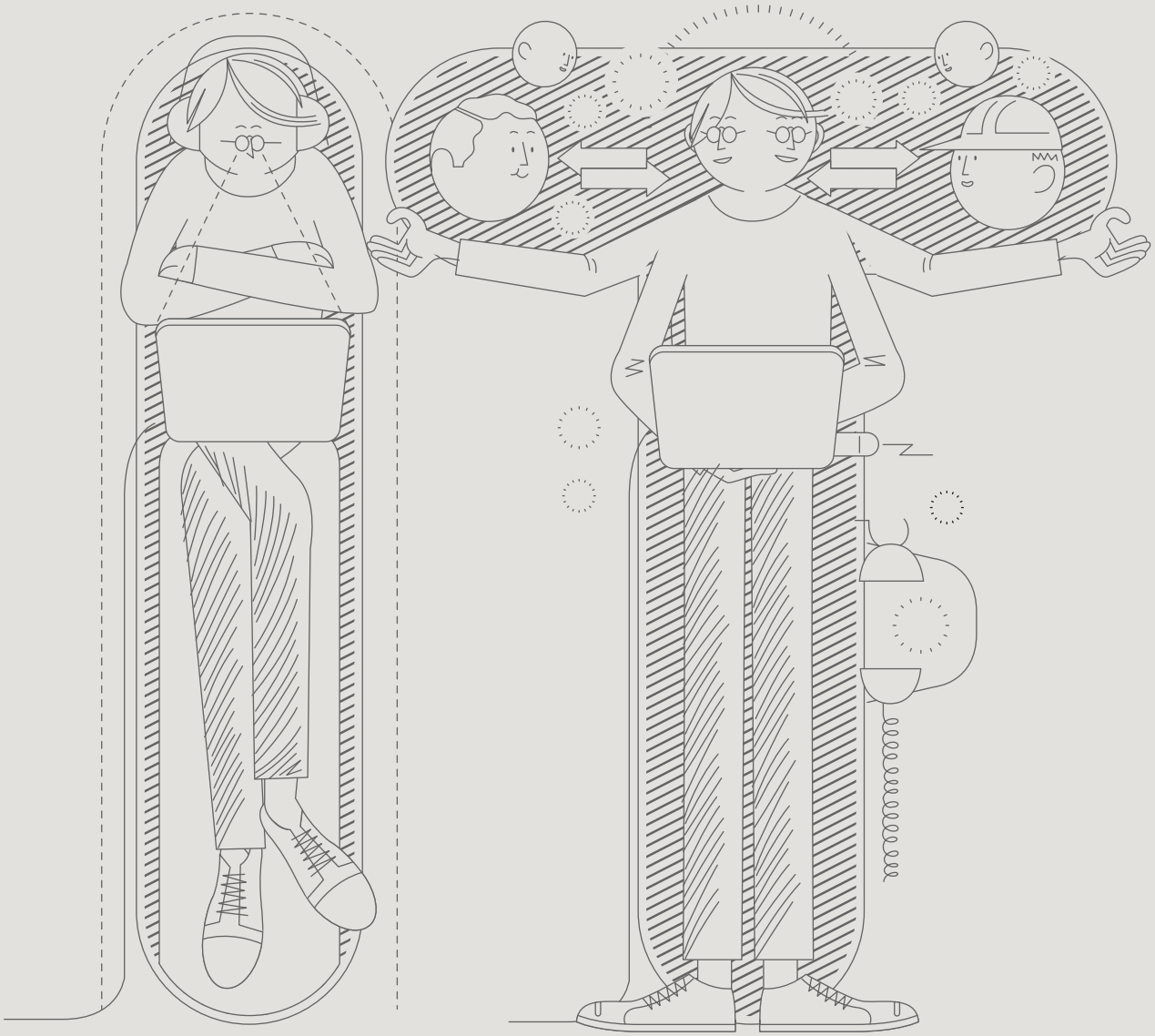
2 www.norden.org/da/publikationer/publikationer/2011-706 (language: Danish)

3 According to an article in the Wall Street Journal (9 March 2011), learning that coaches for entrepreneurship includes negotiation skills, failure, overcoming fears and the ability to combine skills. According to Cameron Herold, problem solving, creativity and the ability to see possibilities are the most important features of education that teaches entrepreneurship. Cameron Herold: Let's raise kids to be entrepreneurs (TED Talk 03/2010). www.ted.com

4 InnoSchool is a transdisciplinary research project that published its results at the end of 2010. Smeds, Krokfors, Ruokamo & Staffans (edit.): Innoschool – Välittävä koulu (Innoschool – Caring School).

Future work life requires T model experts

Figure 2



IBM has launched the so-called T model expert. The consulting company IDEO in the United States also says that it recruits T model individuals. In this model, the stem of the letter refers to deep substance competence and the horizontal line refers to the ability to understand other areas of competence and get excited about them.

It is difficult to form T model groups out of I model people. The Finnish education system has been based in the belief that the horizontal line in the letter T grows of its own accord, if needed. Future education should focus on growing the horizontal line in T.

Everything has not yet been invented

Many have asked themselves the question 'what will I be when I grow up' – most of us when we were very young. The question has its downside. At some point it becomes a mind game that tends to condition us to think throughout our formal training (and even after it) that somewhere there is a point that seals 'being grown up' – a professional title. However, most of us find several differing points or several careers instead of only one.

Many experts participating in Oivallus were wondering whether we inadvertently give the pupils and students the impression that everything has already been invented. Does education generate the idea that this is a complete world in which most things have already been solved? The illusion of a complete world easily contributes to seeing work as repetition and implementation of something that already exists. Work places are seen as established structures in which work is permanently done in tried and true ways, in the same order and with the same tools.

Those who are at work know that everything has not been invented yet, far from it. Even in small daily matters there are many things that can be done differently. The world is not complete, on the contrary. It is crucial to notice the differences in the worlds of thought between those who are already in work life and those who are only entering it.

Because everything has not been invented and the world can still be moulded, finding your so-called own agenda become a central mission of education. Chief Innovation Activist **Anssi Tuulenmäki** of Aalto University spoke in Oivallus' seminar in the autumn of 2010 and emphasised that people need an agenda, in other words a dream or passion, because "dreams run the world". Some recognise their agenda, but many do not. Schools should encourage pupils to recognise and realise their dreams. People with dreams are also motivated to learn and to dig for more and more information related to their own agenda.

Should the question in the familiar mind game be changed? What all will I be? What are the things I want to work with? What is my agenda?

the future, from the point of view of the learner, the following things, among others, support creative learning:

- Possibility to participate, suggest and invent
- Possibility to examine and search for connections between things, and
- Atmosphere that underlines the joy of doing.

A collaborative learning concept stresses the social character of learning as well as the interaction and participation in common construction of knowledge: together one is able to solve more complex tasks than individual persons could.

2.1 Soft skills result from hard training

Learning is about skills and knowledge in parallel. Pedagogues speak of holistic learning. The separation of skills and knowledge as well as theory and practice is often artificial.

In the Education Intelligence project[5], competence was defined to be comprised of knowledge, skills, attitudes, values and networks. Oivallus project relies on this definition. However, in the company interviews and expert discussions done during the project, skills and attitudes proved to be most central. The message was that the Finns and Finnish education have the greatest challenge in developing these. That is why this report focuses on skills and attitudes.

Skills culminate in two things: the way we relate to others and the way we relate to information.

In the interviews made by Oivallus in 2010, many companies said that they need 'interpreters' in their work communities. This in part indicates deficient soft skills. The need of interpreters does not so much refer to interpreting between different languages but rather to the discussion between people with different competences. The experts of different fields have even been described as 'tribes with different languages'; the interaction between these requires mediators to fit together different points of view and different competences. We may ask whether work life in the future needs interpreters or whether it needs for the different 'tribes' to practice mutual discussion earlier.

5 Education Intelligence is an anticipation project of the Confederation of Finnish Industries that ended in 2006. The final report, "Networking Makes the Knowledge Society Strong", is available at www.ek.fi.

"Most students still have a so-called cookbook orientation: they demand superficial facts directly applicable in practice. It is hard to get these kinds of people involved in ambiguous work with experts of different fields."

Vice rector in charge of university education

Do skills go unappreciated?

Does the typical division into soft and hard competences lead us to think that skills are innate competences and something that one either possesses or does not?

The cornerstones of an entrepreneurial attitude – daring, experimenting and creativity, learning from others and building on the ideas of others – are skills. In layman's terms skills are often called 'soft' competences as opposed to knowledge, 'hard' or substance competences.[6] We assert that the significance of skills that are considered soft is growing at the same time as the share of not-by-the-book jobs increase. We also claim that they are not strengths in Finland today. Excellent skills are a result of hard and long-term practice. That is why they need to be emphasised in schools and during studies more systematically than is currently done.

Several of the experts participating in Oivallus have stressed that the use of skills must be integrated as part of learning in all school levels. As was noted in an Oivallus workshop, skills are hard to learn by sitting down and talking about them. Therefore, skills must be practiced and used in practice.

2.2 The whole truth is not generated by mere information

"Information is power" is a famous statement by philosopher **Sir Francis Bacon** (1561-1626). This notion is still true: the one holding the most recent, most profound and most clandestine information often has an advantage over others. However, the ability to utilize information has become ever more central. Utilizing information is power. Ever more often it is those who mutually share and refine information and do not keep it a secret that have the advantage. Instead of mediating information, education should offer preparedness to utilize and apply information better than it currently does.

The Finnish school system is strong in educating informational content. Traditionally, competences have been seen as the information that an individual masters. The education system has built on the idea of knowledge as a synonym for hard facts.

6 According to Stanford University Innovation Professor Larry Leifer, the dynamics between people, i.e. cooperation and communication, are more important than substance competence from the point of view of generating innovation. (Kauppalehti 23 January 2009: "Stanford tekee putkiaivoista pellepelottomia" ("Stanford turns pipe brains into propeller heads").

The greatest concern in the belief that all knowledge is fact is related to people as users of information. Does this belief turn us into mechanic adopters of information and cautious appliers of it?

In Oivallus' interview, Professor **Erno Lehtinen** told us about the problems of learning mathematics based on mechanical thought patterns. Research done in the early 1990's showed that in lower school levels, teaching produced the kind of mathematics skills that can be called 'calculus without mathematics'. The pupils were able to repeat sequences of symbols using mechanical memory strategies but they did not understand the mathematical ideas they had learnt and they were not able to apply them in situations that differed from the original ones even slightly. Similar strategies have been observed to be used by upper secondary school students. Upper secondary school students often mention that differentiation is the easiest part of upper secondary school mathematics. In fact, according to Lehtinen, differentiation involves one of the most difficult changes of thought in mathematics. Lehtinen underlines that understanding does not develop by merely memorising mechanical memory strategies.[7]

Understanding ambiguity and use of intuition will be very valuable in (work) life

The ambiguity and the contractual nature of information have not usually been strongly underlined in Finnish education. This has contributed to creating the illusion of pupils and students that work is something in which hard facts are the only keys to solution. Not even natural sciences are mere hard facts.[8] In addition to hard facts we need interpretation, views, opinions and for example intuition. Tolerating ambiguity is one of the basic requirements for succeeding in work life in the future.

According to **Samu Mielonen** and **Asta Raami**, intuition is particularly helpful if there is too little or too much information. At worst, there is simultaneously an overload and an underload of information: there is too much information but at the same time relevant information is missing.[9]

Education could further the understanding of the ambiguity of information for example by bringing together experts of different fields and by illustrating in this way to students and pupils that phenomena can be observed from the angles of different disciplines or differently even within one discipline. It would also create understanding that different points of view between people are natural and desirable.

Ambiguity requires argumentation: the more ambiguous the issue discussed and the more unique the goals, the more there is need of argumentation skills. This is how skills and knowledge are connected in future work life. One of the central skills is the ability to observe information from different angles and argue for one's own point of view.

7 Oivallus project interviewed Professor Erno Lehtinen in March 2011. Dan Meyer's speech in TED Talk has also inspired the project. Dan Meyer: Math class needs a makeover (TED Talk 03/2010). www.ted.com

8 ChemistryLab Gadolin in the LUMA centre of University of Helsinki Chemistry Department makes an effort to increase interest in studying chemistry. Pupils get to experiment and see in a laboratory environment what chemistry is about. One way to spark interest is to present how much there is ambiguity and things we do not yet know in the field of chemistry. Oivallus project visited ChemistryLab Gadolin in April 2011.

9 Helsingin Sanomat 1 May 2011. Mielonen and Raami study intuition in a research project financed by the Academy of Finland.

"Tell me and I forget, show me and I remember, do with me and I understand."

Chinese proverb

2.3 Capability belief emphasised in future jobs

Sari Lindblom-Ylänne, professor of higher education, underlines that the perception we have of our capabilities and our desire to learn define our actions even more than intelligence does. According to Professor of educational psychology **Kirsti Lonka**, it is the perception of one's capabilities that explains underachieving and overachieving in learning.[10]

The significance of capability belief is underlined in not-by-the-book jobs. Capability is linked to attitude, and companies strongly underline the significance of attitude in their competence needs. Ultimately, it is the attitude that matters, the companies note nearly unanimously. Belief in one's capabilities is needed especially when work is based on a broad framework instead of detailed instructions.

At best, the creative process produces a state of flow. Reaching flow requires that there is a high level of challenge but also a strong sense of capability. Developing capability belief requires a learning culture that encourages experimenting, doing and possibly failing. Feedback and encouragement should be self-evident in learning.

This kind of learning culture has been adopted for example in the Swedish Hyper Island School. The pupils in the school describe that the feedback culture feeds openness. After each project, everyone considers together what failed in the project and why. "Failure is not only an option; it is a reality of life."[11]

Capability belief is one of the messages of Oivallus that has received the most amount of positive recognition both among the companies and among the actors in the field education. When discussing capability, we want to emphasise that capability is something that education can enhance. Capability belief is connected to the ability and the desire to work in a team: people who believe in their capabilities dare to participate in refining information both in the role of giver and receiver of it.

2.4 Key issue of education: what or rather how?

The solution proposals of this report for the future of education are based on two main ideas: how to converge the ways of learning in schools with the ways of working in the future, and how education could motivate learning substance competences and developing them. Could the ways of working demonstrated by jazz improvisation be introduced in educational institutions since they can already be found in work of ever greater number of people?

Discussion about the future of education often turns into discussion about the methods, i.e. how people learn and how they are being taught. The common denominator in the messages about the future ways of learning and teaching is that they would model themselves after the methods of vocational education so that they would include more work life cooperation, experimenting, testing and also failing.[12]

10 Oivallus project interviewed Lindblom-Ylänne and Lonka in early 2011.

11 Scanorama 4/2009. Hyper Island upper secondary school is located in Karlskrona in Sweden. Its learning methods are based on active participation and experimenting, business projects and team learning. www.hyperisland.se

12 An article in the Newsweek magazine describes how a learning method involving experimenting and games has been adopted in 40,000 schools of the Indian province of Tamil Nadu, where the percentage of students skipping class had become extremely high. (Success Stories: Order through Activity. Newsweek Education 13 September 2010.)

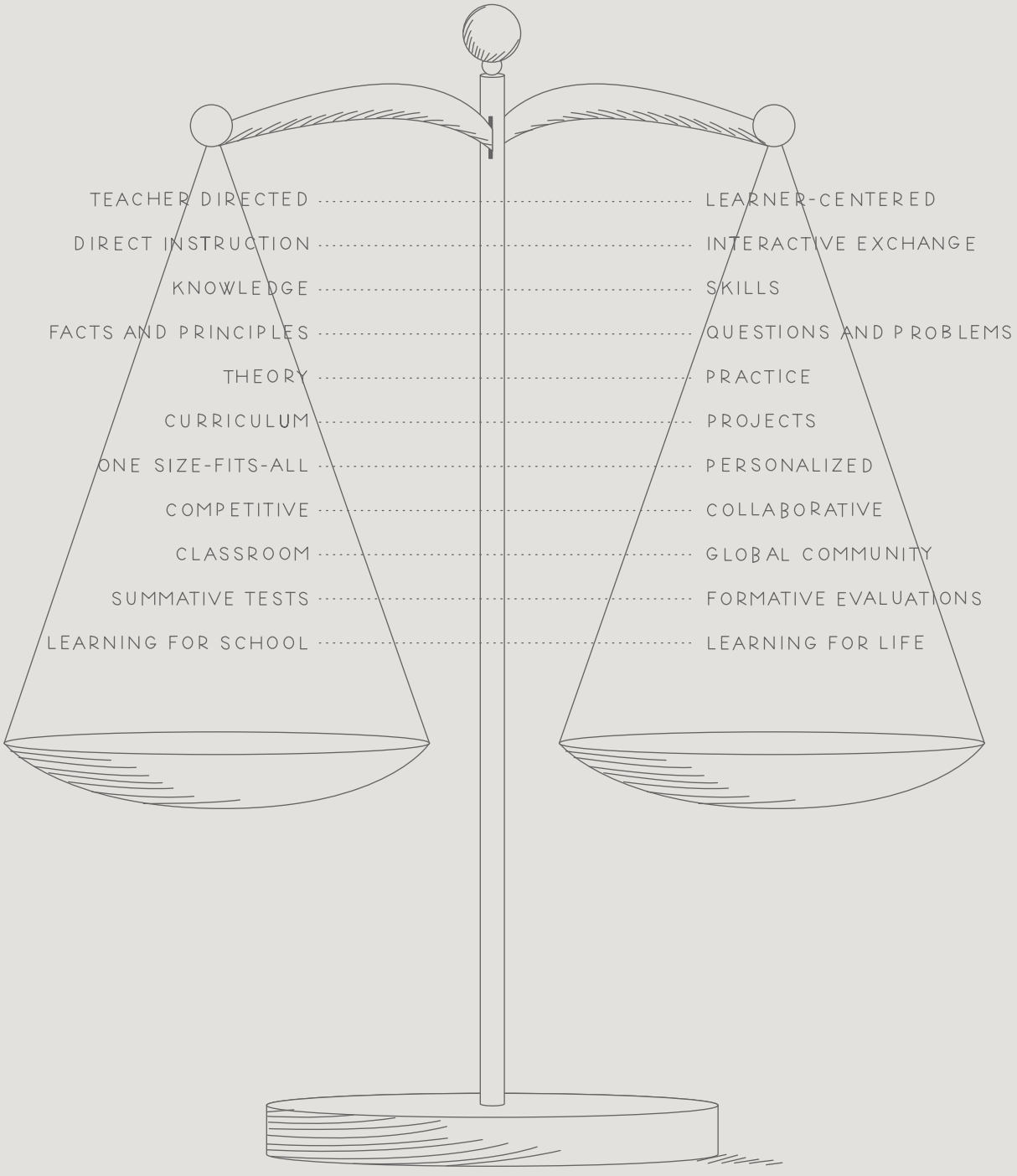
Chart 1: Reaching a flow requires capability belief

	Level of challenge low	Level of challenge high
Capability belief high	Boredom	Flow
Capability belief low	Apathy	Anxiety

Source: Kirsti Lonka. Flow-theory is developed by Mihály Cs'kszentmihályi.

Educational methods are not a zero-sum game

Figure 3



The figure specifies various teaching and learning practices. The goal is to achieve better balance between these ways of learning, not to replace the old with the new.

Source: Trilling & Fadel (2009): 21st Century Skills. Learning for Life in Our Times.

"Why don't people get out of the classroom more? Changing your point of view is an important skill in life and getting some fresh air is the simplest way to practice it."

Interviewed pedagogue

In his book "21st Century Skills", **Charles Fadel** writes that the teacher directed learning with direct instructions, transmitting information and stressing theory have long been the prevailing practices in teaching and learning (Figure 3).[13] Now actors around the world are looking for a new direction and a new balance between these. Fadel, who spoke at an Oivallus seminar, asked whether the scales should be tilted to the right when the equivalent change is occurring in work life.

The same formula does not work in all situations

While Fadel stressed the significance of skills, processes and practical doing in learning, he also underlined that this is not an either-or situation. The experts on learning and teaching interviewed by Oivallus had a similar message. They stressed that there is no single Method that is suitable for every case. There should be variation in how things are done and how things are studied. Variations in the use of methods in school help to understand the versatility of working and learning. Not all things can be solved with the same formula, tool or model of thinking.

According to **Maaretta Tukiainen**, a researcherer of creative work place, says that the importance of variation also comes from the fact that at different stages of the work process it is fruitful to operate in different ways. Both learning and working include different stages such as getting tuned, getting acquainted, brainstorming and elaborating.[14] (See Chapter 2.5)

Adopting new methods does not only mean abandoning the old ones, but also developing the existing ones. We claim that emphasising the 'how' does not jeopardise educating the 'what', rather the contrary.

Progressive teaching and learning methods may be simple

Although it would be tempting to give the future teaching methods the attribute 'innovative', progressive teaching methods may be simple. For example the Design Factory of Aalto University considers it crucial that the chairs and the tables of the classrooms can be moved. It is important for elaborating and learning together that the participants see each other and can modify the space to suit their needs.

Classroom teaching is most likely one method among many in the future. A lecture functions well as a learning occasion but its main purpose should be to activate, arouse interest and encourage self-study instead of pouring information into the heads of the listeners. Indeed, this already happens, but not often enough.

Before digital information, the most efficient way to transfer latest scientific information was to distribute it centrally from the lecturer to the heads and notes of the students.[15]

Simplicity does not mean acting without a method. Could not undeniable facts (C major consists of c, e and g or $a^2 + b^2 = c^2$) be transferred on without

13 Charles Fadel is the Global Education Lead of Cisco Systems. Fadel spoke in the Oivallus project seminar in the fall of 2010.

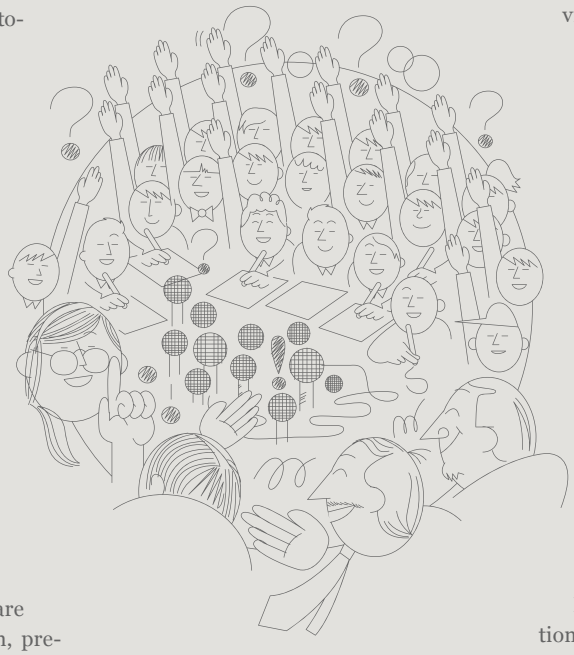
14 Maaretta Tukiainen 2010: Luova tila. Tulevaisuuden työpaikka (Creative Space. The Work Place of the Future.) Oivallus project interviewed Tukiainen early in 2011.

15 Professor Teemu Leinonen from Aalto University wrote about the connection between space and learning in Oivallus' Shanghai study visit report.

FUTURE MASS LECTURE TAKES AFTER A PRESS CONFERENCE

Although lectures to masses of students are criticised for their one-way teaching, an image of a future without them is not particularly realistic. It is therefore more fruitful to think what a lecture could be like in the future, as we did in Oivallus' workshop.

Currently, this is roughly what happens: a hundred students gather for the lecture in an auditorium with terraced rows of seats. The teacher lectures in the front of the auditorium. Students listen or at least pretend to listen and copy what is said in their notes. At best, a couple of comments or questions are presented to the teacher although the lecturer has said at the beginning to "interrupt if you have anything to ask". When the series of lectures is over, an examination is done, and those who pass will get a credit entry in their record. In the Finnish culture, there is hardly any debate or questions though the lecturer would hope for it.



In a press conference reporters are anxiously trying to get their turn, prepared to ask a dozen of questions. Could not the same work in the university? Lectures in the future could be modelled after a press conference with no lack of audience and questions presented. A press conference and a lecture both are more rewarding when you have first gathered background information, asked all the questions that concerned you and finally weighed everything you heard.

At times, there could be two or more lecturers. They would highlight different approaches to matters and thus further the idea of ambiguity of phenomena. Experts of the same field but belonging to different schools of thought would generate an understanding that there is debate even within the field. Experts from different fields could illustrate different sides of a phenomenon (human behaviour seems very different from the point of view of economics or behavioural science).

Although there are several speakers in a press conference, reporters and the TV audience usually want to hear more. What all do we still not know about the episode in hand? Thirst for knowledge gets many of us to seek for more information. "The human mind is not a copy machine. An activating lecture gets students interested, the debate continues in chat rooms and so forth", underlines Kirsti Lonka, professor of educational psychology.

Professor **Teemu Leinonen** and Professor Emeritus **Jorma Enkenberg** also think that a similar point of view would be good in the university. In a lecture it would be important to tell the students about what the particular field of science does not yet know. It would also be a fruitful starting point for sparking debate and motivation.

Learning project: What is money?

Elementary education should give tools to understand the operation of economy. Information about economy is offered through current school subjects but a more comprehensive understanding should be formed.

Oivallus' workshop worked on future curriculum. Of the themes focused on, knowing oneself and one's role in the society were considered most weighty. A learning project called 'What is money?' formed an exception.

The purpose of 'What is money?' project is to illustrate the operating mechanisms of society and demonstrate in different ways the connection between money and work. The project helps learners to have insight in why money exists, where money comes from, where it is made and where it goes.

In activating lessons, a stock broker and an auto repair shop entrepreneur tell about the movements of money. The history of money is taught for example on excursions to a bank and a mint. Applying a problem-based approach, learners consider what new things they would like to have in their living environment. Could you or could a group implement these ideas? How? Participants practice selling a good idea by giving speeches to convince others.

Could this kind of approach partly help in that Finns' sales competence, which has been considered weak, would not be a concern any longer in the 2020s?

any particular method? According to **Anu Yanar**, expert on higher education, who participated in our workshops, the strategy of information transfer is not that simple: "The process through which a fact in my mind turns into a fact in your mind is anything but a fact."

Grasping information through phenomena and problems

Recent debate on the distribution of lessons in basic education sparked discussion among those participating in Oivallus on what schools should teach from the point of view of future work life, and what the future curricula are like.[16] The discussion reflected concern that current subjects are fragmented and not in touch with each other. In its current form, elementary school seems to resemble a comb with teeth that are long but terribly far apart.

During their study of the elementary school, Finnish Youth Research Network's Research Professor **Tommi Hoikkala** and Researcher **Petri Paju** made an interesting observation about the gaps between subjects: it was the pupils that seemed to adhere most strictly to the notion that matters pertaining to one subject should not be handled during the lesson of another subject. Even natural sciences that are close to each other could not be mixed together. "That is not part of this class", was a telling comment made by a pupil.[17]

"When things are in silos in school, even one's mind ends up in a silo. People do not learn to connect things", one interviewed researcher cleverly synthesised. When speaking of future curriculum, it would seem suitable to move towards phenomena from isolated subjects.

Education that reaches across the subject-specific silos may be one solution to educating T-shaped people needed in work life (Figure 2). Phenomenon-based learning enhances the ability to perceive matters from different angles. In the CITE group of the University of Jyväskylä's Department of Teacher Education, the education of teacher students is based on crossing the borders between subjects. The basic idea is that learning in schools should not be based on separate subjects because the world is not divided in that way either.[18]

From the point of view of work life, learning that encourages grappling problems seems natural because to an ever

16 The debate was inspired by an article in Wired magazine (27 September 2010), which drafted future subjects for upper secondary school level. Among others, statistical literacy, writing for new forms, waste studies and remix culture were named as future subjects.

17 Hoikkala and Paju studied elementary school by observing a 9th grade group in a junior high school in Hämeenlinna for one semester. Oivallus project interviewed Hoikkala in April 2011.

18 Oivallus project got acquainted with the University of Jyväskylä's CITE group in March 2011.

"In 1930 my grandmother went to school to get the information, because that's where the information lived. It was in the books and inside the teacher's head. My father, again, had to travel to the school to get the information, from the teacher. Stored in the only portable memory he had, which was in his head, because that's how information was being transported. From teacher to student and then used in the world."

-Diane Laufenberg: "How to learn? From mistakes" (TED Talk 11/2009).

increasing extent jobs consist of defining problems and solving them. In problem-based learning, the starting point is a problem deriving from the society. **Esa Poikela** writes that the methodical aspect of handling the problem is central: the connection between education and work is not sought after only in the *content*, but also in the *operational linkage*.[19]

When discussing education that encourages creativity, people participating in the work of Oivallus have wondered which furthers learning more: giving the correct answers or the process of searching for answers to questions. Learning that occurs when handling a problem may be more meaningful than finding a solid solution or a 'correct' answer. Some participants in the project have continued this line of thought by pondering whether posing questions should be encouraged more than finding answers. Posing good questions is also the starting point of many new innovations and businesses.

How much do you need to know about the parts in order to examine the whole?

This is a question that has partly divided the experts participating in the Oivallus project. Some think that phenomenon-based and problem-based examination of things is possible only when those examining have a broad knowledge-base of the parts of the phenomenon. Therefore, facts need to be learnt first for example based on the current division of school subjects. Only after that can the learnt knowledge be applied to larger phenomena.

Those advocating phenomenon-based learning believe that the whole will lead to and also motivate to find out about the parts i.e. individual pieces of information. Their argument relies on research according to which competence and expertise develop rather by participating in the activities of a community than by studying formal information.

Whether an extensive base of knowledge been reached or not is also questionable. When can one begin to participate in building knowledge?

2.5 School doors open up to the surrounding society

The elements of a learning environment are typically divided into social, physical, emotional and virtual. They cover actions, structures and all instruments used to enhance learning.

It has become necessary to widen the concept of a learning environment because ever more learning takes place ubiquitously. Widening the learning environments does not refer to abolishing schools and work places as central places for learning. Learning that occurs outside of educational institutions or bringing outsiders into them enhances learning.[20]

There are already several interesting examples of educational institutions opening up to their surroundings. As an extreme example there is the School of Everything

19 Esa Poikela (edit.) 2002: Ongelmaperustainen pedagogiikka – Teoriaa ja käytäntöä (Problem-Based Pedagogic – Theory and Practice).

20 Flexible elementary education (JOPO) was started in 2006 to battle the problem of school drop-outs. Pupils in JOPO groups learn through action and utilise work places and other external learning environments. Could the idea of flexible elementary learning be broadened to apply to the entire elementary education?

PROJECT MASTERS FROM THE WEB CONNECT SCHOOLS TO THE SURROUNDING COMMUNITY

In junior high school, an electrician organises an electronics workshop, and in drama class a professional actor is sparring pupils. These project masters complement flexibly the competence of teachers.

Teachers have access to a service through which they can easily contact experts in different fields who offer flash presentations, lectures and additional services to teaching – either through the internet, in school or in their own facilities. For the pupil, external actors add a topical touch and interesting angles to teaching, and act as role models as well.

Is a classroom the right place for projects?

Networks are tools: those who have never been in contact or who have lost contact can find each other through networks. Networks are not any more mysterious than this. AISI initiative in Alberta, Canada (www.education.alberta.ca) and Tampere city Expert Network (www.asiantuntijaverkosto.fi) are examples of networks serving schools.

If we want to bring external competence to schools, the question arises whether the classroom is the right place for projects. Expertise does not only consist of the person but also of the person's work environment and tools. One alternative is to take the learners to the expert's natural environment, but this may make cooperation too demanding. A compromise would be to use all the school facilities in a versatile manner and adapt them gradually to become inspiring workshops.

Threshold to utilising experts must be low

Individual teachers do not necessarily contact experts that they do not know even though there was a functioning service for this purpose. One way to lower the threshold and to increase reliability is to build a school-specific local database with information on people who are willing to contribute their expertise to classroom needs. Experts could be encouraged to offer brief web interviews or flash lectures for free to teachers.

In the original operating model, the service would have experts on different school subjects, but the service could be broadened in many ways. Method coaching, work supervision, organising excursions and copyright counselling as well as special skills needed in projects are examples of things schools may need.

Expert is present to support teaching

Certain risks come with utilising external experts in schools. As the service becomes more widely known, prices may reach consultation fees in the market. Actors must understand the difference between consulting assignments and expert assistance in teaching.

The Basic Education Act decrees that basic education can only be given by a class teacher, subject teacher, special education teacher, pupil counsellor or teacher trainee under the guidance of a teacher. It restricts the use of external experts so that they do not teach in elementary school. Therefore, the division of roles and responsibilities would be clear: the teacher teaches, the expert is present to support teaching.

Tarmo Toikkanen and Jukka Purma wrote Oivallus a discussion paper in which they outline project-like learning and guidance in the school of the future. The writers are researcher of learning environments at the Media Lab of Aalto University School of Art and Design. The proposal is a summary of the original text. The entire text is available (in Finnish) at www.ek.fi/oivallus

in which learning has been organised according to supply and demand. The web-based marketplace for learning brings globally together volunteer teachers and those who want to learn. The purpose is to minimise the limitations to learning set by place.[21] Ritaharju School in Oulu is also an often quoted example of a school that has thrown its doors wide open.[22] The school is part of a community centre that consists of a day-care centre, youth centre and a library. The learning centre is open to all inhabitants of the area and the school aims at being a modern village community where learning is project-based and collaborative. Simulation of real world situations in learning also tells about the continuously more ubiquitous nature of education. In Enterprise Society elementary school pupils get to run the daily routine of a society and especially work places in the professions they have chosen.[23]

Project-based ways of learning encourage the schools to open their doors. Researchers **Tarmo Toikkanen** and **Jukka Purma** approach opening school doors from a teacher's point of view. The central idea of the researchers is that in the future, there would be so-called project masters working alongside the teachers. An equivalent model is already being used in Alberta Province in Canada (more information on project masters on the previous page).

The school doors are also opening to new cultures and nationalities. Even now and especially in the future, Finnish is certainly not going to be the only language or the only cultural background in a school or a workplace. Differences are richness in a work or a school community: multiculturalism brings with it lots of new competences, new ways of working and new points of view. If there is will, multiculturalism and a global mindset will be daily and natural parts of work and school community in the future.

Space that furthers creativity furthers learning

"We are not here to have fun" is a thought pattern that is still reflected in the Finnish culture. Of course having fun is not the main purpose of a work place or a school, but it is not harmful either.[24] As one of the interviewed researchers noted: "Creative thinking does not blossom in a state of burn out, but neither does it blossom in a state of boredom".

New learning environments may further cosiness, and as a consequence also learning.[25] In an ideal situation, a suitable learning method is tailored based on the learning goal and based on the method, the space is chosen that is best suited to the learning situation. Naturally, it is not always possible to do this. However, by small measures, the learning space can be modified to be more opportune for learning.

Already the fact that the learners can modify the space may further learning. In an Oivallus workshop in the facilities of Aalto University School of Art and Design, the participants agreed that the possibility of making the space one's own is central to learning.[26] It creates an actor-centred atmosphere and a feeling

21 www.schoolofeverything.com

22 Oivallus project visited Ritaharju School in April 2011. www.edu.ouka.fi/koulut/

23 Oivallus project visited Enterprise Society in the Museum of Technology in April 2011. www.yrityskyla.fi

24 Edible Schoolyard in California is an example of a learning environment that fights against boredom. It is a garden and a kitchen that functions as an experimental learning environment of the local elementary school. In addition to providing an environment that encourages experimenting and doing, it also strives to enhance a comprehensive understanding of the environment. www.edibleschoolyard.org

25 The concept of the Stress Free Area created by Margit Sjöroos has been applied for example in Siltamäki School in Helsinki.

26 In Jakomäki Elementary School in Helsinki, pupils designed the classroom of their dreams. The classroom was divided into parts for different work stages, encouraging project-like learning. kuninkaantien. koulufoorumi.fi/node/223

that the learner is not 'chained to space', having to work on its terms.

According to Maaretta Tukiainen who has studied the creative process and space, at different stages of work it is good to utilise different methods but also different kinds of spaces. Spaces that serve different stages of work are at the core of the future school and the future workplace.[27] According to Tukiainen, familiarization often requires a peaceful environment whereas brainstorming requires that the team is adequately small in order to create a trusting atmosphere. Elaboration stage requires a space and a method that enhance open interaction so that information sharing is done in the best possible way. The basis of a creative space is that it allows team work.

Many work places are only in the beginning when it comes to providing spaces that enhance learning and working. There is focus on for example who gets the biggest study and the best view. In more advanced work communities thought and effort is put into providing spaces that suit different stages of work.[28]

Traditionally, advertising agencies and other work places considered creative have focused more on work spaces. Recently, however, there are similar examples even among law firms.[29]

The increase of teleworking has sparked questions about whether there is too much focus on spaces and their significance. Many of the respondents in Oivallus' company questionnaire (see Chapter 1) disagreed, however. "As teleworking increases, there is less need of a classic office environment which means that office space is designed for meetings of small groups and for teamwork."

Technology enables a collaborative learning culture

If we want to bring education to this millennium, the role of technology and virtuality must be a given in daily learning.

In the United States, companies of the so-called creative industries were asked for ideas that would enhance creativity in education in a contest launched by the initiative No Right Brain Left Behind. One of the proposals that made it to the shortlist of the contest was a Stand-Up Desk.[30] It is hardly likely that schools would soon have desks that turn into interactive whiteboards, as the proposal suggested. However, the central idea of the proposal is not technology but rather reversing the roles of teacher and learner: the desk is believed to encourage the pupils to present their own thoughts and ideas in the learning situation.

Adopting information and communication technology does not necessarily come from an attempt to improve learning results but from a need to guide pupils in the use of tools that are used everywhere outside of school, says **Jarmo Viteli**, researcher of e-learning. Information and communication technologies offer several ways to interact. They also further the generation of a collaborative culture.

27 Maaretta Tukiainen 2010: Luova tila. Tulevaisuuden työpaikka. (Creative Space. The Work Place of the Future.)

28 For example Microsoft's mobile office in Holland is a rotating workplace. The space has been designed according to work stages so that the personnel do not have permanent rooms of their own.

29 Fondia is a law firm in which development discussions can be held on a treadmill in a gym called Hikilä (Sweatville) and meetings in the Classroom in front of a blackboard. Anna magazine wrote about Fondia and new kinds of work spaces in its article "Hyvästi peruskonttori" ("Goodbye, ordinary office") 11/2011. www.fondia.fi

30 rightbrainsare.us/ideas/stand-up-desk/

31 Suora yhteys. Näin sosiaalinen media muuttaa yritykset. EVA 2010. (Direct connection. This is how social media is changing companies. Finnish Business and Policy Forum report 2010).

32 There are several excellent examples in Finland about the use of virtual world in enhancing teaching. For example in Sotunki Distant Upper Secondary School in Vantaa, ever since 2009 courses have been available on the Sotunkisaari (Sotunki Island) created in Second Life.

33 www.ocw.mit.edu Oivallus project met Carson during its visit in MIT in the spring of 2010.

Weight on the word social

Antti Isokangas and **Petteri Kankkunen** note in their report on social media that new ways of working and digital communication media used to move from companies to homes and people's private lives. The direction is reversed in the ongoing change of work culture.[31] There is also a technology gap between many educational institutions and pupils: in the before mentioned up-to-date devices are an exception, in the latter they are a rule. In order to narrow the gap, we do not necessarily need to bring the technology in schools to the level of homes, but the techology and the devices the students already have could be used in teaching. Using the students' own devices to enhance learning has been a trend in schools for years and it seems to be growing stronger.

In addition to the pupils' own devices, the pupils' personal virtual environments will also be a part of daily learning in the schools of the future. As Jarmo Viteli has noted, the use of social media in learning is not a fad but rather a long-term change in the ways of working. That is why the web, and social media as part of it, is a natural part of preparing people for the work of the future.[32] Social media is a collaborative instrument for refining information (read more in Oivallus' second interim report).

Technology allows globality

A large part of learning occurs outside of schools. Internet has had a big role in this development. As the aforementioned report on the impact of social media notes, the web has so much information that large parts of it are inevitably mutually conflicting. The recipient is increasingly more responsible for interpreting it. Critical evaluation of sources and of the quality of information is also part of technology competence.

Although interactive technology is a clear trend in future learning, one-way utilisation of the web also has its role. OpenCourseWare (OCW)[33] is a databank of MIT's course material in which the university publishes lecture material as well as exam questions and assignments openly for everyone to use.

MIT's External Relations Director **Steven Carson** says that a special feature of OCW is that students are able to access the so-called basic information in advance and the time allotted for lecturing can be used for discussion. Carson underlines that sharing the course material does not aim at interactive telestudying: interaction occurs within the classroom walls.

In the era of social media this seems strange. Carson's explanation is simple: "MIT is good at teaching in the classroom. Internet is good at distributing information."

MIT has also noticed another interesting factor in the web learning offered by OCW. It encourages teachers to share and utilise each others' ideas. OCW is based on the idea of making information globally accessible for everyone interested so that learning can occur ubiquitously.

In the school of the future, virtual and physical learning environments as well as interactive and one-way use of information and communication technology are present side by side in learning. The virtual space does not replace the physical one.[34]

2.6 In appropriate circumstances, teachers can be the engines of change

Changing schools and the culture of education ultimately depend on the actors: teachers on all educational levels. Education can be changed through the actions of current and future teachers if they perceive work life and competences in a new way. Teacher training is a cause of pride in the Finnish educational system, and with good cause. However, based on the results of this project we propose two points worth developing:

- On all levels of education, the teacher must primarily be an expert and a guide in learning, not so much a holder and transmitter of the information content to be taught.
- Teaching must be more of a team work so that it functions as an excellent example of working together to the pupils and the students.

The roles of teacher and leader resemble each other

At best, the teacher is an enabler and a sparring partner. The same characteristics are true of a good leader. For a long time, the literature on management and organisations has discussed the increased emphasis on leadership instead of emphasising the management of issues. The need for teachers as enablers of learning instead of transferers of information has been widely recognised in official speeches, but according to those participating in Oivallus' discussions, there is still a long way to go until this way of thinking is adopted on the grassroots' level. 'Information first' -thinking seems to be true not only of teachers but also other expert professions.

Strengthening learner-centrism does not mean that the teacher's significance vanishes but that the teacher's (and the leader's) role becomes that of an enabler. From an expert on teaching, the teacher turns into an expert on creating a learning environment and into a facilitator of learning.

Self-management both in work and in learning has been discussed much.[35] It should be emphasised that it is not synonymous to aimless drifting on one's own. A self-guided pupil needs strong guidance the same way as self-guided workers need their closest supervisor, was pondered in the Oivallus workshop.

Although teachers are the engines of change, they cannot be burdened with changing the entire education on their own. Directors of schools are in a central role – teachers need a leader as well. According to many, supporting the (competences of) teachers has suffered at the expense of supporting the (competences of) pupils. The directors of schools also hold the keys

34 In A Day in My Life project, pupils in Mesa Union School in California and Arabia Elementary School in Helsinki documented their environment by photos and web journals. Pupils learnt about each others' environments through the web so that virtuality and locality were combined in learning. Find out more about the project in Innoschool – välittävä koulu (2010) (Innoschool – Caring School).

35 Newcastle University Professor Sugata Mitra's well-known experiment Hole in the Wall demonstrated how a computer placed in a slum got the children in the area to learn on their own. After Mitra's research results were published, many asked if teachers are no longer needed. Mitra himself has underlined that this is not the case. (Sugata Mitra: Can kids teach themselves? The video is available on YouTube.)

"If the entire education system aims at developing individual performance and assessing it, the indicators are off when considering the work to which the education leads."

Interviewed pedagogue

to enhancing the interaction between the school and the surrounding community.

Teaching from private matter to common matter

Autonomous teaching is one of the strengths of the Finnish education system. The reverse side of the coin is a solitary teaching identity. Generally speaking, the pet peeve of some experts is thinking that my affairs are nobody else's business. Shared models of teaching or expertise can be seen as a threat to a person's expertise although that is not the case. If we wish to raise pupils to adopt a collaborative working culture, they need to see teachers acting according to that culture. For this reason alone teaching should not be a private matter.[36]

In his doctorate thesis, **Matti Rautiainen** studied the perceptions that subject teacher students had of the collaborativity of the school culture.[37] According to Rautiainen, the lack of a collaborative culture and co-operation is pervasive in the entire school system. "To simplify, we could say that the school does not change if the personnel does not adopt a collaborative culture and stress its significance in developing the school. And if teacher education does not stress co-operation in the teacher community as an important part of a teacher's profession, it is likely that the culture of solitude continues."

According to many experts, more collective forms of teaching clearly seem to be the direction in the future.[38] A more phenomenon-based curriculum also seems to push in the same direction by encouraging teachers to co-operate more closely.

Let us forget the mantra about aptitude for math or languages!

Numerous hopes and proposals, even demands have been presented in this report about reforming the Finnish culture of education and learning. The current and future teachers have received their share of these messages. One observation concerning the learners themselves is that the threshold for giving up on learning something should be kept high.

It became evident in Oivallus' discussions that many of us have decided early on and on rather feeble grounds whether we have aptitude for mathematics, languages or studying in general. Afterward many have understood that the decision could have been quite the contrary. Why was it ever necessary to choose?

Learning is about studying and practicing. Very few people are natural talents. Learning is not always nice and easy; sometimes it is downright uncomfortable.[39] However, it is always rewarding.

2.7 What is assessed will be learnt

Assessing is giving value to matters, notes **Jouni Välijärvi**, director for the Finnish Institute of Educational Research at University of Jyväskylä. According to Välijärvi, we must think carefully about what we want to give value to.

36 One key to developing collaborative attitudes is strengthening the mentoring culture. In Finnish schools, mentoring-style guidance in which older students help the younger ones is used relatively little when compared internationally. Mentors do not replace teachers but function as support to them. This was also underlined during Oivallus' discussion with the vice rectors of Finnish universities.

37 Matti Rautiainen 2002: "Keiden koulu? Aineenopettajaksi opiskelevien käsityksiä koulukulttuurin yhteisöllisyydestä." Väitöskirja. (Whose school? The subject teacher students' views of the community spirit in school culture. Dissertation.)

38 KnowledgeWorks Institute for Creative Collaboration has a vision that in the future, learning is supported by seven actors. For example people mapping community intelligence gather networks around local intelligence to identify learning paths and to organise community resources. www.futureofed.org/about/LearningAgents/

39 The significance of learning to learn is a standard matter in competence need reports. It is often said that there are three learning styles: auditory learners learn by listening, kinaesthetic learners by doing and visual learners by seeing. Self-knowledge is the cornerstone of learning to learn.

"The culture of one correct answer should be abolished. It is completely wrong to guide learners to reach for never being wrong."

Interviewed pedagogue

When we think of learning as linear transfering of information, it is logical to verify how much of the learnt material has remained in the person's memory. Nowadays, desire i.e. motivation is considered important for learning. That is why the kind of assessment of learning and competences that furthers motivation will be ever more central in the future. If the goal of education is furthering creativity, the assessment methods must focus on creativity. Assessing creativity and creative ways of working is not simple but the same goes for all assessment.[40] All assessment is contractual.

Traditionally, assessing learning has been divided into diagnostic, formative and summative. Diagnostic assessment examines the learners' starting level competence, formative assessment focuses on assessing the learning process and traditional summative assessment focuses on the learning result. The direction of learning assessment is clearly toward formative assessment and that is also under the greatest change in the future.

If we only value being correct, making mistakes becomes dreaded

Success is rewarded in learning. The most valuable thing is to get high grades in tests and not to give wrong answers (in public) to questions. The insight generated by making mistakes is, however, one of the greatest enhancers of learning. But if being right is the thing most valued in assessment and test situations, people easily begin to be terrified of making mistakes.[41]

'You learn from mistakes' is an attitude that also requires that you return to the mistakes made. The deficiencies in feedback culture were recognised especially on university level. "If you make a mistake, typically you get a lower grade, and you may not even know which mistake had been made."

Forbidden in school, required at work

Perhaps the most central tool for assessing learning in the educational system is a test or an examination. The test-centred assessment of learning has been criticised for its 'me and my brain' type of thinking. Namely, outside of the educational institutions, people are daily required to also use other people's ideas and thoughts.

Network competence refers to the ability and the desire to connect to different streams of information, seek information and refine it further. However, utilising tools, devices and learning material in the situation where learning is assessed is most often forbidden. In examinations, relying on information of others and on outside sources is called cheating. "In real life that's called collaboration", to quote the words of **Sir Ken Robinson**.[42]

From the perspective of work, assessment should target the application of information and the ability to refine it. Asking for help from a friend should be a central element in learning. What is forbidden in school is vital in work. It would be good to stress the use of information

40 One solution for assessing creativity might be to ask pupils in an exam to seek connections between different subjects. The article "Can we teach critical thinking?" discusses how creativity can be assessed in schools: www.good.is/post/can-we-teach-creative-and-critical-thinking/

41 Scientific American magazine article "The Pluses of Getting it Wrong" discusses the research results according to which pupils learn better in situations in which making mistakes is inevitable (Scientific American 03/2010). "The Failure Issue" (04/2011) of Harvard Business Review is dedicated to understanding mistakes, learning from them and recovering from them.

42 Sir Ken Robinson's animated speech on the topic is available at www.thersa.org/events/vision/animate/rsa-animate-changing-paradigms

outside of your own head in learning situations, such as examinations.

Assessment of learning that furthers the application of information uses projects as a tool. In the assessment of problem-based projects carried out by a team, the central focus of assessment should not so much be on the end result as much as on how the team has worked together.

Not less assessment, but better assessment

Should learning therefore be assessed less? Hardly. We probably do not need less assessment, but better assessment. Report cards at the end of term or periodic development discussions are not synonymous with a culture of continuous feedback. The idea of continuous feedback and encouragement are a given in trailblazer work places and schools.

Self-assessment is naturally included in continuous assessment; this way the learner can better recognise his or her personal learning style. Self-assessment forces people to return to what they have learnt and think about their own interests. Self-assessment is a way to raise life-long learners. In the school of the future, self-assessment is a daily activity and the teacher is foremost a supporter of it.

In Oivallus project, assessment of learning was examined in two dimensions: as an individual performance and as an overall performance. In the current education system, individual performance includes for example spot checks, examinations, portfolios or active participation in learning situations. Methods assessing overall performance include for example the baccalaureate and the elementary school diploma. Methods placed between the two are among others development discussions, self-assessments and theses.

What kind of assessment methods would focus on working in a team, everyday creativity and operating with information? We suggest that rather than assessing the overall performance, stronger focus would be on continuous, micro-level assessment. Self-assessment is part of continuous assessment and a tool that helps the student finding their own agenda. Technology helps the teacher in monitoring learning. Technology also allows real-time assessment in which, thanks to the internet, the teacher is aware of the pupils' progress, moment by moment if necessary. Continuous assessment does not mean moving toward continuous control, but toward continuous encouragement.

The assessment of learning, i.e. continuous feedback influences the learner's capability belief. Assessment is a finishing touch of learning that generates motivation. As one interviewed researcher put it, assessment methods are the last thing to change. What if we changed that first? What is assessed will be learnt.

EXAM ASSIGNMENT: DESIGN AND ASSESSMENT OF TEACHING AND LEARNING ENVIRONMENTS

The assignment is done collaboratively in a small group. The maximum size of the group is 4 persons. The solution/answer is returned during examination on 9 December 2010. Each group is prepared to present its solution in the examination.

Groups must agree on working rules in their first meeting. The work should take about ten days.

The assignment of the group (team) is to draft a description on future learning environment. The description may contain text, images and drawings. A creative solution is expected. Course exercises as well experiences and knowledge adopted elsewhere must be used in completing the assignment. The description must include an assessment of possible risks/ difficulties that may be involved in adopting the learning environment as well as an assessment on what may prevent adopting it.

Instructions for working rules:

Two things are relevant in good team work: the job gets done and the team member are satisfied with the way the solution was produced. Usually, working is easier if the rules related to working are agreed upon in the beginning. Usually, working rules are agreements on the following issues:

1) Agreements pertaining to working itself: how is work divided within the team? Who sets the deadlines? What is done if the team members disagree on the quality of the outcome? What is done if the members have different ways of working?

2) Agreements pertaining to the person in charge: is someone acting as the person in charge of the team? How is the person elected? Does responsibility rotate (recommended)? What are the responsibilities of the person in charge?

3) Agreements pertaining to communication: when does one communicate, what is communicated and by what media (face to face, email, chat, SMS etc.)?

4) Agreements pertaining to meetings: is one team member responsible for organising meetings? Where and when are the meetings held? What is done if someone is late or does not show up?

5) Other agreements: can members drink coffee or eat during meetings? What is done if someone is dissatisfied with the work of the team? How are conflicts solved?

Professor Emeritus Jorma Enkenberg's exercise for teacher students at the University of Eastern Finland sparked interest in Oivallus workshop in February 2011. Apart from the title (future learning environment), workshop participants also considered brilliant the second part of the assignment (what constitutes good team work?). The assignment was evidently a success, since the end results were very insightful. Read more about some of the exam answers at www.ek.fi/oivallus

3

CONCLUSIONS

Finnish education is recognized and looked up to. An egalitarian and stable educational system is an asset on which Finland's strong competence largely relies. We must put effort in the high quality of education continuously because recent, still somewhat weak signals indicate that differences between both learners and schools levels are increasing.

However, tending to quality does not mean that everything is done exactly the way it has always been done.

As 'not-by-the-book jobs' increase, primarily two things linked to each other should be furthered in all education: creativity and entrepreneurship. Learning in teams and networks advances both of these.

Changes in work require reshaping education (!)

As we have moved from an industrial society towards an information society, the earnings logic of companies has changed and it will increasingly be based on innovations. Considering Finland's characteristics and the developmental stage of its economy, we should be moving toward an experimental society that refers to a society that is widely looking for the new and unafraid of making mistakes.

The central issue will be whether people in companies know how to work in a new way, i.e. so that they generate renewed and new products and services. Mechanical doing by the book is rarely very fruitful. In the future, the goals of work and the methods to reach these goals in companies are very seldom set in stone.

In work that has more open methods and goals, the ability to invent alternative operating methods, views and solutions is needed. This is meant by the much-debated creativity. The core of entrepreneurship is in daring to try.

Social and other skills can (and must) be learnt

A systemic change is required to further creativity and entrepreneurship. Adopting an entrepreneurial attitude should be a theme that is pervasive throughout all education. Entrepreneurship must not be understood merely as individual courses or subjects or even as raising students to become entrepreneurs, but rather as supporting and furthering an entrepreneurial attitude or mindset. Divergent thinking and a desire to experiment and solve problems are the cornerstones of this kind of education.

Change is obtained when we focus on two things throughout the educational system: educating skills alongside information and doing together instead of stressing individual performances.

The skills that companies call for in their employees are linked to how we relate to information and how we relate to other people. Skills related to information culminate in observation, asking questions, association as well as critical observation of information and application, for example.

IN THE FUTURE THE PATHS OF EDUCATION AND WORK INTERSECT

Figure 4

The skills that are often refered to as soft skills, have for a long time been considered innate characteristics. This is not the case. The second interim report of Oivallus explained that having social skills and being extrovert are two different things. Whereas being extrovert refers to congenital temperamental features, social skills can (and must!) be learnt. Included in social skills is for example the ability to form contacts with people in multicultural networks, to discuss, to understand the viewpoints of others and to listen. Because these skills are really needed in work (and in life generally) developing them into natural tools requires long-term practice.

Wikiperson's competence is built together with others

The more complex and the more ambiguous the entities we work with or the more unique the ideas we reach for, the more we need the ideas and hands of other people. A human resource director interviewed for Oivallus sums up cleverly and perhaps provocatively the message of his colleagues: "Finnish education produces high-quality individual performers." Ever more seldom does this kind of competence profile serve work, and it is definitely not conducive to renewing it.

The competences of a person should be seen as wiki-like: our knowledge and skills are constantly building up. At times, we must also return back and specify. It is not called life-long learning without a reason. Accumulating knowledge and skills, specifying them as well as making corrective moves all require the help of others. We need education that supports and furthers working together.

In (work) life, multiple skills and top-notch expertise are characteristics of a group, team and a network. It is worthwhile to get interested in the skills of other people and also to lend and utilise them actively.

Cramming belongs in the past

Finnish schools have been blamed for being too focused on information and for fragmenting information into such small particles. Focusing on the mastery of information is not the best way to feed a learning culture that motivates or to further the competences described above. The cornerstones of the school of the future, skills and doing together, are learnt by doing, not by cramming. At best, learning is done in projects, it grasps information through phenomena and problems and it emphasises working in teams.

One of the central insights of Oivallus has been that the new kind of teaching and learning methods or spaces that further learning do not need to be something drastic. Much can be done with small things. For example strengthening the use of technology does not have to mean getting new expensive equipment, but utilising the devices the students already have.

If we assess mastery of information and use of information as individual performances, we raise and educate individual performers. What is assessed will be learnt.

Assessment means appointing value. Assessment criteria are contractual. It is important that the learners can be involved in making these contracts. From the point of view of the learners, self-assessment and developing the feedback practices are also necessary.

Education and research development plans and national core curricula are full of method speech, but...

The importance of developing teaching and learning methods and a collaborative culture is widely recognised. It has been written in the lines and between the lines of many curricula, reports and regulations. For example the national core curriculum of basic education says that it is based on a concept of learning in which learning is understood as an individual and a collaborative building process of knowledge and skills. Therefore, information cannot be transferred into the heads of learners, but the learners must build it with their own actions.

Although the Finnish education system has been improved continuously for decades, certain basic problems have persisted from one reform to another. Syllabuses packed with information undermine the good goals.

One way to instigate change is utilising the so-called change agents: making experiments and relying on reform-spirited people. The foundation of Finnish education is so strong that we can afford to try out new ways of learning.

Change agents are needed especially in Finnish universities. Universities are sought after places of study but not enough effort has been put in developing teaching because they have been able to attract good student material regardless.

University education is based on the latest research in the particular field of science that is being taught. You may ask, however, why university teaching is not based on the latest scientific knowledge on teaching. Oivallus' message to universities is: lots of incentives and interest in raising the level of pedagogic skills are needed!

The school of the future has no shortage of student counsellors

Providing fruitful circumstances is of utmost importance. When the circumstances – structures, tools, atmosphere and leadership of pedagogic operations – are in place, current and future teachers can be the instigators of change.

Teachers are made up of much the same elements as are the leaders of the future. Both are enablers, willingly sharing responsibility and acting as examples. Acting as an example also brings out the importance and necessity of working together. Internalising the culture of working together requires two things. That pupils work together and that they see that working together is daily life for their teachers. Teaching is not a private matter.

In the future all teachers could in their own way be student counsellors and career planning supporters. From the point of view of the students, career planning and student counselling should be seen as searching and finding guidelines for (work) life. For teachers, supporting career planning means opening up future prospects of different fields to the learners.

Message to all: from faith in diploma to faith in competence

In the future, degrees are made up of individual modular study paths. Taking into consideration individuality in education should not lead to the student drifting along alone too much. Concern for this undesirable development was expressed in many discussions and interviews of Oivallus.

In the future, education is in ever closer contact with the surrounding society, also with work life. Experts outside of school support learning, and learning also occurs outside of school doors, such as work places. Do companies have enough competence and desire to participate in coaching future professionals? In the future, as is the case today, 'ready-made professionals' needed by work life are not going to be available directly from schools.

These development trends powerfully shake our traditional ideas of the 'education pipeline'. We must really consider whether the old saying 'first study then work' is completely outdated. In Finland, people study for a relatively long time. Some of the additional years are generated by wandering in between the different levels of the education system. Because studying and working are often closely linked together in students' lives in Finland, it is in fact hard to say when current students actually enter the world of work. Does the fact that students work even really need a remedy?

From now on, we must consider critically the terrain between diplomas and competence. The issue of identifying and recognising competences is essential. Although getting a degree is sensible from the student's point of view in the future as well as today, we should turn from a certain kind of faith in diploma to faith in learning and competence. Considering the strength of the faith in education and diplomas in Finland, our faith in learning is weak. Are for example the three-year standard degrees in vocational education always necessary? Does the baccalaureate too heavily dominate the development of competences in upper secondary school? Do people need to start from the beginning when going from one field of education to another or when continuing studies that have begun in another country for example?

Could these kinds of changes gradually lead to education that produces, instead of diplomas, competences needed in daily life and that helps young and older students to find their own agenda in the path of life-long learning?

* * *

Oivallus' final report presents numerous wishes, proposals and even demands about changing the education structures and learning culture. We hope that the alternative ways of operating we propose would inspire experiments and ultimately reform.

TO DO

1. TEACHERS

   MAKE LEARNING A COMMON MATTER BY ACTING AS EXAMPLES OF WORKING TOGETHER

2. PRINCIPALS AND OTHER DECISION MAKERS:

   MAKE THE AFOREMENTIONED POSSIBLE!

3. LEARNERS:

   FORGET THE MANTRA ABOUT APTITUDE FOR MATH OR LANGUAGES! LEARNING IS PRACTICING. VERY FEW OF US ARE NATURAL TALENTS.

4. COMPANIES:

   MULTIPLE SKILLS ARISE AS THE SUM OF MANY INDIVIDUALS. NETWORK OPEN-MINDEDLY AND DARE TO RECRUIT OUTSIDE THE CUSTOMARY EDUCATION FIELDS.

5. EVERYONE

   LET'S KEEP THE VALUE OF LEARNING AND COMPETENCES HIGH WHILE SHAKING UP OUR FAITH IN DIPLOMA.

Oivallus project participants

The people that have participated in the work of Oivallus are the central informants of the project. Other sources are mentioned in the text.

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Discussion on the future of vocational education 6.4.2011:

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Discussion with the rectors of the universities of applied sciences (Arene) on 17 March 2011:

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