The Future of Learning: Preparing for Change
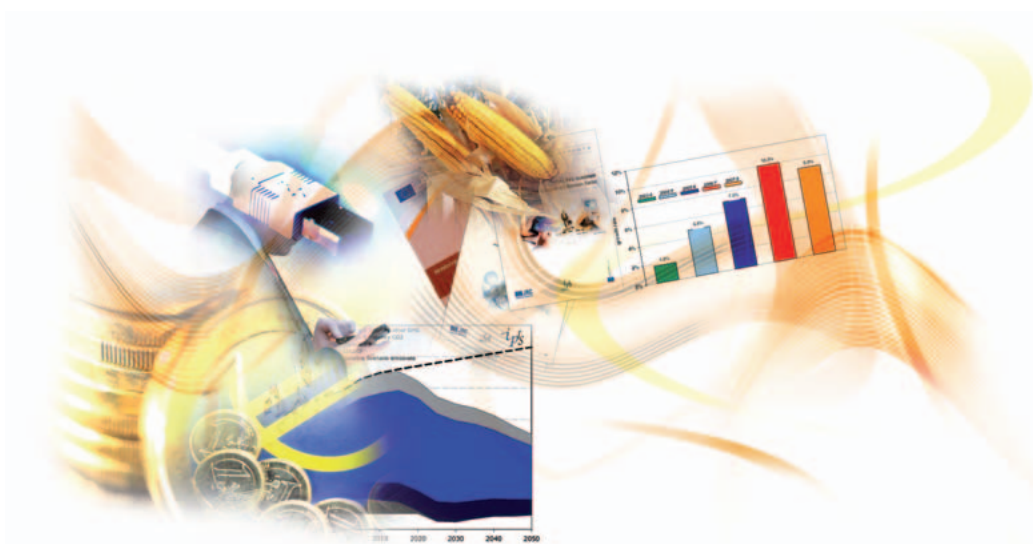
Authors: Christine Redecker, Miriam Leis, Matthijs Leendertse, Yves Punie, Govert Gijsbers, Paul Kirschner, Slavi Stoyanov and Bert Hoogveld

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However, as ever, the views and conclusions expressed in the report, together with any errors or omissions, are the responsibility of the authors.

■ Preface

The Europe 2020 strategy acknowledges that a fundamental transformation of education and training is needed to address the new skills and competences required if Europe is to remain competitive, overcome the current economic crisis and grasp new opportunities. The strategic framework for European cooperation in education and training ('ET 2020') recognizes that education and training have a crucial role to play in meeting the many socio-economic, demographic, environmental and technological challenges facing Europe and its citizens today and in the years ahead. However, to determine how education and training policy can adequately prepare learners for life in the future society, there is a need to envisage what competences will be relevant and how these will be acquired in 2020-2030.

To contribute to this vision-building process, JRC-IPTS on behalf of DG Education and Culture launched a foresight study on "The Future of Learning: New Ways to Learn New Skills for Future Jobs", in 2009. This study continues and extends IPTS work done in 2006-2008 on "Future Learning Spaces" (Punie et al., 2006, Punie & Ala-Mutka, 2007, Miller et al., 2008). It is made up of different vision building exercises, involving different stakeholder groups ranging from policy makers, and scientists to educators and learners. The majority of these stakeholder consultations were implemented on behalf of by a consortium led by TNO of the Netherlands with partners at the Open University of the Netherlands and Atticmedia, UK.

The detailed results of these stakeholder discussions have been published in dedicated reports (cf. Ala-Mutka et al., 2010; Stoyanov et al., 2010; Redecker et al., 2010a).

This report synthesizes and discusses the insights collected. It identifies key factors for change that emerge at the interface of the visions painted by different stakeholder groups and arranges them into a descriptive vision of the future of learning in 2020-2030. In a second step, the report discusses future solutions to pending challenges for European Education and Training systems and outlines policy options. Based on the descriptive vision presented in the first part, a normative vision is developed of an ideal learning future, in which all citizens are enabled to develop their talents to the best and to foster their own wellbeing and prosperity as well as that of the society they live in as active citizens. Strategies fostering such a vision and the policy implications supporting it are presented and discussed.

This final report and intermediate deliverables are available at the project website, http://is.jrc.ec.europa.eu/pages/EAP/ForCiel.html

The site also contains links to multimedia visualisations of the main issues raised in this report.

■ Executive Summary

Context and objectives of the study

To determine how education and training policy can adequately prepare learners for life in the future society, there is a need to envisage which competences will be relevant and how these will be acquired in 2020-2030. To contribute to this vision-building, JRC-IPTS on behalf of DG Education and Culture launched a foresight study on "The Future of Learning: New Ways to learn New Skills for Future Jobs" (http://is.jrc.ec.europa.eu/pages /EAP/ForCiel.html). This study aims to identify, understand and map how learning strategies and trajectories are expected to change, given current trends, thus creating a *descriptive vision* of the future, and to develop a *normative vision* outlining how future learning opportunities should be developed to contribute to social cohesion, socio-economic inclusion and economic growth. These two objectives were implemented by a series of extensive stakeholder consultations, employing different formats (workshops; online consultations; group concept mapping) and including different stakeholder groups (experts and practitioners; teachers; policy makers) as well as a review of studies and foresight activities.

The future of learning

The overall vision is that **personalisation**, **collaboration** and **informalisation** (informal learning) will be at the core of learning in the

■ Figure 1:   Conceptual map of the future of learning
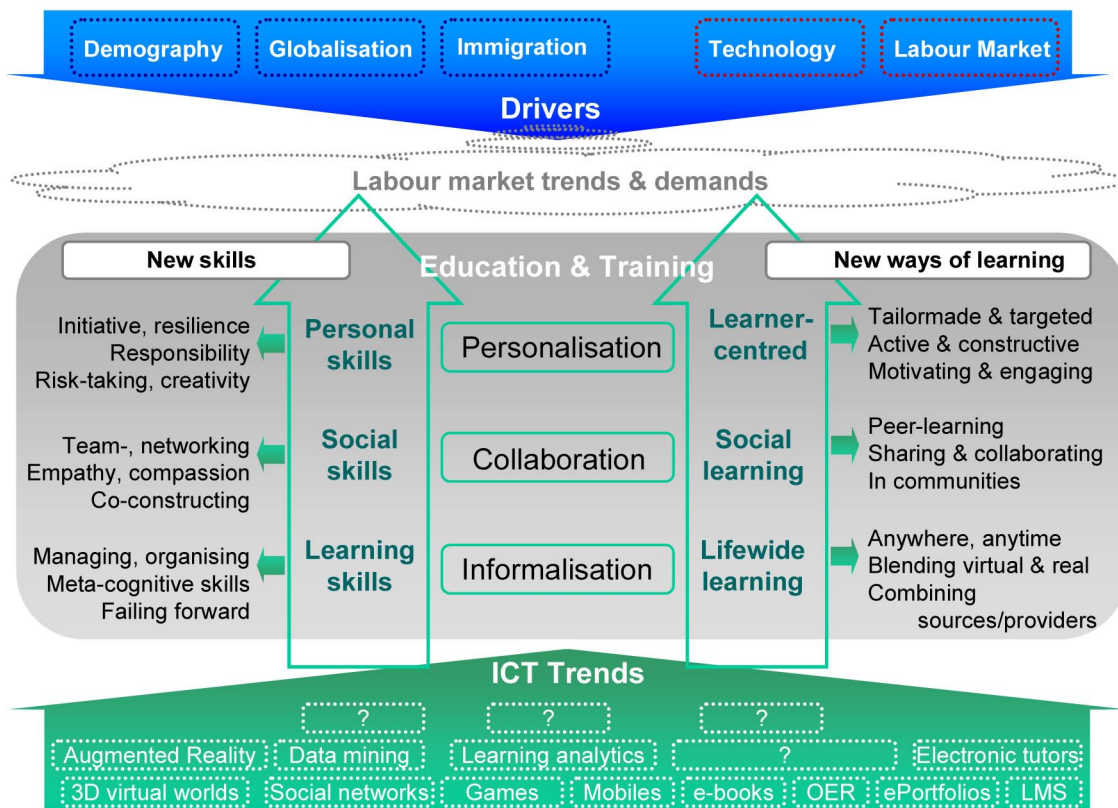
future. These terms are not new in education and training but they will become the central guiding principle for organising learning and teaching. The central learning paradigm is thus characterised by lifelong and life-wide learning and shaped by the ubiquity of Information and Communication Technologies (ICT). At the same time, due to fast advances in technology and structural changes to European labour markets related to demographic change, globalisation and immigration, **generic and transversal** skills are becoming more important. These skills should help citizens to become lifelong learners who flexibly respond to change, are able to pro-actively develop their competences and thrive in collaborative learning and working environments.

New skills. The increased pace of change will bring new skills and competences to the fore, in particular **generic, transversal and cross-cutting skills**, which will enable citizens to flexibly and pro-actively respond to change and to seize and benefit from lifelong learning opportunities. Problem-solving, reflection, creativity, critical thinking, learning to learn, risk-taking, collaboration, and entrepreneurship will become key competences for a successful life in the European society of the future. While mathematical, verbal, scientific and digital literacy will remain key building blocks for successful participation in society, it will become increasingly important for citizens to have a better understanding and awareness of the natural and social environment in which they live, which will lead to a new focus on nature and health on the one hand, and on civic competences on the other.

New learning patterns. With the emergence of lifelong and life-wide learning as the central learning paradigm for the future, learning strategies and pedagogical approaches will undergo drastic changes. With the evolution of ICT, **personalised learning and individual mentoring** will become a reality and teachers/trainers will need to be trained to exploit the available resources and tools to support tailor-made learning pathways and experiences which are motivating and engaging, but also efficient, relevant and challenging. Along

with **changing pedagogies, assessment strategies and curricula** will need to change, and, most importantly, **traditional E&T institutions** – schools and universities, vocational and adult training providers – **will need to reposition themselves in the emerging learning landscape**. They will need to experiment with new formats and strategies for learning and teaching to be able to offer relevant, effective and high quality learning experiences in the future. In particular, they will need to respond more flexibly to individual learners' needs and changing labour market requirements.

Six major challenges for the future of learning

This study has identified the following major challenges for the future of learning. *Initial Education and Training* institutions have to deal with:

- **multicultural integration** to address immigration and demographic change;
- **reducing early school leaving** to combat unemployment and to promote a better educated workforce for competitiveness and economic growth;
- **fostering talent** to develop a 'smart' economy based on knowledge and innovation and to let people develop themselves as reflective and responsible persons.

The challenges for *lifelong learning* are also three-fold:

- promoting a rapid and more fluent **transition from school to work** in order to reduce the barriers between the worlds of work and education;
- facilitating **re-entrance to the labour market**, especially to tackle long-term unemployment; and
- focussing on permanent **re-skilling** to enable all citizens to keep their competences updated and quickly respond and adjust to possibly fast changing work environments.

Figure 2:   Persona development

	Inclusion Getting everyone involved	**Participation** Keeping everyone involved	**Engagement** Fostering everbody's talents
Education	**Multiculturality** Chanta, 8, feels lost in a foreign country	**Early School Leaving** Bruno, 14, skips school	**Fostering Talent** Emma, 16, needs new challenges
Employment	**Labour Market Re-integration** Sven, 42, full-time father, looking for a job	**Re-skilling** Martina, 59, needs to enter a new job field	**Transition from Higher Education** Joshua, 23, relevant degrees, but lack of key skills

To better understand and discuss these six challenges, a number of "persona" were developed, which illustrate the key issues involved for future learning strategies (Figure 2).

Various online and face-to-face stakeholder consultations on viable future learning strategies for the different persona were conducted, independently of the descriptive vision development. Expert opinion underlines and confirms that in 15 years' time learning strategies will be personalised, tailor-made and targeted; collaborative and networked; and informal and flexible. For initial Education and Training (E&T) this will signify a move towards learner-centred and social learning strategies that are integrated in their daily lives and into society. For continuing professional development and learning strategies for re-skilling and up-skilling, there is a trend towards shorter-term, targeted and flexible learning modules; to tapping the tacit knowledge of a team and supporting intergenerational learning and towards mechanisms that better support the validation and recognition of informally acquired skills.

A vision for the future of initial Education and Training.

Initial Education and Training will need to react more effectively and promptly to changing job requirements and societal trends. They will need to better address and narrow the current gap between the world of education and the world of work. In the future, learner-centred, decentralised, and tailor-made learning strategies will prevail, which will (need to) be accompanied by corresponding pedagogies and teaching strategies as well as flexible curricula, modified assessment and validation mechanisms and closer collaboration with other societal players, including tertiary education providers and prospective future employers.

Personalisation in initial E&T. The key for unlocking the future of learning will be the promotion of personalised learning plans and tailor-made learning activities. Personalised learning will facilitate the social and cultural integration of migrant children and help them to overcome language barriers; it will enable teachers to detect students at risk of dropping out, help them to diagnose the problems and learning needs and to offer re-engagement strategies; and

Figure 3: Overview of future Lifelong Learning strategies
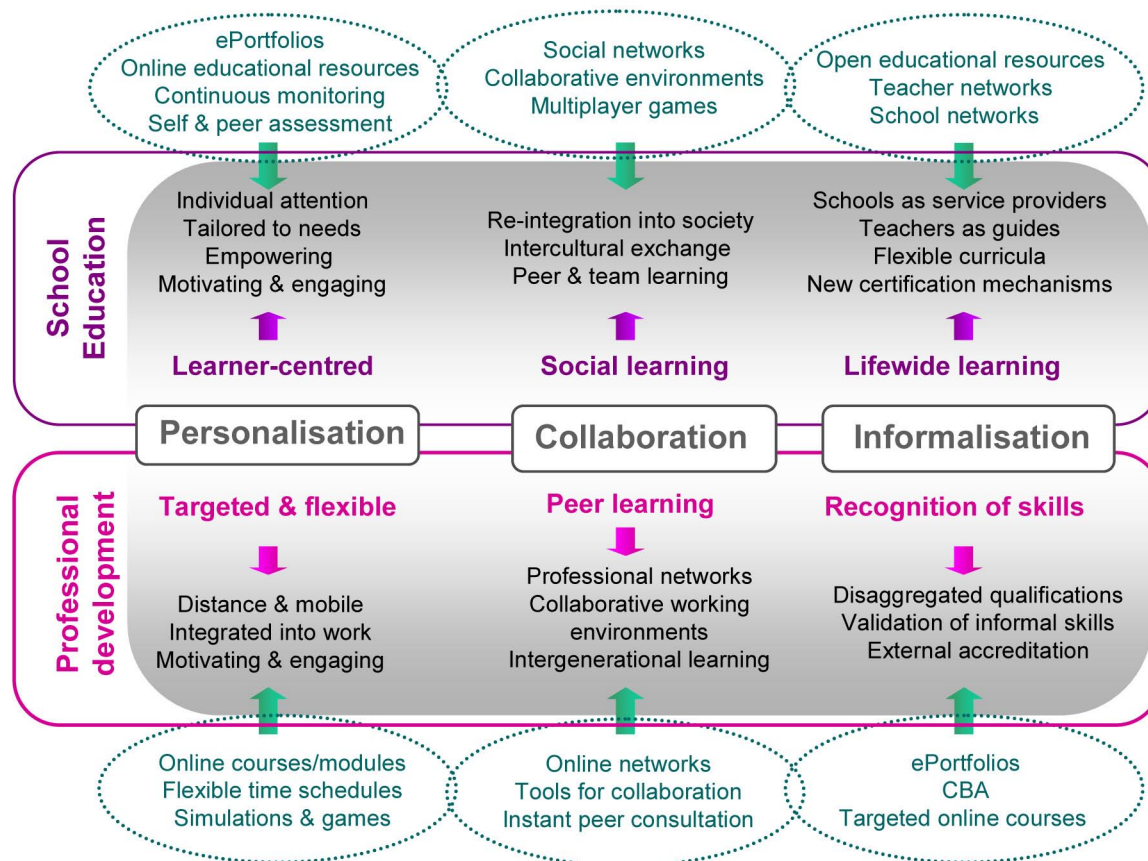
it will help develop talent and foster excellence by providing more engaging and challenging learning opportunities. A mix of different technologies will support personalisation, by allowing for a diversity of learning activities, tools and materials; by providing tools which support continuous monitoring and support diagnostic, formative and summative assessment strategies; by making educational resources openly available; by allowing for the implementation of collaborative projects; by offering learning opportunities that are motivating, engaging and even playful; and by supporting multilingual environments.

Collaboration in initial E&T. E&T institutions need to re-connect with society to better align learning objectives and societal needs. In the future, European societies will be more inter-cultural and flexible. Young people need advice and guidance to come to terms with the increasing

rate of change and find their way in a complex world. Schools must offer them the orientation they need and promote mutual understanding and active citizenship, in direct interaction with society. Thus, collaboration not only within the classroom, as it is (or should be) practiced today, but with the community at large, and with people from other social, cultural or age groups, will become increasingly important to enable younger learners to come to terms with life in an increasingly diverse and uncertain world. Virtual study exchange programmes, internet-based intercultural exchange projects, online massive multiplayer games, simulations and other internet-based services can assist schools in allowing learners to experience, understand and reflect upon societal developments in a safe and protected environment.

Informalisation of initial E&T. In the past, one of the major roles of schools was to make

knowledge accessible to all citizens. Today information has become a commodity that is available anytime and anywhere. Thus, the future role of schools will be to guide students in identifying and selecting the learning opportunities that best fit their learning styles and objectives; to monitor progress, realign learning objectives and choices and intervene when difficulties arise; and to implement viable assessment, certification and accreditation mechanisms. Schools will become learning hubs which offer guidance and support for learner-centred learning pathways, tailored to individual learning needs, paces, modes and preferences. Achieving this requires flexible curricula; teachers who are trained to effectively guide and coach students in their learning endeavours; competence-based assessment strategies that are to a certain extent independent of the concrete learning content; and certification mechanisms that allow alternative learning experiences to be integrated into school education.

A vision for the future of lifelong learning

In the future, people are likely to change their professions more frequently throughout their life and they are remaining longer within the workforce due to demographic changes and higher life expectancy. According to experts, it will be common for all citizens – whether they are at the beginning or end of their careers, whether they are highly skilled or do not have any relevant qualifications – to continuously update their skills. Professional careers will become more flexible and dynamic and all citizens, no matter how highly qualified, will need to pro-actively design and promote their careers by seizing relevant training opportunities. ICT will play an important role in facilitating lifelong learning opportunities, as, in the future, a range of sophisticated and adaptive learning tools and programmes will be available which will make it easy for people to upgrade their skills and drive their professional careers.

Personalisation. Due to increased labour market dynamics, people will have to assume responsibility for their qualifications and take initiative in developing their professional careers. However, to improve the match of skill supply and demand and to make training targeted, effective and efficient, industry will also need to get more involved in shaping training and encouraging workers to participate in lifelong learning. In the interests of both employers and (prospective) employees, training opportunities will become targeted and tailor-made. Technological advances will allow people to effectively and efficiently (re-)qualify for jobs of their choosing, by identifying and addressing their particular training needs and offering learning strategies that are tailored to their level of competence, their (future) job requirements, their time constraints, and their learning styles and objectives, thus making effective and efficient lifelong learning far easier than it is today.

Collaboration. Professional relationships will increasingly be characterised by an open knowledge exchange, not only between colleagues and peers with similar professional profiles and learning needs, but also between older and younger, experienced and inexperienced workers. To enable citizens to quickly and effectively upgrade their professional and practical skills, ICT-based peer learning networks and communities, which allow workers to mutually benefit from each others' specific knowledge and experiences, will become an important tool for lifelong learning. Furthermore, intergenerational learning will facilitate continuing professional development, as it allows younger workers to tap the tacit knowledge of more senior workers whose professional experiences will become better recognised as a valuable source of knowledge in a fast-changing work environment, while, at the same time, allowing more senior workers to continuously update themselves on the fresh knowledge younger people bring into the workplace. ICT supports these developments by providing environments that scaffold, document and archive this learning process and thus convert

knowledge exchange into an accessible learning resource that is available anywhere and anytime.

Informalisation. In 2025, it is expected that there will be abundant learning opportunities that assist people in converting professional experiences and personal skills into competences that are relevant for (new) job profiles. However, not all of these training opportunities will lead to formally recognised qualifications. Similarly, professional experiences acquired in previous jobs will give rise to a number of diverse competences that are seldom officially acknowledged or recognised. Thus, the experts repeatedly and almost unanimously underline that in view of increasing labour market dynamics, informally acquired skills need to become better recognised and mechanisms will have to be put in place that allow people to obtain formal recognition for their experiences and skills. ICT can support the documentation and validation for informally acquired skills. However, accreditation frameworks and mechanisms need

to be developed to make individuals' learning portfolios relevant and valuable for their career development.

Policy implications

The visions presented in this report are not necessarily new or radical. Many of the changes depicted have been foreseen for some time but they have now come together in such a way that policymakers must urgently consider them and propose and implement a fundamental shift in the learning paradigm for the 21st century digital world and economy. To reach the goals of personalised, collaborative and informalised learning, holistic changes need to be made (including, among others: curricula, pedagogies, assessment, teacher training, leadership) and mechanisms need to be put in place which make flexible and targeted lifelong learning a reality and support the recognition of informally acquired skills.

■ 1 Introduction

1.1 Policy Background

Europe is currently facing a number of changes and challenges which will profoundly affect the way in which people live, work and learn in 10 to 20 years' time. By 2020, 16 million more jobs will require high qualifications, while the demand for low skills will drop by 12 million jobs.[1] However, Europe has a lower share of university graduates than other leading industrial nations like the USA or Japan, and is struggling to offer viable lifelong learning options to 80 million people who have low or basic skills. 25% of the current generation of students have poor reading skills and 1 in 7 young people leave school early. These learners are ill prepared for life in a society that will require, on the whole, higher skills than today. Also on the social and demographic level, profound changes will manifest themselves which will pose additional challenges to social cohesion and to the sustainability of European social systems, requiring policy makers to take measures to ensure that all citizens can actively participate in society.

The Europe 2020 strategy[2] acknowledges that, to remain competitive, overcome the current economic crisis and grasp new opportunities, Europe has to concentrate on smart, sustainable and inclusive growth. One way to achieve these overall goals is to develop and invest in citizens' skills and competences. Consequently, one of the five targets for measuring the success of the Europe 2020 strategy is the modernisation of European Education and Training systems and

institutions by reducing early school leaving and increasing tertiary education attainment. Also to meet other targets, such as increasing the overall employment rate as well as the share of women, older workers and migrants in the work force, and to reduce poverty, it is of paramount importance to develop citizens' occupational skills and relevant competences. The importance of competence development is further emphasized by three of the ten Broad Economic Policy Guidelines adopted by the Council in July 2010[3] and by the fact that six of the seven flagship initiatives address, among others, appropriate and adequate skill training and competence development.

However, with the speed of technological and socio-economic change, learning strategies and trajectories are becoming similarly volatile. Considering that knowledge generation and organisation have changed substantially over the last 10 to 20 years, giving rise not only to new communication and working patterns, but also to new learning approaches and competence needs, it is vital to have a clearer understanding of how learning opportunities may change over the next 10 to 20 years in order to better advise policy makers.

Thus, to determine how education and training policy can adequately prepare learners for life in the future society, there is a need to envisage which competences will be relevant and how these will be acquired in 2020-2030. To contribute to this vision-building, JRC-IPTS in collaboration with DG Education and Culture launched a foresight study on "The Future of Learning: New Ways to Learn New Skills for Future Jobs" (http://is.jrc.ec.europa.eu/pages/EAP/ForCiel.html). This study aims to provide evidence

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1 http://ec.europa.eu/commission_2010-2014/president/news/statements/pdf/20102010_2_en.pdf.

2 Europe 2020. A European strategy for smart, sustainable and inclusive growth. Commission Communication. COM(2010) 2020. http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf.

3 http://register.consilium.europa.eu/pdf/en/10/st11/st11646.en10.pdf.

on how competences and occupational skills will and can be acquired in the future, in order to support priority setting for education, training and skilling policies. It does not intend to correctly predict or model the future. Rather, it employs a number and variety of stakeholder consultation exercises to come up with imaginative visions and scenarios of the future of learning, which provide valuable insights into current trends and their possible development in the future.

This report presents a synthesis of the results of this project, which was conducted jointly by IPTS, TNO, the Open University in the Netherlands and Atticmedia, on behalf of the European Commission (DG Education and Culture).

1.2 Methodology

The main objectives of the Future of Learning study are twofold. On the one hand, it aims to identify, understand and map how learning strategies and trajectories are expected to change, given current trends, thus creating a *descriptive vision* of the future. On the other hand, based on the projection of current socio-economic trends and challenges into the future, the study sets out to develop a *normative vision* of the future by identifying strategies which ensure that future learning opportunities contribute to social cohesion, socio-economic inclusion and economic growth.

In order to achieve these two objectives, a series of extensive stakeholder consultations, employing different formats (workshops; online consultations; group concept mapping) and including different stakeholder groups (experts and practitioners; teachers; policy makers) were set up. The different consultations were designed to jointly reinforce and cross-validate one another. Both research lines were developed on the basis of extensive desk research, including other foresight studies and policy documents, and intensive discussion and planning activities among the consortium members and IPTS to ensure the significance and validity of the results obtained.

■ Figure 4:   *Overview of the methodological approach*
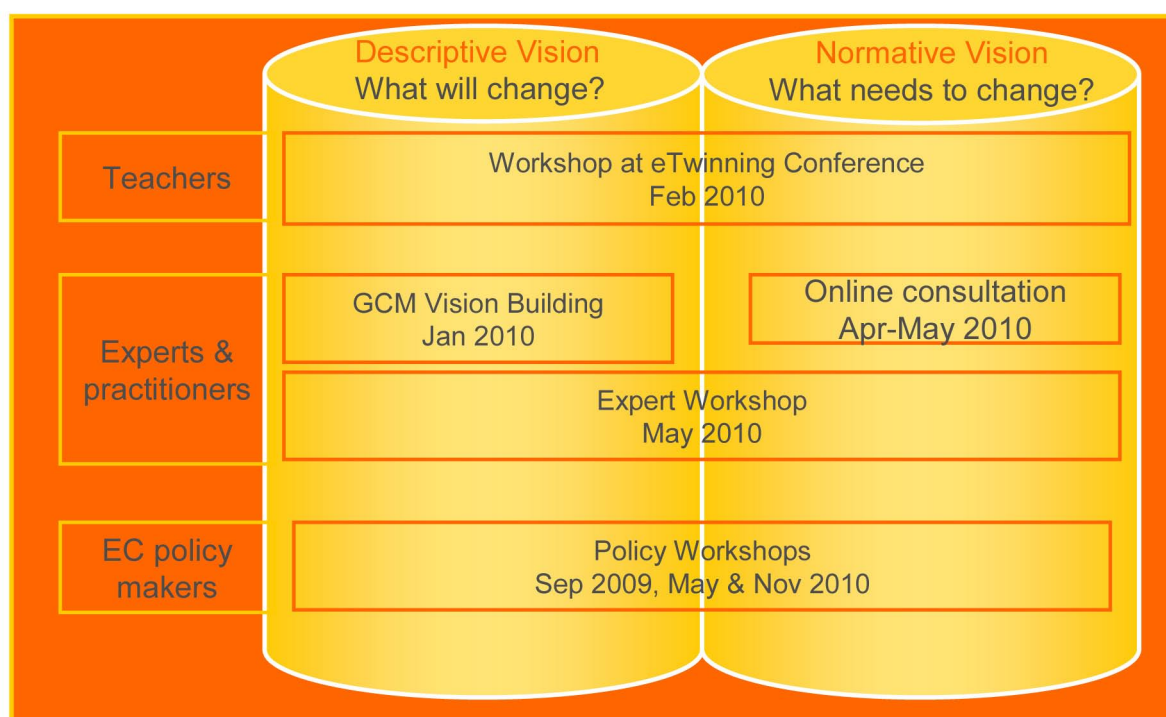
1.2.1 Towards a descriptive vision of the future of learning

The key question for this line of the research was: "What will learning look like in the future?" Variants of this question were put to experts (May 2010, 16 experts), teachers (February 2010, 13 teachers) and policy makers (May 2010, 15 policy makers) in dedicated workshop brainstorming and discussion sessions, leading to three different, though vastly overlapping and coinciding maps of the landscape of future learning.

Additionally, a selected group of experts were involved in a more targeted and intensive consultation process, employing the Group Concept Mapping Methodology (GCM). This intensive process involved a focus group of 13 experts at three stages, i.e. in (1) gathering, (2) clustering and (3) rating insights on major changes to education in 20 years' time. The experts came up with a total of 203 ways to complete the trigger statement "One specific change in education in 20 years' time will be that: …". Each expert then arranged the changes foreseen in different thematic clusters and rated them for importance and feasibility.

The vast amount of data thus generated was subsequently aggregated and analysed. To depict the emerging structure in the data, multidimensional scaling and hierarchical cluster analysis were applied. Based on the experts' sorting activity, each statement was placed on a map, reflecting its proximity or distance to the other statements. Based on the position of the statements and the clusters proposed by experts, the statements were subsequently clustered into 12 groups, which were labelled using titles suggested by the experts.

1.2.2 Towards a normative vision: identifying challenges and their solutions

Based on literature research, the findings of the GCM mapping exercise and in intensive consultation with policy makers, a number of challenges were identified that are expected to have a pronounced effect on the socio-economic future of Europe. Each of these challenges was illustrated by the use of a "persona", a stereotypical character, outlining the main problem at hand. Subsequently the persona descriptions and illustrations were subjected to a series of stakeholder consultations with experts, teachers and policy makers, both online and face to face.

Persona development

In total, nine different persona were developed, which address the two key questions for the normative vision development: 1. How can education and training institutions and systems address future learning needs?, and 2. How can demand and supply of skills be better matched? (Figure 4).

While contributing to the two overall questions, each persona addresses a particular challenge for future education and training or employment and labour market strategies (or both, as in the case of Joshua and Frank), namely:

1. How will E&T meet future learning needs, e.g.:
- How can an increasing number of **children from multicultural backgrounds** be integrated and be enabled to fully develop their talents (Chanta)?
- How can **early school leaving** be prevented and effectively dealt with (Bruno)?
- How can all students be enabled to fully develop their individual talents, i.e. how can learning pathways and trajectories be adapted to **individual learning needs** (Emma)?
- How can the learning objectives and strategies in **vocational and higher education** better be aligned with labour market needs?
- What will the **future role of teachers** be? (Frank)

2. How can demand and supply of skills be matched, e.g.:

- How can people, who do not have directly relevant qualifications, be enabled to **re-enter the labour market** after a longer period of unemployment? (Sven)
- How can people with **low qualifications** be enabled to develop a professional career that enables them to remain in employment throughout their lives? (Ingrid)
- How can (possibly highly qualified) people who are faced with **unexpected labour market shifts** which make their expertise obsolete, qualify for a job in a different field? (Martina)
- How can people effectively **update their professional skills** to actively develop their career? (Slavi)
- How can experts effectively **pass on their professional knowledge and experience** to younger generations? (Frank)
- How can the **transition from vocational and higher education to the labour market** be improved and skill mismatches be addressed? (Joshua)

Online stakeholder consultations

Based on these character descriptions and illustrations, a series of stakeholder consultations were conducted, both face to face and online. For the full results and transcripts of the online consultations, including a more detailed description of the methodology, see Redecker et al., 2010a.

Phase 1: Preparation

In a first phase a network of experts and stakeholders interested in the research was set up on different online platforms, on LinkedIn, Facebook and YouTube. The LinkedIn group on "The Future of Learning", with its over 1,100 members currently (September 2011), proved to be by far the most valuable resource for expert input.

Phase 2: Experimentation

Based on the personas, a forum-like discussion about the specific questions and topics represented by the personas was set up. A discussion site was set up on the website (www.futureoflearning.eu) where in weekly rounds, three personas with corresponding challenges

Figure 5: *Overview of the personas developed*
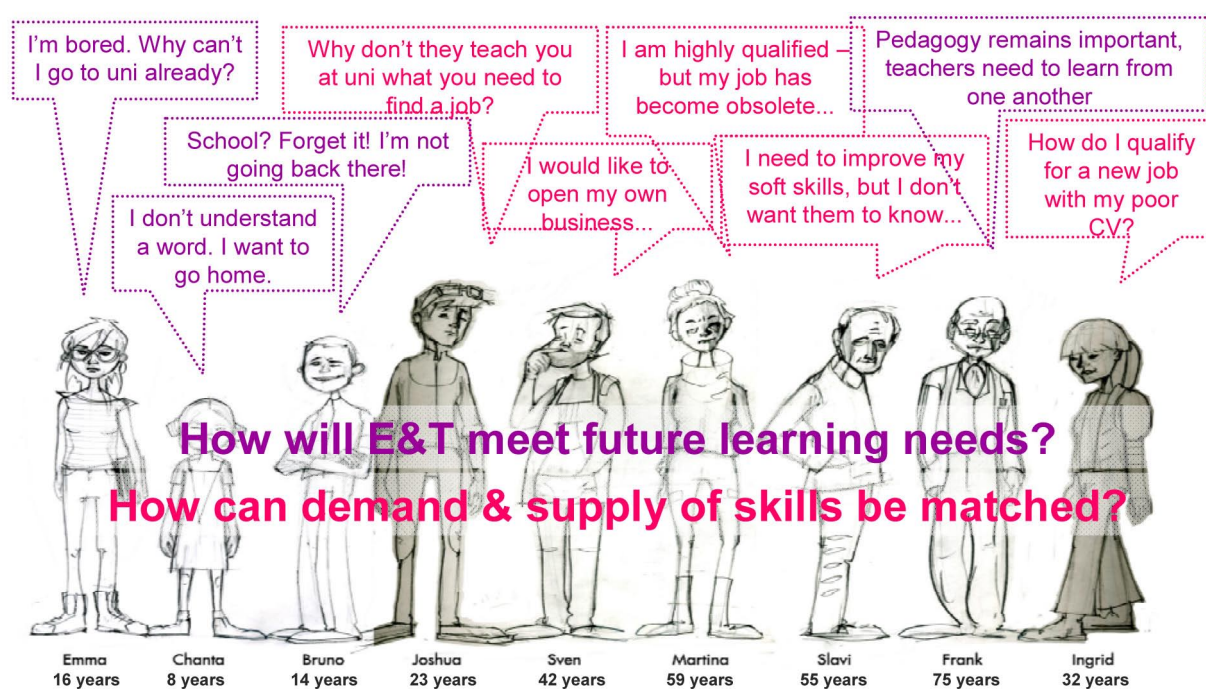
■ *Figure 6:   Example of the first open consultation on the personas of Emma and Chanta*
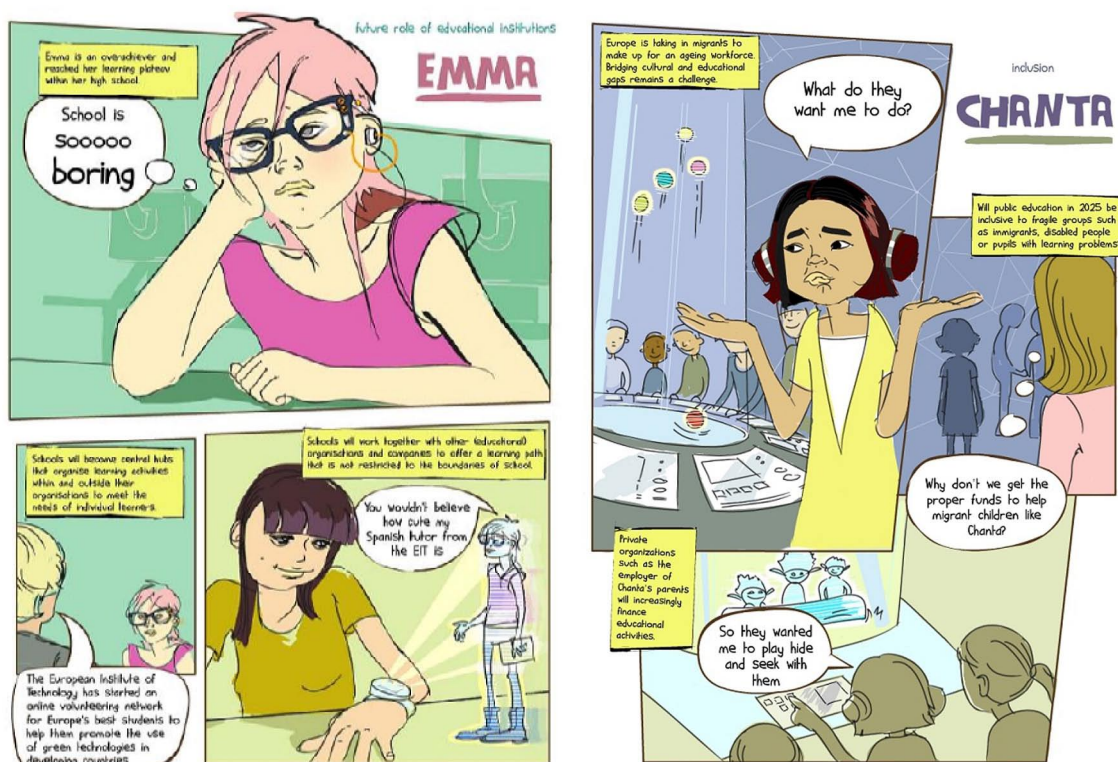
were presented. For this, a set of open-ended questions were posed, that users could comment on in a forum-like environment. The topics discussed were:

- The future role of teachers (illustrated by Frank, 23 comments)
- The school of the future (illustrated by Emma, 20 comments)
- Inclusion (illustrated by Chanta, 8 comments)

While the discussions were interesting, some comments proved difficult to interpret and integrate into a coherent set of ideas.

Phase 3: Piloting

To consolidate and validate the findings of the previous stage, three statements per persona were selected among those provided by the experts in the initial open online consultation. A survey was set up, asking respondents to express their agreement or disagreement (on a range from 1=strongly disagree to 5=strongly agree) and encouraging them, for each statement, to justify

and explain their agreement or disagreement. This pilot survey (PS) was launched on 20 April and closed on 20 June 2010, generating responses by 111 stakeholders.

Phase 4: Implementation

Based on reflection on the results of the pilot survey, a series of three quantitative surveys was developed, each consulting stakeholders on three personas grouped according to a common theme. The surveys were drafted around the following three topics, taking into account multiple personas and their related questions and topics:

- Lifelong Learning (132 completed surveys) – Online Consultation I (OC I)
- Future Challenges (101 completed surveys) – Online Consultation II (OC II)
- The Future of School Education in Europe (90 completed surveys) – OC III

All three quantitative surveys were designed along the same lines: providing an introduction based on the personas and listing several

statements to which respondents could rate on a 1 to 5 scale with "1" representing "strongly disagree" and "5" = "strongly agree", i.e. a 5-level Likert scale. The results were analysed using standard descriptive statistics, assessing the percentage of responses on each scale. In the analysis, special attention was paid to statements that received considerable variation (i.e. a considerable share of agreement as well as disagreement).

Based on the information voluntarily provided by about half the participants, respondents' profiles range from academics, researchers, consultants and practitioners (most of these have expertise in education and training, pedagogy, technology, foresight and/ or innovation) to educational policymakers and advisors. The majority of respondents come from Europe covering at least 15 different European countries. None of the surveys can be regarded as representative however.

1.2.3 Face-to-face consultations

To validate initial findings on the online stakeholder discussion, a series of workshops with different stakeholder groups was implemented.

Teachers were consulted in two workshop session at the eTwinning conference in Seville in February 2010. The focus of the workshop sessions was on the personas of Chanta (albeit represented as "Max"), Emma and Frank (a teacher, re-named "Daniel") and on the questions of (a) how schools will be able to best develop the potential of their students and teachers, and (b) which should be the key learning objectives for each of these persona in the future.

A workshop with 16 external experts and four European Commission members, involved in the research, and six further project members was organised and took place in Amsterdam on 15-16 May 2010. Here, the results of the online consultations were presented and discussed and the challenges represented by the different personas were debated.

Furthermore, on two occasions, in May and in November 2010, the findings of the online stakeholder consultations were discussed by staff from a range of different European Commission Directorate Generals. On the first event, discussion focussed on validating the overall (preliminary) results, whereas in the second workshop policy recommendations

■ Figure 7:   Key personas and the challenges they illustrate

	Inclusion Getting everyone involved	Participation Keeping everyone involved	Engagement Fostering everbody's talents
Education	**Multiculturality** Chanta, 8, feels lost in a foreign country	**Early School Leaving** Bruno, 14, skips school	**Fostering Talent** Emma, 16, needs new challenges
Employment	**Labour Market Re-integration** Sven, 42, full-time father, looking for a job	**Re-skilling** Martina, 59, needs to enter a new job field	**Transition from Higher Education** Joshua, 23, relevant degrees, but lack of key skills

were developed for some of the key challenges and themes, namely (1) how education and training institutions and systems should develop strategies to address multiculturalism, implement personalised learning strategies, adapt assessment, and use ICT effectively, and (2) how changing job requirements can be addressed, self-responsibility and flexible training opportunities can be fostered and informal learning can be better recognized.

Considering the findings of the consultations and the focus of the overall study, for the purposes of this report, a set of six personas was further developed to represent the most urgent and pressing challenges for education and employment in the future (Figure 7).[4]

Thus, the personas illustrating the changing role of teachers (Frank); challenges faced by workers with low formal qualifications (Ingrid) and strategies for up-skilling (Slavi) will not be explicitly presented in this report. Instead, relevant findings will be integrated in the discussion of the presented personas as follows. The changing role of teachers (originally illustrated by Frank) will be reflected in the discussion of the personas representing primary (Chanta) and secondary (Bruno, Emma) education. Challenges for lowly qualified workers (originally represented by Ingrid) are reflected in the discussion of the persona of Sven, which illustrates the similar problem of re-entering the labour market without relevant qualifications. Finally, the problem of up-skilling (Slavi) is addressed in the discussion of Martina, who is a highly qualified senior specialist who faces the more severe problem of changing professional profile.

1.3 Outline of this Report

The report is divided in two parts, the first of which is devoted to the development of a (descriptive) vision of the future of learning. The second part focuses on future challenges for E&T and on future strategies and supporting policy options for making the best of all possible futures a reality.

In Chapter 2, a series of trends and drivers impacting the future of learning are outlined, which form the basis and background for the stakeholder consultations conducted in this study, the findings of which are outlined in Chapter 3. Chapter 3 discusses and summarizes the major changes to learning in the future, and develops a vision of the future of learning on the basis of the different stakeholder consultation exercises.

Chapters 4 and 5 present and discuss six challenges for the future of learning which are illustrated and represented by six different persona. Chapter 4 focuses on E&T systems and institutions, by considering how increasing multiculturality and heterogeneity in European classrooms can be addressed adequately early in primary school (Chanta, 4.2); how early school leaving can be effectively prevented or dealt with when it happens (Bruno, 4.3); and how schools will be able to develop all students' talents and foster excellence, thus preparing students for tertiary education and assisting them in their career choices (Emma, 4.4).

Chapter 5 exploits lifelong learning opportunities which assist in matching labour market skill supply and demand. It discusses how the transition between tertiary and vocational E&T and the labour market can be smoothed (Joshua, 5.2); how people who have been out of employment for a longer period of time can be re-integrated into the labour market (Sven, 5.3) and how highly qualified people can be enabled to re-skill if their specialist skills become obsolete, due to technological advances, labour market shifts or unexpected labour market disruptions (Martina, 5.4).

Chapter 6 draws conclusions from the findings in all parts and sections and discusses policy implications. These could help to pave the

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4 For a full presentation of all personas see Redecker et al., 2010.

way to an efficient and effective European E&T system that responds adequately to the changes ahead and contributes to competitiveness and sustainability by driving excellence and equity.

Part I. Envisaging the Future

■ 2 Trends and Drivers

A variety of demographic, societal, economic and technological factors is expected to influence and impact on the future of learning and education. This chapter will provide a brief overview over the main trends and drivers which affect the future of learning and will present some of the more salient consequences for employment and Education and Training.

2.1 Demographic Trends: Ageing and De-greening

Across Europe there is a growing awareness that our societies are going through an unprecedented demographic transition, based on the combined effects of decreasing fertility rates and rising life expectancy.[5] Both demographic extremes, **ageing** and **de-greening** (i.e. the decline in the number and share of younger people), will impact future jobs, employment, work-biographies and skills and competences.

Individual life expectancy has risen substantially over the last 50 years and is expected to continue so for the next decades. Over the past 45 years, life expectancy at birth has increased by about eight years for men and women.[6] In most EU Member States, life expectancy - currently 75

Figure 8: Share of European population by age groups in the geographical region of Europe
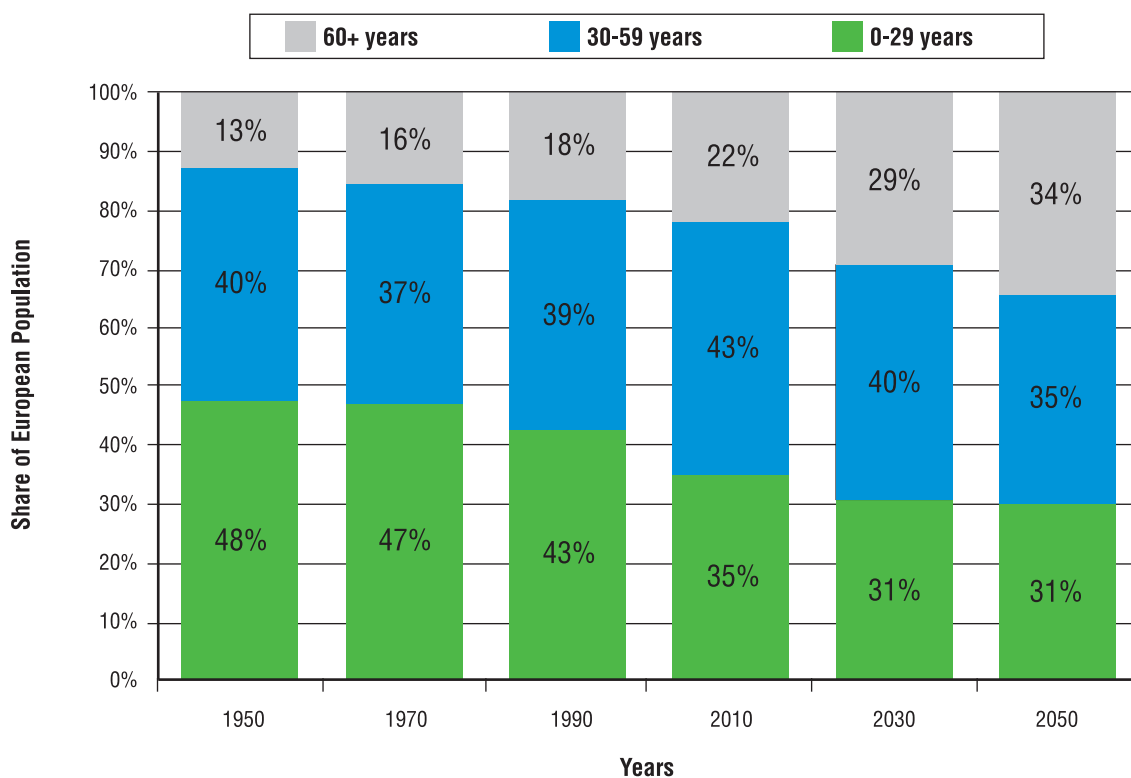
Source: UN population statistics, http://esa.un.org/unpp/index.asp

5 EENEE & NESSE, 2008; Reflection Group, 2010.
6 Schlotter et al., 2008.

■ *Figure 9:* *EU 27 population projection by age group, 2010-2030*

| 0-9 | 10-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80+ |

EU 27 population by age group. in million

	2010	2015	2020	2025	2030
80+	23.3	26.3	29.3	31.6	36.0
70-79	39.6	40.9	44.5	49.6	53.3
60-69	52.8	58,1	61.8	65.6	68.5
50-59	66.3	70.0	72.7	72.1	69.7
40-49	74.6	73,9	71.4	70.1	69.6
30-39	71.0	69.9	69.4	67.0	62.7
20-29	65.7	63.6	59.6	57.0	57.5
10-19	54.6	52.4	53.1	53.9	53.4
0-9	56.8	57.8	57.5	56.1	54.5

Source: Eurostat Population projections, EUROPOP2008.

years for men and 82 for women on average – is set to increase by an additional 15 to 20 years in the course of this century.[7] Whereas back in 1950 only 13% of the European population was over 60 years of age, this share has increased to 22% in 2010 and is expected to reach 34% in 2050.[8]

While the population aged 60 and above will increase by about 42 million between 2010 and 2030, the number of young people under the age of 30 will decrease by about 12 million in the EU27 (Figure 9). The population aged above 80 years is expected to double from 23 million in 2010 to 46 million in 2040 in the EU 27.[9] The share of old people in the population will be significantly higher in Europe than in other world regions such as Asia and Africa.[10]

In parallel, the fertility rate in Europe has decreased steadily, from 2.7 children per family in 1964 to 1.4 in 1999, a trend that is expected to continue. In Europe, the number of children and teenagers under the age of 19 is expected to decline from 160 million in 1980 to 110 million in 2025.[11] With women giving birth to 1.5 children on average, and more and more women foregoing children altogether, Europe's population is ageing and its native-born labour force declining.[12]

The combined demographic extremes of very high life expectancy and very low fertility will exert enormous pressure on Europe's social welfare systems. Europe has to come to terms with the reduction in the working age population and a higher share of people of retirement age.[13] In an ageing society with almost twice as many people

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7 Reflection Group, 2010.
8 UN population statistics: http://esa.un.org/unpp/index.asp
9 Eurostat EUROPOP 2008 data.
10 Schlotter et al., 2008.

11 UN population statistics http://esa.un.org/unpp/index. asp?panel=2
12 Reflection Group, 2010.
13 Schlotter et al., 2008.

over 65 per worker as today, EU Member States will have to make considerable efforts to finance their social support regimes and to retain older people in the workforce.[14] Employers will need to change their recruitment and retention policies to attract and retain qualified staff.[15] The future workforce of Europe will need to be recruited increasingly from the older population, which raises the need for an improved training system especially for this group because economic growth in Europe will heavily depend on their performance in the labour market.[16]

2.2 Globalisation

A new multi-polar world is emerging where power is more diffuse and international dynamics more complex.[17] Between 2005 and 2050, the working-age population of emerging economies is expected to increase by 1.7 billion, compared with a decline of 9 million in the developed economies.[18] As new global competitors with innovation capacity like China and India emerge, it will be increasingly challenging for Europe to keep its competitive edge.

By 2030, China could be the biggest global economy and India the fourth largest.[19] China and India contributed 58% of all global growth in 2007 and it is estimated that BRIC economies could be delivering 40% of all global growth by 2018.[20] Over the past 15 years, trade volume grew by over 50% as a proportion of GDP in Russia, nearly doubled in China and more than doubled in Brazil and India.[21] Forecasts by some leading economists suggest that China in particular may increase its share of world GDP from 11% today to 40% in 2040, whereas the EU15 GDP is projected to decline from 21% today to 5% in

2040.[22] China's GDP could overtake that of the US as early as 2015[23] and within the next 40-50 years, the overall GDP of the BRIC countries could exceed those of the largest EU countries, the US and Japan.[24]

Although the assumptions underlying some of the forecasts have been challenged,[25] the figures are indicative of the speed at which the global economic balance is tilting in favour of China. By 2030, Asia is expected to be at the forefront of scientific and technological developments, producing high-value goods capable of transforming production and overall quality of life.[26]

With slower growth than its main competitors, the EU's share of global wealth is inevitably declining.[27] Europe will increasingly compete with much younger societies whose pools of young "digitally-empowered talent" will eventually out-number Europe's under any demographic scenario.[28] The power of these emerging economies will challenge European societies and call for targeted measures to ensure that, through innovation and excellence, Europe is able to maintain its prosperity and defend its social welfare states.[29]

2.3 Immigration

The UN projects that up to two million people will migrate from poor to rich countries every year until 2050, with around 1.6 million coming to Europe.[30] As the domestic supply of labour and skills declines, Europe will need to attract more migrant workers, with consequences for our

14 Reflection Group, 2010.
15 Wilson, 2009.
16 Schlotter et al., 2008.
17 Reflection Group, 2010.
18 Talwar & Hancock, 2010.
19 Talwar & Hancock, 2010.
20 Talwar & Hancock, 2010.
21 Eurostat, 2007.

22 Fogel, 2007.
23 Maddison, 2007.
24 OECD, 2007.
25 Cf. EENEE & NESSE, 2008.
26 Reflection Group, 2010.
27 Reflection Group, 2010.
28 Linton & Schuchhard, 2009.
29 Hofheinz, 2009; Linton & Schuchhard, 2009; Fingar, 2008.
30 http://www.un.org/esa/population/unpop.htm.

ability to manage societal integration. Without migration, the EU will not be able to meet future labour and skills shortages.[31] According to a 2007 study by the Hamburgisches Weltwirtschafts Institut (Germany), in the absence of immigration, the size of Western and Central Europe's labour force would shrink from 227 to 201 million in 2025 and to 160 million in 2050. To maintain the labour force constant, a net inflow of 66 million labour migrants would be necessary.[32]

However, currently third-country nationals show low employment and high unemployment rates,[33] the reasons for which are not only rooted in education and qualifications. Thus, it is already recognized that measures need to be adopted to make education and training accessible to immigrants to facilitate their transition to the labour market which contributes to social cohesion.[34] To tap the potential of the current generation of young migrants, efforts in formal education need to be increased, addressing the specific needs of immigrant children and youth at an early stage, to empower them to become active participants in society.[35] This is particularly important, considering that many children of migrants have significantly lower levels of educational attainment than their peers.[36]

2.4 Labour Market Trends

The jobs of tomorrow, whatever they look like, will, on the whole, require new and higher levels of skills.[37] The foresight report "Changing professions in 2015 and beyond" identifies three main drivers that are expected to impact the skills requirements even by 2015: the shelf-life of knowledge is decreasing; the amount of information is increasing; and concurrent

pressures of generalisation and specialisation of the workforce will persist/increase.[38]

European economies are witnessing a general trend towards an increased demand in knowledge- and skill-intensive occupations related to technical and managerial activities.[39] For example, by 2015, there will be a shortage of ICT practitioners estimated at 384 000 to 700 000 jobs; by 2020 an additional 1 million researchers will be needed and the health sector will face a shortage of about 1 million professionals.[40] The share of jobs requiring high-level qualifications will rise from 29% in 2010 to about 35% in 2020, while the number of jobs employing those with low qualifications will fall from 20% to 15% (Cedefop, 2010b).

On the whole, the occupational structure of Europe is moving towards knowledge and skills-intensive jobs, and most new jobs are expected to emerge in knowledge- and skills-intensive occupations. (Cedefop, 2010b). This trend towards more knowledge-intensive jobs is reinforced by another general trend: Already, 65% of Europeans, who are or have previously been in employment, have changed employer at least once in their lives.[41] The majority of Europeans feel that one's level of professional experience (54%) and one's qualifications (52%) are the two most important assets which one should emphasise in order to find a job easily today.[42]

Given the growing importance of qualifications and skills, a chronic skills shortage is expected in Europe's labour markets, as currently one in three Europeans of working age have few or no formal qualifications and nearly a third of Europe's population aged 25-

31 Reflection Group, 2010.
32 http://www.oecd.org/dataoecd/43/15/38295272.pdf
33 http://www.oecd.org/dataoecd/43/15/38295272.pdf
34 European Commission, 2009c.
35 European Commission, 2007a.
36 European Commission 2008b; 2008c.
37 http://ec.europa.eu/social/main.jsp?catId=568&langId=en; Cedefop, 2010a.

38 European Commission, 2006.
39 Cedefop, 2010b.
40 European Commission, 2010b.
41 Eurobarometer 261, 2006; http://ec.europa.eu/public_opinion/archives/ebs/ebs261_en.pdf
42 Eurobarometer 316, 2009; http://ec.europa.eu/public_opinion/archives/ebs/ebs_316_sum_en.pdf

Figure 10:   Cedefop jobs forecast (2010)
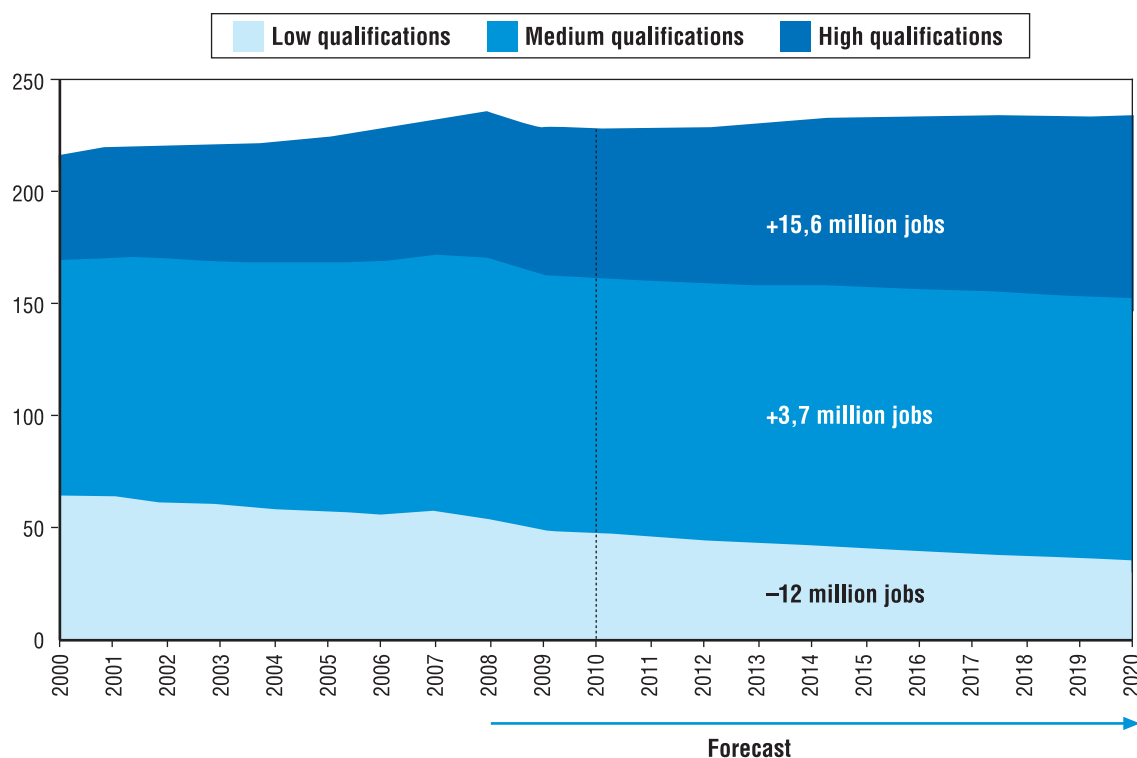
Source: Cedefop 2010a.

64 have no, or only low, formal qualifications.[43] Expected future decreases in the demand for unskilled labour in the EU will aggravate societal inequality. Currently, however, people who need training most, i.e. those with low or irrelevant skills, tend to be those who use training the least. Workers who already have a tertiary degree are 50% more likely to receive post formal education training than those with only a secondary degree.[44] Hence, increasing the educational level of low-skilled workers, who face a substantially higher risk of being unemployed than medium- and high-skilled workers, as well as improving the equity of the educational system are major challenges for educational policies in the 21st century.[45]

2.5 The Impact of Technology on Education and Training

Technological developments and changes have had significant impact on society, not only in ICT but also in biotechnology, medicine, materials and nano-sciences. In the future, it is expected that technological developments will continue to advance at unprecedented speeds. Trends include increases in computing power accompanied by decreases in cost; a shift from networked to ubiquitous computing; computing based on bioscience; smart drugs and cognitive enhancement; brain-machine interfaces; 3D printing and plastic electronics; complex and intertwined socio-technical systems.[46]

Furthermore, digital technology could become the single biggest lever for productivity and competitiveness, underpinning the majority of future job creation in Western economies

43 Euractiv 2010; http://www.euractiv.com/en/enterprise-jobs/unemployment-soars-due-to-skills-shortage, referring to: http://ec.europa.eu/social/BlobServlet?docId=4508&langId=en
44 Schleicher, 2006.
45 Schlotter et al., 2008; Hofheinz, 2010.

46 Facer, 2010.

– at least, if these manage to foster a "vibrant, growing, highly skilled workforce of technology professionals, create an increasingly large pool of technology-capable business people, and encourage every individual to develop their IT user skills to secure employment, to interact socially and to access government services".[47]

Technology will be one of the main drivers for changing job structures and requirements, and will thus determine which skills people need to acquire. We can already see that technology changes job requirements and profiles, when we observe, for example, nurses now routinely performing minor operations, builders and mechanics working with digital maps, and farmers using advanced knowledge of remote animal health monitoring or precision farming.[48]

This trend is expected to become more pronounced. For example, it already is expected that there will not be enough experts who are able to interpret genetic data, although genetic sequencing as such will become even cheaper.[49] The e-skills UK (2009) report predicts that, in the UK alone, 550 000 new technology professionals will be needed by 2015. The strongest growth will continue to be in high skill areas, but hybrid skills (technical, business, creative, interpersonal) will also be increasingly important.

A study on the "shape of jobs to come"[50] argues that advances in science and technology will give rise to new career opportunities, both in existing disciplines and in newly created fields. The list of 110 possible future job profiles generated in this study ranges from "old age wellness manager", over "memory augmentation surgeon", "vertical farmer", "waste data manager", "virtual clutter organiser" and "social networking workers" to "virtual lawyers" and "virtual teachers", to mention just a few. All of

these job profiles will require skills that have not even been identified yet, although it is clear that all of them will require some degree of ICT skills.

However, technology does not only affect *what* we will need to learn, but also *how* we will learn in the future. A range of (foresight) studies underline the impact of technological change on education and training. According to the *European Internet Foundation*, for example, the key to adequately preparing learners for life in a digital world is to "redesign education itself around participative, digitally-enabled collaboration within and beyond the individual educational institution". They predict that by 2025 this will have become the dominant worldwide educational paradigm.[51]

In a similar vein, a study commissioned by the *MacArthur Foundation* envisages that, in the future, learning in E&T institutions will be based on the principles of self-learning, networked learning, connectivity and interactivity and collective credibility. Pedagogy will use inductive and de-centred methods for knowledge generation and open source education will prevail. Learning institutions will be characterised by horizontal structures, mobilizing networks and flexible scalability.[52] *Collins and Halverson* (2010) envisage that, with the advent and increasing impact of technologies, a new era of education – the **lifelong learning** era – will begin, which will differ substantially from the current "schooling era" and will to a certain extent reflect a return to the pre-industrial "apprenticeship era". In the lifelong learning era, learning will take place across a number of different "venues" and will involve mixed-age groups in different constellations. On the whole, flexibility and diversity will increase.

In line with these studies, the *Beyond Current Horizons (BCH)* project (Facer, 2009; 2010) explores from a **socio-technical perspective**

47 e-skills UK, 2009.
48 ftp://ftp.cordis.europa.eu/pub/foresight/docs/21966.pdf
49 http://jahresthema.bbaw.de/kalender/leben-3-0-und-die-zukunft-der-evolution
50 Talwar & Hancock, 2010.

51 Linton & Schuchhard, 2009.
52 Davidson & Goldberg, 2009.

how education (in the UK) will (need to) change up until 2030. Key socio-technological trends as identified by the BCH study include the increasingly important participation in **networks** comprising both technical and social elements and the expectation that formal and informal learning will take place across a wide range of different sites and institutions. Consequently, according to BCH projections, the future of learning will be characterised by networked learners, networked workers, networked E&T institutions, and information forums promoting public debate. A second thread running across all scenarios is the expectation that **informal** learning strategies will become an integral part of learning and will also (need to) be embedded in E&T.

The DELPHI study conducted by the *Learnovation* project identifies technological progress (4.2)[53] and social networking on line (3.8) as the two most important factors for changing the way in which people learn, followed by cuts in public funding for education (3.8), globalisation (3.7) and multiculturalism (3.3). Thus, the vision developed by the Learnovation project for 2025 is characterised by **technology-enabled lifelong learning** opportunities:

"Being a lifelong learner becomes a condition of life. Technologies, due to their massive and common use in everyday life, acquire an emancipating power on people's opportunity and ability to learn, favouring a spontaneous tendency towards metacognition and ownership of their learning process".

A study by *IBM Global Education* (2009) identifies five interrelated "signposts" for the future of education, indicating a number of challenges and/or opportunities for E&T. These signposts are **technological immersion**; **personalized learning paths**; knowledge **skills** for service-based economies; **global integration** of systems, resources, and cultures; and aligning

E&T with **economic needs** and demands. Again, technology is identified as the main driver of change, promoting technologically-enhanced learning opportunities that are immersive, tailor made and globally networked.

2.6 Implications for the Future of Education and Training

2.6.1 Lifelong learning

A common thread identified by studies on the future of E&T is the emergence of lifelong learning as the new central learning paradigm. Lifelong learning is seen as an important ingredient for Europe's response to demographic change, globalisation and increased labour market dynamics. Thus the key insight for the future is that all citizens will need to continuously update and enhance their skills throughout their lives, from the cradle to the grave.

Technology will play a key role in levering the potential of lifelong learning. With the ubiquity of technology and with its increasing adaptability, learning "anywhere, anytime and anyplace" can, in the future, become a reality. Furthermore the increased adaptability of computer programmes and environments will contribute to making targeted and tailor-made learning opportunities feasible, thus raising the attractiveness of professional training courses. Furthermore, technology can contribute to making learning and training more accessible and attractive to those who need it most, including those with low skill levels.

2.6.2 Shift from institutions to individuals

Several emerging technologies, in particular open source technologies, cloud computing and mobile technology will enable a seamless education continuum that is centred on the

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53 On a Likert scale from 1=very little impact to 5= very significant impact.

student, not the institutions.[54] Thus, education institutions will cease to be exclusive agents of coordination, service provision, quality assurance, performance assessment, or support. They will need to re-create themselves as resilient systems with flexible, open, and adaptive infrastructures, which engage all citizens and re-connect with society; schools will become dynamic, community-wide systems and networks that have the capacity to renew themselves in the context of change.[55]

As a consequence, the responsibility for the provision of individual education will increasingly move from the state to the individual and family groups.[56] While state involvement in early years' educational provision will remain central, the influence of the private sector on curriculum and policy will continue to grow.[57]

Assessment will, on the one hand, becomes embedded in the learning process and pedagogy will rely increasingly on interaction, including the interaction with rich technological environments, which will be responsive to learners' progress and needs.[58] Thus, assessment will continue to move towards technologically-supported automation, while peer production will remain marginal. On the other hand, however, content, teaching and accreditation will become disaggregated.

Different forms of accreditation should be developed to recognise informal know-how and practice-based competences.[59]

2.6.3 The increasing importance of generic and transversal skills

The widespread use of technology in society is expected to give rise to new skills and increase the pressure on E&T systems to respond to economic demands.[60] Furthermore, the digital economy of 2025 will demand a flexible workforce, with a mindset of continual change and the capacity to change and adapt in response to the complexity of the global economy. This flexibility will need to be developed and nurtured.[61] Generic and transversal skills – sometimes also labelled soft skills – such as problem solving, communication in different media,[62] team working and ICT skills, management and leadership, multicultural openness, adaptability, innovation and creativity and learning-to-learn are increasingly valued in modern economies and labour markets, along with basic skills such as reading and writing, academic skills, technical skills, managerial and entrepreneurial skills (Wilson, 2009; Green, 2008).[63]

In particular at the post-secondary and professional learning level, people will need to develop skills that facilitate going back and forth between learning and work.[64]

54 IBM, 2009.
55 KnowledgeWorks, 2008.
56 Collins & Halverson, 2010; KnowledgeWorks, 2008.
57 Sandford, 2009.
58 Collins & Halverson, 2010.

59 Sandford, 2009.
60 IBM, 2009.
61 Linton & Schuchhard, 2009.
62 Collins & Halverson, 2010.
63 OECD, 2011; Collins & Halverson, 2010.
64 Collins & Halverson, 2010.

■ 3 The Landscape of the Future of Learning

How will we learn in 10-20 years' time? This was the key question put to experts in the education and technology field, to teachers and to policy actors at the European Commission in dedicated face-to-face workshop sessions over the course of the year 2010. As a result, a series of "maps" visualising the key future changes to learning strategies and responses of the education and training systems were generated. Additionally, this question formed the basis of an extensive brainstorming, sorting and rating exercise, involving 13 experts and employing the GCM methodology.

Though each of the visions developed collaboratively on these different occasions is distinct in focus and scope, together they provide a detailed picture of a diverse and changing landscape, in which technological trends together with socio-economic dynamics impact learning strategies and trajectories and call for a profound change of E&T systems and institutions.

3.1 Brainstorming the Future of Learning

3.1.1 Teachers' views of the future of school education

In a first session, teachers were asked which will be the major changes to (school) education over the next 10-20 years. The answers gathered can be grouped into three main clusters, each including several types of topics, as illustrated in Figure 10. The main types of changes expected are:

More active ways of learning. Learning will become more active, focusing on learning by doing, experiencing, touching. At the same time, it will become more social and collaborative with each learner constructing his/her knowledge in interaction with others in the context of practical applications and tasks. Student-centred learning approaches, where each learner's individual needs and progress are taken into account, will come to the fore. The traditional roles of teachers and students will change to support this development, and teachers will become moderators and guides for students' personalised and collaborative knowledge creation.

Revised learning objectives. More active and constructive ways of learning will arise from a shift in the balance between knowledge and skills, and the emergence of new competences. In a world that is characterised by information overload, "knowing how" will become more important than "knowing what". Furthermore, values, like respect, tolerance, responsibility and cultural awareness and diversity will become important learning objectives.

New learning settings and contexts. Changing learning objectives and ways of reaching them will be accompanied by the emergence of new learning settings and their connections to various contexts. Learning will be supported by flexible and dynamic virtual environments and by a range of tools and applications to facilitate individual and collaborative learning processes inside schools, outside school, and with connections to various contexts. Physical or virtual boundaries will become obsolete. From pre-school onwards, learning will take place in versatile environments that are smoothly integrated into life. Learning environments will be motivating, social and connected to nature and to the local community and global society. In particular, learning will become more holistic, embedded in the societal context and the local community. Parents will be respected as partners in the learning process.

In a second brainstorming session, participating teachers were asked to identify the

Technical Report Series

Figure 11: Teachers' views on future changes to school education
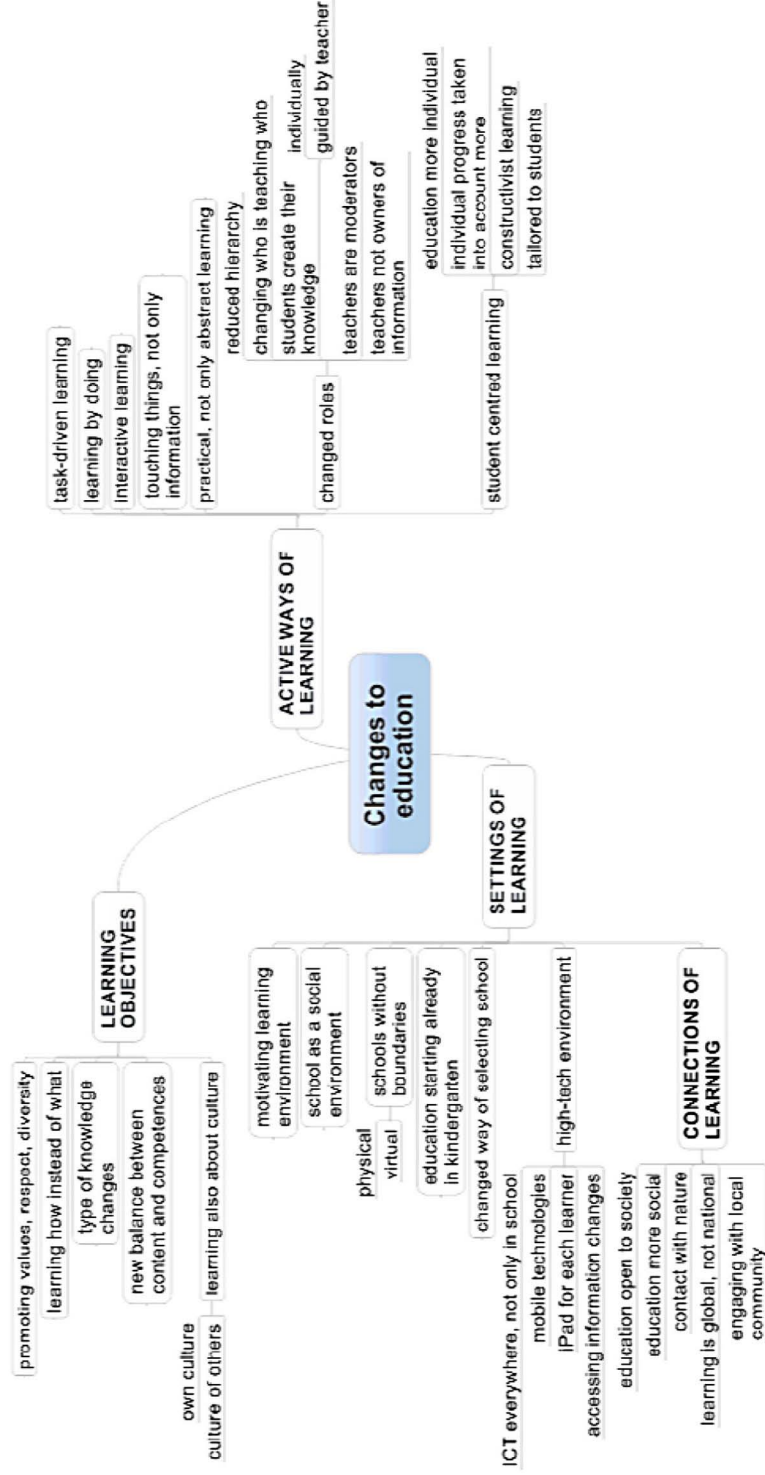
Figure 12: Key competences as defined now and as suggested by the audience for the future

The Present – and the Future

| 2010 | | 2030 |

communication in the **mother tongue**

communication in **foreign languages**

mathematical competence and basic competences in **science and technology**

digital competence confident and critical use

learning to learn pursue and organise one's own learning

sense of initiative & entrepreneurship turn ideas into action; involves creativity, innovation, risk-taking,...

social and civic competences engage in active and democratic participation

cultural awareness & expression of ideas, experiences and emotions different media

Reading skills for all

Communication skills

Languages

Environment; Nature

High level of mathematics for all

Media literacy; Finding, selecting and processing information quickly; using ICT effectively; Creating digital information; Being online 24/7; Web2.0; Management of digital identities

Innovation; Creativity; Entrepreneurship

Problem-solving; Analysing; criticizing; Keep things short and simple

Mobile learning; Learning to learn; Self-studying; Making investigation in internet; Learning by doing

Identity; Self-confidence; Self-esteem; Keep independence;

Active participation in society; Collaboration skills; Co-operation; Conflict resolution skills; Networking

Flexibility to change; Openness to change; adapting to change; Stress management

Understanding diversity; Intercultural dialogue; Cultural identity

European Commission: Key Competences (2006)

eTwinning workshop participants: Key competences for the future

key competences students will be required to acquire in the future, i.e. in 10 or 20 years' time. Subsequently, their answers were juxtaposed to the key competences laid down by the European Key Competences Recommendation of 2006,[65] of which teachers were unaware.

Interestingly, all competences currently defined as key competences and as important cross-cutting skills in Europe were mentioned in the brainstorming session as being important for the future, thereby confirming their continuing importance and relevance. However, the discussion and the suggestions from the participants transcended and refined the current set of key competences, indicating how they could be modified to better meet future needs. For example, the description of Digital Competence was enriched by the proposal to include new communication patterns, such as

being constantly online and coming to terms with using different identities and communication tools in parallel.

Furthermore, workshop participants emphasized the increasing importance of transversal skills, such as problem-solving, analytical thinking, critical skills and effective communication; attitudes such as flexibility, openness and self-management; personal skills such as self-confidence and independence, and societal awareness, as expressed in the need to respect nature and the environment.

3.1.2 Experts' vision of the future of learning

In May 2010, a two day workshop with experts from a range of related fields (education, foresight, technology) was conducted in Amsterdam, at which a mix of brainstorming and targeted discussion exercises was employed to generate insights on current and future trends and tendencies and their effect on learning in the future. The initial post-it

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65 Council of the European Union, 2006.

Figure 13:   Experts' views on changes the E&T over the next 10-20 years
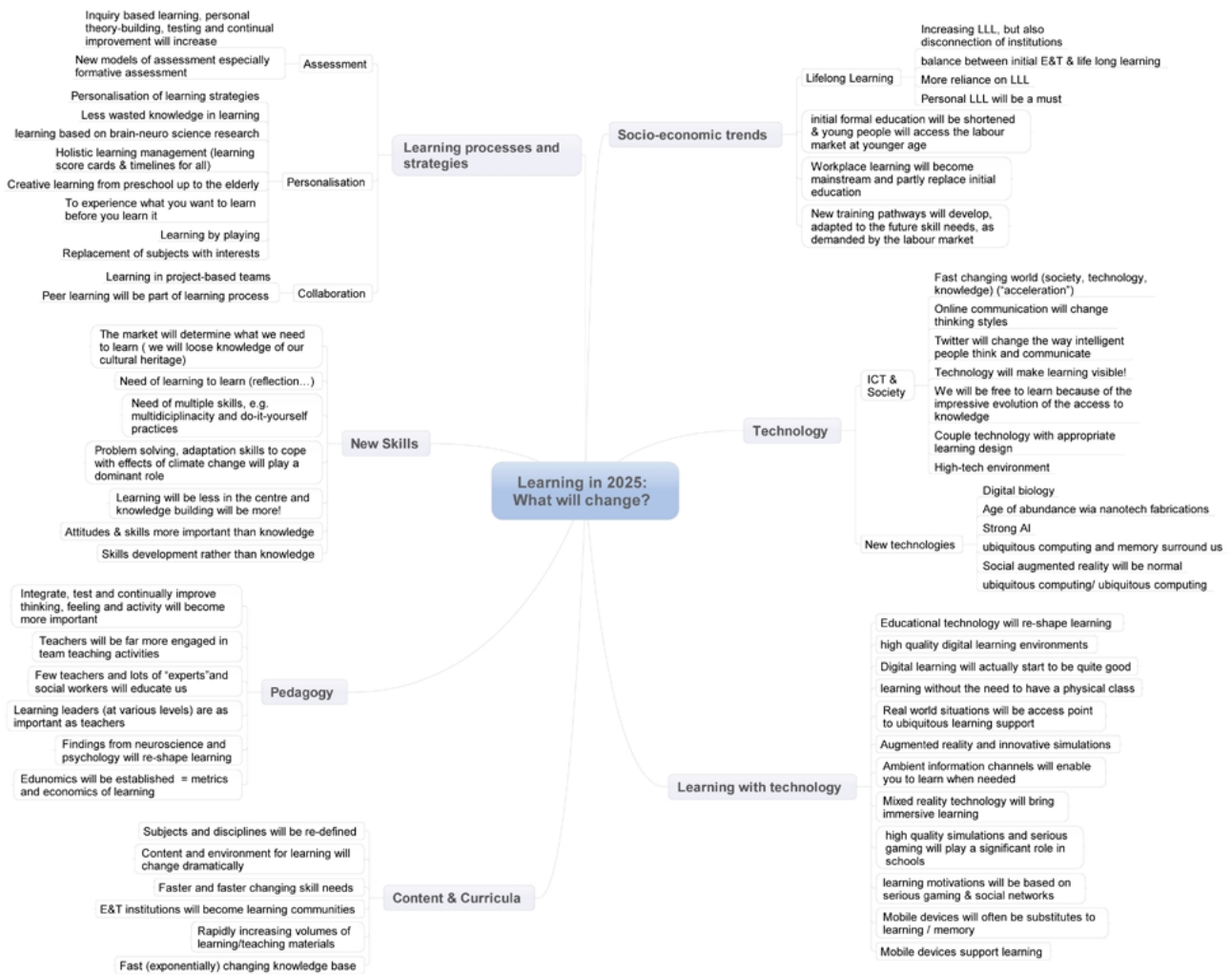
brainstorming exercise focused on generating a general and comprehensive vision in response to the question: "What will be the major changes to education and training over the course of the next 10-20 years?" The responses were collected, discussed and subsequently sorted by the experts. Figure 12 visualises the emerging map of the future of learning.

Comparing experts' findings with those of the teachers, who had been asked to concentrate on school education rather than the whole picture of societal change, what is striking is the degree of coincidence and overlap. Experts and teachers both underline that technological change will be one of the main drivers for change in education and training. At the core of both maps are the ensuing changes to learning strategies and

pathways: new competences and associated assessment procedures which focus on skills and attitudes rather than knowledge; learning strategies that put the learner at the centre of the learning process; personalised learning pathways, adapted to learners' individual learning needs and objectives; the prevalence of collaborative learning processes which also modify the relationship between learners and teachers; and new learning environments integrated into life and work.

The picture the experts paint is one of a rapidly changing world where integration, coordination, collaboration and personalisation are key strategies for equipping citizens with the skills and attitudes necessary to participate actively in society. Additionally, the experts expect that E&T institutions will become learning

Figure 14: Experts' vision of a desirable future

A Vision of a DESIRABLE Future

Learning opportunities for all
- Access to learning for all
- Diversity of learning opportunities
- Flexible form & timeframe
- Free & open learning

Lifewide learning
- learning becomes integrated in life
- learning anything, anywhere, anytime
- learning is modular & segmented
- holistic learning
- Immersive, situated learning
- Classrooms will be replaced by learning spaces

Personalised learning
- personalised education
- empowerment
- Enable the person to create her/himself
- learning is a social process
- collaborative processes
- the learner decides
- Be the best at something
- Individualised assessment

Pedagogy
- Methods
  - (Serious) games used for learning at all levels
  - Networked learning
  - Peer teaching
  - encourage learners to "fail forwards"
- Teachers
  - virtuoso
  - helping designer
  - mentor
  - moderator
- Curriculum
  - focus on the future
  - focus on the individual

New Skills
- Open knowledge
- learning makes you fit for life
- Minimal sets of knowledge
- the knowledge acquired is relevant
- learning should be more challenging

Recognition of skills
- make learning visible
- Alternative ways of recognising skills
- Learning is respected and valued
- Certification is not part of the learning process
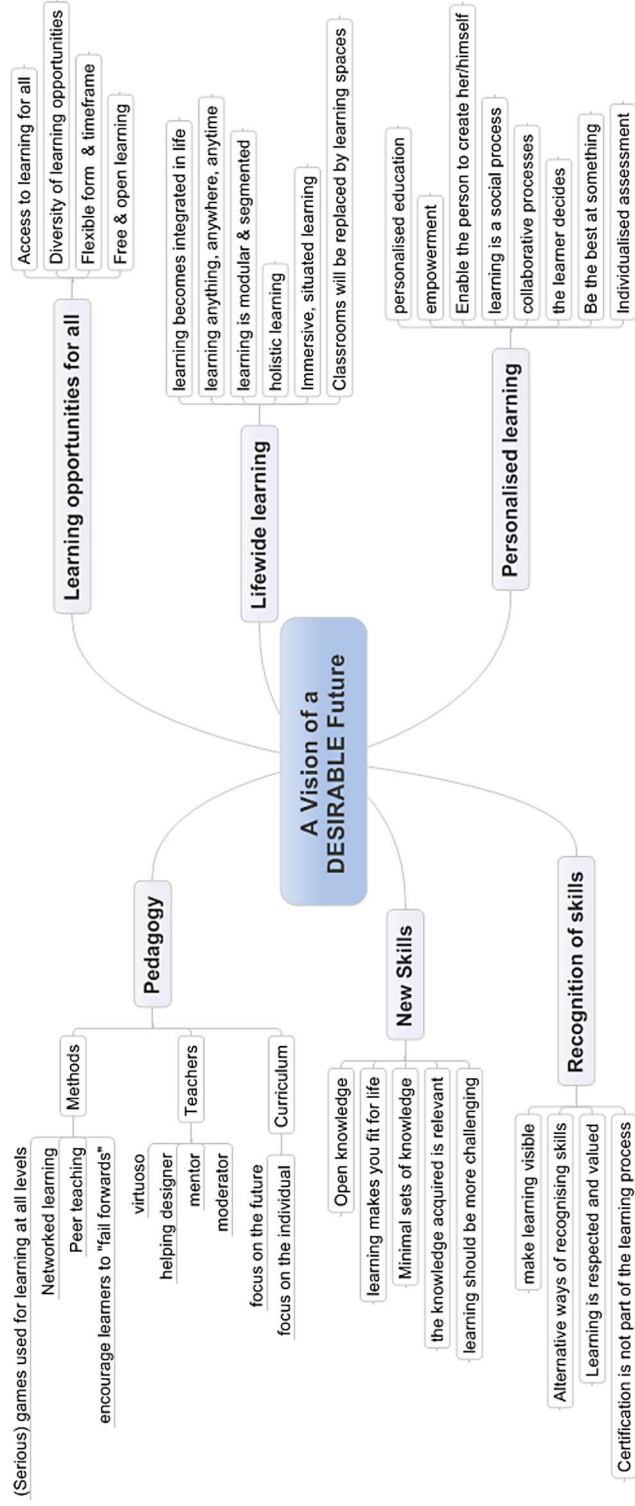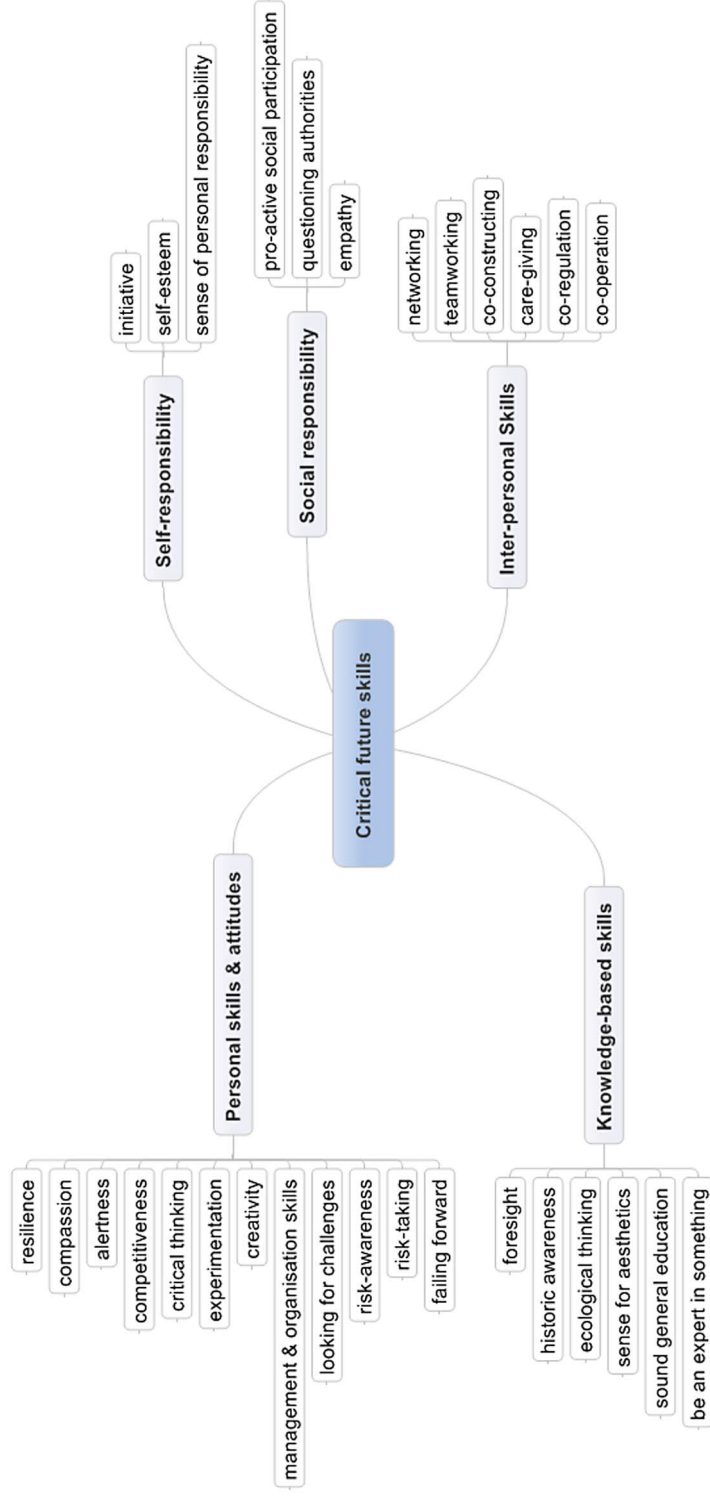
Technical Report Series

Figure 15: Experts' view on future skills requirements

communities that collaborate with employers on identifying skill needs and adapt the abundance of learning and teaching materials to serve the individual learning needs of each of their students. Skills and attitudes, such as problem-solving, flexibility, creativity and reflection will become more important than knowledge. Scientific research will assist teachers and learning in making learning more efficient. Learning will be playful and inquiry-based.

In the discussions, experts underlined that some of these developments should be seen critically. For example, it was stressed that although curricula need to be adapted to better address labour market requirements, E&T should not completely submit to market demands and mechanisms.

Towards the end of the workshop, to summarize the interesting and diverse discussions and draw conclusion, participants were asked to list the key elements of a desirable future of learning. Figure 13 gives an overview of the findings of the group. Technology related contributions are marked in green.

When comparing this map to the initial map, what sticks out is the need for (policy) mechanisms that ensure that all citizens can benefit from the wealth of learning opportunities expected to be available in the future. The desirable future that experts describe is thus one in which everybody has access to a range of free and open learning opportunities that flexibly respond to the learner's learning needs and preferences. Learning will be integrated in life and work, tailor-made, enjoyable, networked and collaborative and adaptable. Skills rather than knowledge will come to the fore and there will be new assessment and certification mechanisms that make relevant skills visible.

Experts were also asked to identify the key competences and critical civic skills that citizens will need to acquire to successfully participate in the future European society.

When comparing experts' responses on future skill needs to those of teachers and policy actors, interesting differences arise which indicate that experts think more "out of the box" than those directly involved in either teaching or educational policy-making. For experts, it is clear that skills and attitudes are the decisive factors for a successful future contribution to society. They underline that personal and social responsibility as well as inter-personal skills such as team-working and networking form the basis for successful participation in society. Personal skills that will enable citizens to seize learning and employment opportunities include risk-awareness and risk-taking, which is also expressed in a sense of entrepreneurship, experimentation, looking for challenge and 'failing forward'; creativity and critical thinking; and resilience, compassion, alertness and competitiveness. Experts also underline that some knowledge-based skills and a sound general education will remain important. History, ecology and aesthetics are fields in which they think individuals will need to develop awareness and understanding in the future.

3.1.3 Policymakers' visions of the future

Policy actors at the European Commission have contributed to the study on three occasions, in September 2009, May 2010 and November 2010. At the May workshop, 16 participants from different Directorate Generals and other European institutions (EAC, INFSO, EMPL; EACEA, ETF) participated in a brainstorming exercise, similar to the ones conducted with experts and teachers, on the major changes expected for E&T over the course of the next 10-20 years.

In line with the observations expressed by teachers and experts, policy actors emphasize that technology will be one of the main drivers for change in education and training. They also expect personalised and collaborative learning processes to prevail and teachers and learners to be empowered to design learning processes that are better fitted to individual needs on the one hand and societal changes on the other.

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Figure 16: Policy actors' view on future changes to E&T
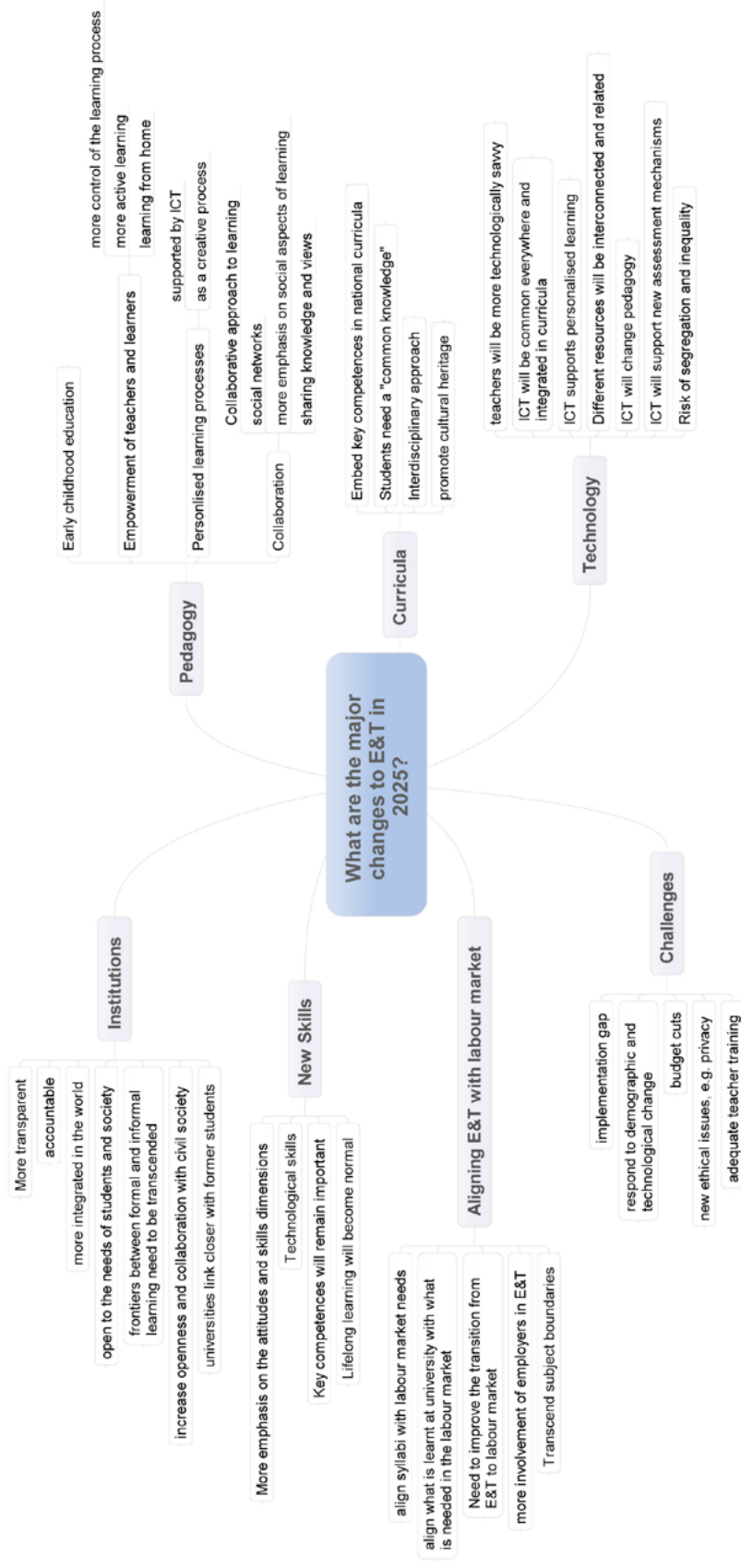
Correspondingly they underline, while the current set of key competences will also remain important in the future, their focus will change towards skills and attitudes rather than knowledge, which will be acquired and complemented in a lifelong learning perspective.

As a general tendency, E&T will (have to) become more responsive to labour market needs and better align curricula, content and learning objectives, particularly in higher education and vocational training. Also, industry should be more closely involved in shaping and re-aligning curricula to ease the transition from E&T to work. E&T institutions on the whole will need to become more transparent and accountable, open to society and the needs of their learners. Informal learning activities need to become better recognised. The main challenge for E&T in the future is, according to policy actors, overcoming the current "implementation gap" and putting into practice what have long been recognised as necessary and needed transformations. This is perceived to be particularly difficult in view of expected or persisting budget cuts and continuing

technological and demographic change. Barriers that hinder the take up of promising learning strategies, such as new ethical issues arising from privacy concerns or a lack of adequate and targeted teacher training, also need to be adequately addressed for change to happen.

3.2 Group Concept Mapping Exercise

The Group Concept Methodology (GCM) was employed to evaluate the findings of a focus group of 13 experts which was involved at three stages, i.e. in (1) gathering, (2) clustering and (3) rating insights on major changes to education in 20 years. The experts came up with a total of 203 ways to complete the trigger statement "One specific change in education in 20 years will be that: …" Each expert then arranged the changes foreseen in different thematic clusters and rated them for importance and feasibility.

The vast amount of data thus generated was subsequently aggregated and analysed. To depict the emerging structure in the data,
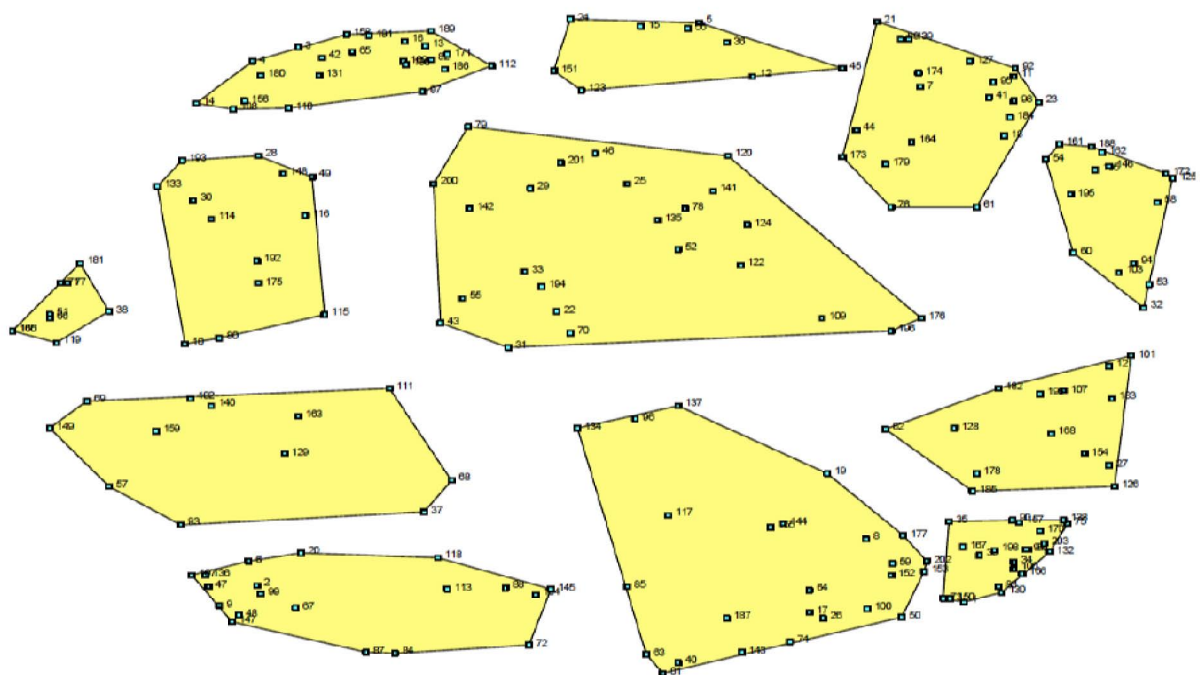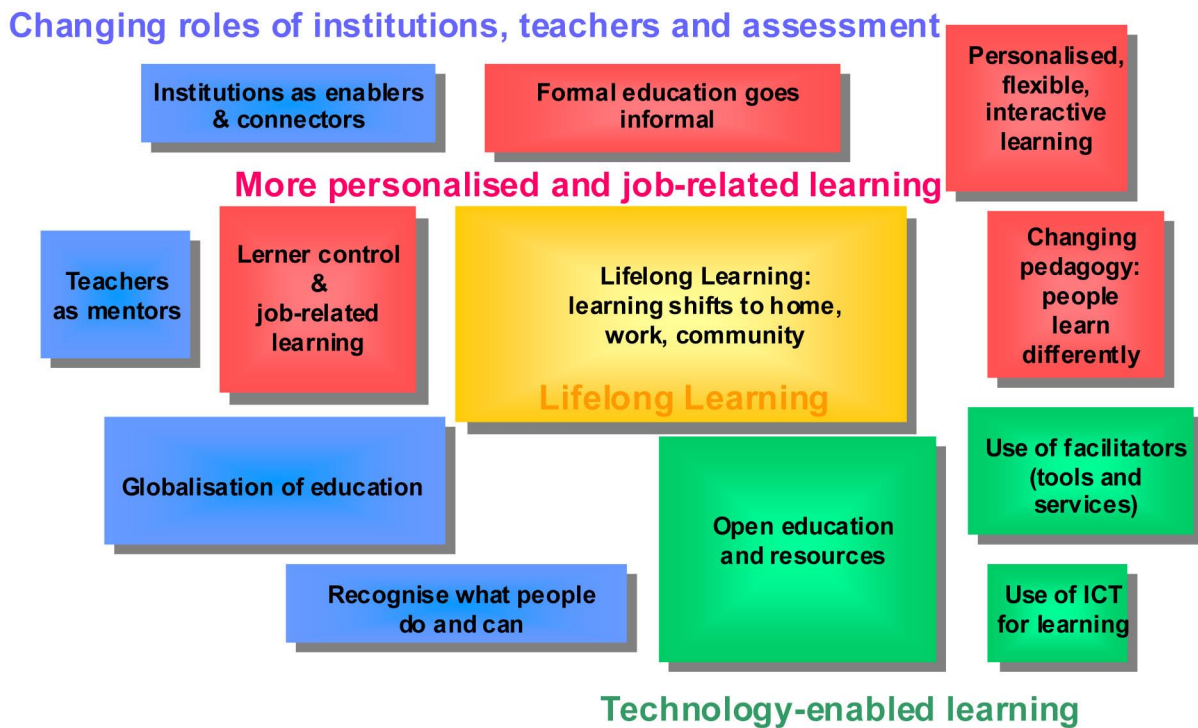
Figure 17:   GCM Cluster Map

Figure 18: *GCM landscape of changes to E&T in 2020-2030*

Changing roles of institutions, teachers and assessment

Institutions as enablers & connectors

Formal education goes informal

Personalised, flexible, interactive learning

More personalised and job-related learning

Teachers as mentors

Lerner control & job-related learning

Lifelong Learning: learning shifts to home, work, community

Lifelong Learning

Changing pedagogy: people learn differently

Globalisation of education

Open education and resources

Use of facilitators (tools and services)

Recognise what people do and can

Use of ICT for learning

Technology-enabled learning

multidimensional scaling and hierarchical cluster analysis were applied. Based on the experts' sorting activity, each statement was placed on a map, reflecting its proximity or distance to the other statements. Based on the position of the statements and the clusters proposed by experts, the statements were subsequently clustered into 12 groups (Figure 16).

Looking at the content of the different clusters, four general themes or trends emerge. The first set of clusters (in blue in Figure 188) address changes that are expected to happen to formal education and training. Experts underline the fact that, in this respect, institutions will change to become enablers and connectors in a globalised education market. Informally acquired skills will be better recognised and integrated in qualification frameworks. These clusters also suggest a shift in the responsibility for acquiring competences from the institutional to the individual level.

Teachers will become mentors rather than instructors, in line with the general tendency,

expressed by the second set of clusters (in red), towards learning strategies that are targeted towards individual and professional needs and respond to individual learning preferences and needs. The central position of the lifelong learning cluster on the map indicates not only its central role for future learning, but also that this cluster is a connection point for all other clusters, suggesting that many of the envisaged changes to learning strategies and pathways are related to the fact that, according to the experts, in the future, skills and competences will be acquired in a life-long learning perspective.

Information and communication technology (ICT) plays an important role for the future of learning. While statements across all clusters reflect changing learning patterns due to the opportunities offered by ICT, there are three clusters that explicitly address how emerging technologies will give rise to new learning strategies (in green).

Looking at the 203 individual statements and their ratings in detail, some of the expected

■ *Figure 19: GCM cluster ratings on importance and feasibility*

Expert ratings on....

Importance | **Feasibility**

Importance		Feasibility
Personalised, flexible, interactive learning	4.06 3.91	Open education and resources
Learner in control		Use of facilitators (tools and services)
Stronger focus on job-related learning		
Formal education goes informal		Use of technology for learning
LLL: learning shifts to home, work, community		LLL: learning shifts to home, work, community
Changing pedagogy: people learn differently		Recognise what people do and can
Use of facilitators (tools and services)		Personalised, flexible, interactive learning
Recognise what people do and can		Teacher becomes also mentor, coach
Globalisation of education		Institutions become enablers and connectors
Institutions become enablers and connectors		Changing pedagogy: people learn differently
Teacher becomes also mentor, coach		Globalisation of education
Open education and resources		Learner in control
		Stronger focus on job-related learning
Use of technology for learning	3.21 3.15	Formal education goes informal

changes stick out as being of particular importance. These include:

- The nature of learning will become more learner-centred, individual and social;

- Personalised and tailor-made learning opportunities will address individual and professional training needs;

- Innovative pedagogical concepts will be developed and implemented in order to address, for example, experiential and immersive learning and social and cognitive processes;

- Formal education institutions will need to flexibly and dynamically react to changes and offer learning opportunities that are integrated in daily life; and

- Education and training must be made available and accessible for all citizens.

Considering the rating of the statements in these clusters with respect to feasibility and importance, as an absolute score, the average score of each of the 12 clusters ranges above 3 (on a Likert scale from 1 to 5), indicating that all 12 major themes can be considered

important and feasible. In relative terms, some differences emerge. The technology-oriented clusters score higher on feasibility and slightly lower on importance when compared to other clusters, while the clusters addressing flexible, targeted and personalised learning strategies rate higher on importance and lower on feasibility. Thus, while experts are optimistic concerning the development of technology-enhanced learning opportunities, they are sceptical about the feasibility of implementing learner-centred approaches in formal education and, in general, the ability of formal education systems and institutions to keep pace with change and become more flexible and dynamic.

This general tendency is confirmed and further specified by a detailed look across clusters at the 57 statements that score higher than average on importance and, at the same time, lower than average on feasibility, thus indicating issues that will need particular attention by policy-makers. The most prominent of these include:

- the need to ensure appropriate, accessible and affordable education that

caters for the learning needs of every citizen, irrespective of age;

- the importance of implementing pedagogies that focus on transversal competences, such as strategic, problem-oriented, situational thinking, creativity and learning to learn;
- the need to align technology and pedagogy to create participative learning environments which enable high quality learning experiences that keep participants interested and motivated;
- ways to integrate learning into the workplace, community and home;
- ways to adapt assessment strategies meaningfully to the manifold ways in which people actually learn; and
- the need to address the changing role of teachers as learning mediators and guides, enabling them to become lifelong learners themselves.

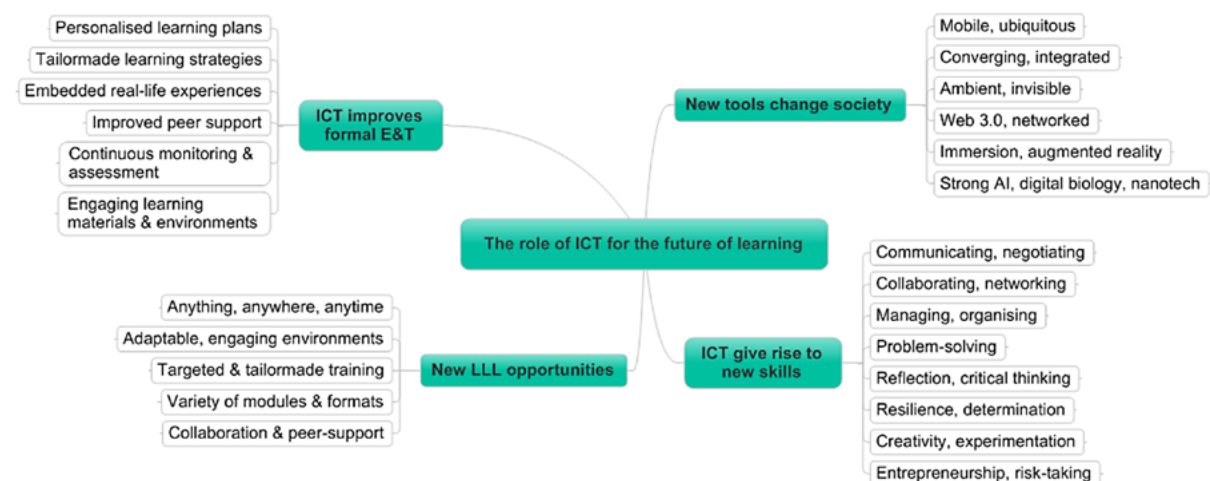## 3.3 The Role of ICT for Future Learning Strategies

One of the most salient and important findings, which emerged in all the different stakeholder consultation exercises, is the impact of Information and Communication Technologies (ICT) on future learning strategies and trajectories. It is therefore worth considering more in depth the role(s) of ICT in the future learning landscape.

First of all, as pointed out by all stakeholders, ICT is one of the driving forces for socio-economic change. On the technological side, trends towards high-quality, converging, mobile and accessible technologies, together with more sophisticated, user-friendly, adaptable and safe applications and services will integrate technology more and more into everyday life. Eventually more advanced technologies, such as ambient technologies, immersive 3D environments and strong AI, may become a reality. As a consequence, technology will be more smoothly integrated into our daily lives and become a basic commodity.

With the emergence of more integrated, adapted and adaptable technological solutions, new skills come to the fore. As a consequence of changed communication and interaction patterns, interpersonal skills – communication, collaboration, negotiation and networking skills – will become more important. At the same time, the ubiquity and abundance of information will require individuals to improve their meta-cognitive skills – reflection, critical thinking, problem-solving, managing and organising. For people to actively manage their personal and professional lives and find their way around

▬ Figure 20:   The role of ICT for future learning strategies

- Personalised learning plans
- Tailormade learning strategies
- Embedded real-life experiences
- Improved peer support
- Continuous monitoring & assessment
- Engaging learning materials & environments

ICT improves formal E&T

New tools change society
- Mobile, ubiquitous
- Converging, integrated
- Ambient, invisible
- Web 3.0, networked
- Immersion, augmented reality
- Strong AI, digital biology, nanotech

The role of ICT for the future of learning

- Anything, anywhere, anytime
- Adaptable, engaging environments
- Targeted & tailormade training
- Variety of modules & formats
- Collaboration & peer-support

New LLL opportunities

ICT give rise to new skills
- Communicating, negotiating
- Collaborating, networking
- Managing, organising
- Problem-solving
- Reflection, critical thinking
- Resilience, determination
- Creativity, experimentation
- Entrepreneurship, risk-taking

in an interconnected maze of interactions, determination, resilience, experimentation, risk-taking, creativity and entrepreneurship will become key competences.

However, ICT not only affects *what* people need to learn, but also *how* they will learn. Due to the ubiquity of technology and its power to facilitate highly dynamic, adaptable and engaging virtual learning environments, personalised lifelong learning opportunities will become feasible. According to experts, in the future a vast variety of learning modules, courses and packages will become available which offer targeted and tailor-made training opportunities for all learning and training needs, in all life stages and for all qualification levels. Different formats and combinations thereof will be available, including programmes that adapt to individual learning pace and progress, self- and peer-assessment tools, serious games, virtual reality, immersion and simulation. Thus learning programmes will be

responsive to individual learning styles, specific learning objectives, needs and preferences. Virtual learning networks, communities and groups will offer (peer) support and online collaboration will lever individual progress. Learning will become smoothly integrated into everyday life, accompanying individuals wherever they are and whatever they do and allowing them to study more efficiently and effectively.

Within formal education and training, i.e. in schools, universities and vocational training institutions, ICT will contribute to transforming pedagogical strategies and re-shaping curricula. Mobile devices, immersive environments and serious games will contribute to embedding real life experiences into formal education and training and to better aligning demand and supply of skills. While face-to-face learning will prevail for students in primary and secondary education, ICT will enable teachers to better respond to diversity and heterogeneity in the classroom

Figure 21:   Conceptual map of the future of learning
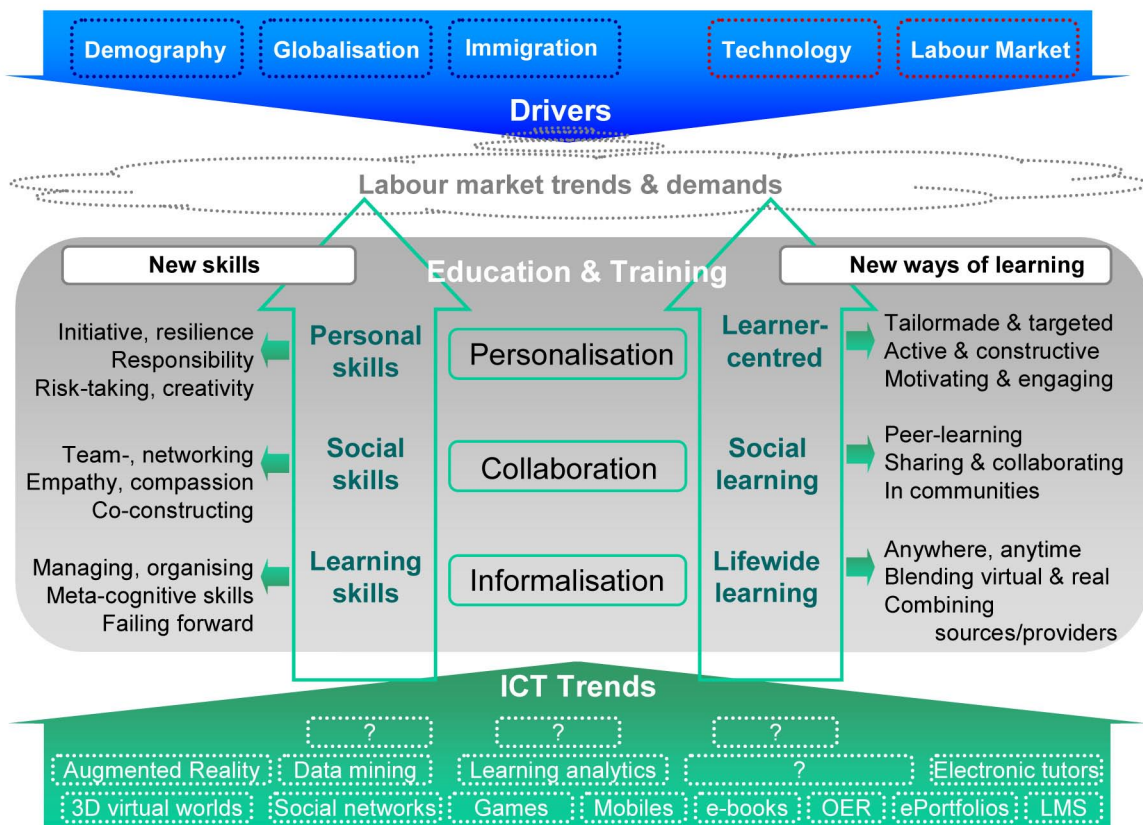
and to adapt learning material and objectives to individual students' learning needs. Technology will allow teachers to compile personalised sets of learning materials; to constantly monitor progress without having to interfere in the learning process; to re-align learning objectives and strategies in response to progress made; and to use a vast variety of engaging and interesting learning materials that more effectively facilitate learning.

However, all stakeholders underline that to realise the potential of ICT in promoting tailor-made collaborative learning opportunities that are adaptable, challenging, relevant and enjoyable, open access and basic digital skills need to be fostered. Policy makers need to ensure that all citizens will be able to benefit from the opportunities offered and that more vulnerable groups are equipped with the necessary skills to participate in learning activities that are more and more technology-based. Similarly, E&T institutions will need to be provided with the necessary ICT infrastructure and tools to become e-mature. Teachers and trainers need to receive targeted training, enabling them to align pedagogy and technology to the benefit of their learners. Guidance is needed for educators, learners and parents alike on how to best use technology.

3.4 Key Insights: a Descriptive Vision of Future Learning

The overall vision of the future of learning emerging from the expert consultations highlights the importance of new skills and new learning patterns that are characterised by a tendency towards personalisation, collaboration and more informal learning settings, the latter dubbed as "informalisation" in Figure 19 above for lack of an appropriate term.

The key drivers for these tendencies are socio-economic trends and their impact on labour markets. Future jobs call for targeted and tailor-made training opportunities, support working

patterns that are increasingly collaborative and require flexible and accessible learning opportunities. Because of increased labour market dynamics, personal, social and learning skills will become increasingly important. Another key driver for these changes is ICT, which is also an enabler to address the arising changes.

Reflecting more in detail on the insights collected, a number of key trends emerge, that were repeatedly and consistently highlighted across all consultations exercises.

First of all, the **pre-dominant role of ICT** in driving change, its impact on society and economy and on education and training, coupled with its potential for facilitating learning strategies and opportunities that more adequately respond to societal change and labour market requirements, make it a key element in the future learning landscape. ICT will change what we will need to learn and how we will learn in 2020-2030.

Secondly, the **role of education and training institutions** will change significantly. With the emergence of **lifelong and life-wide learning** as the central learning paradigm for the future, traditional E&T institutions will need to reposition themselves in the emerging learning landscape of the future. They will need to experiment with new formats and strategies for learning and teaching to be able to offer relevant, effective and high quality learning experiences in the future. In particular, they will need to more flexibly respond to individual learners' needs and changing labour market requirements. They will need bridge and mediate between skill demand and supply and seize the opportunities offered by ICT to better align the two.

Moreover, learning strategies and **pedagogical approaches** will undergo drastic changes. With the evolution of ICT, constructive and learner-centred pedagogies will see a revival. Personalised learning and individual mentoring will become a reality and teachers will need to be

trained to exploit the available resources and tools to support tailor-made learning pathways and experiences which are motivating and engaging, but also efficient, relevant and challenging. Along with changing pedagogies, assessment strategies and curricula will need to change.

Furthermore, the increased pace of change will bring new skills and competences to the fore, in particular **generic, transversal and cross-cutting skills**, which will enable citizens to flexibly and pro-actively respond to change and to seize and benefit from lifelong learning opportunities. Problem-solving, reflection, creativity, critical thinking, learning to learn, risk-taking, collaboration, and entrepreneurship will become key competences for a successful life in the European society of the future. While mathematical, verbal, scientific and digital literacy will remain key building blocks for successful participation in society, it will become increasingly important for citizens to have a better understanding and awareness of the natural and social environment, in which they live, which leads to a new focus on nature and health, on the one hand, and on civic competences, on the other.

Finally, it needs to be emphasized that the expected changes induce profound **challenges for equity and social cohesion**. While ICT

bears a significant potential for making learning more equitable and accessible in the future, not all citizens will automatically benefit from personalised, collaborative and informal learning pathways. Policy action will certainly be needed to ensure that all citizens – and in particular the more vulnerable – will be able to benefit from the ICT enhanced learning opportunities of the future and that all citizens have access to adequate and effective learning and training opportunities.

While there is strong agreement on these central pillars of the future learning landscape, there is lack evidence on how the potential of ICT can best be developed and realised and what policy can do to ensure that, in the future, everybody will receive the learning and training they need. If lifelong learning is to become a reality, how will learning and training opportunities blend into individual people's lives to make "informalised" learning a reality? How can the newly emerging personalised learning strategies be practically used to, for example, enable people to qualify or re-qualify for a job, to develop their individual talents or to simply not be left on the wayside? How can networking and collaboration effectively lever knowledge gain? These, among others, are questions that the second part of this report aims to answer.

Part II. Challenges and Policy Options

■ 4 Initial Education and Training

4.1 Introduction

Schools as a central institution for teaching groups of (young) people date back to the classical era and are historically documented in a variety of cultures and continents.[66] Although there are currently many different school concepts within most European countries, their main goal remains the same: they provide initial education for children and young adults to prepare them for their working lives and to help them develop into responsible and reflective adult citizens. However, today schools and initial training institutions are faced with a number of challenges that will continue to be relevant in the future. This section deals with three selected challenges for schools that have been addressed in the Future of Learning project and have been discussed by experts and stakeholders in online surveys, in dedicated (online) groups, in a workshop, and in a targeted stakeholder consultation exercise.

These challenges address:

- **Multicultural integration:** While immigration can contribute to ameliorating the effects of demographic change, the integration of a growing immigrant population remains a long-term challenge for European societies.[67] Language skills, in particular, are an important pre-requisite for social participation.[68] However, successful socio-economic inclusion will also heavily depend on the ability of European Education & Training systems to help young migrants to develop

their talents and become active citizens of their host society and to prepare all young people for life in a multicultural society.

- **Early school leaving:** Early school leaving (ESL) has been increasingly recognised as one of the main challenges faced by European societies. In 2009, 14.4% of EU citizens between 18 and 24 years had left school without having completed secondary education.[69] Early school leavers face increased risks of unemployment, poverty and social exclusion.[70] Recently, a number of policy measures have been initiated to fight early school leaving[71] at the European level. However, more research is needed on how effective *prevention*, *intervention* and *compensation* mechanisms can be implemented in the future.

- **Fostering talent:** To develop a 'smart' economy based on knowledge and innovation, the Europe 2020 strategy sets the benchmark of at least 40% of the younger generation to have a tertiary degree.[72] However, if more young people are to successfully complete tertiary education, more needs to be done in secondary (and primary) education to enable teachers and learners to identify and develop hidden talents, exploit each learner's strengths, to effectively respond to learning needs and deficits, and to jointly develop and anticipate career choices.

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66 http://history-world.org/history_of_education.htm
67 European Commission, 2009a.
68 http://ec.europa.eu/education/school21/com423_en.pdf

69 Eurostat Labour Force Survey 2010.
70 European Commission, 2011a.
71 Cf. European Commission, 2011a-c.
72 European Commission, 2010a.

4.2 Challenge 1: Multicultural Integration

4.2.1 Persona presentation

Chanta is the (6 year old) child of Cambodian immigrants who came to Poitiers (France) in 2023. The transition from Cambodia to France was quite shocking to Chanta, especially as she immediately started school without speaking a word of French. This of course made it difficult – even nearly impossible - for her to follow the curricula.

Although the family is not poor, they can not afford personalized private lessons and Chanta requires more support than her school can offer – not only with regard to language, but also with regard to what she misses in school due to her lack of language skills.

Her teachers have discussed this situation with her parents, who are unable to help much since their French is also minimal, as language skills are not of primary importance for their jobs in maintenance and cooking.

Key Policy Documents:

- European Commission (2008b). Green Paper: Migration & Mobility: challenges and opportunities for EU education systems. http://ec.europa.eu/education/school21/com423_en.pdf.
- European Commission (2009b). Results of the consultation on the education of children from a migrant background. Commission staff working document. SEC(2009) 1115 final. http://ec.europa.eu/education/news/doc/sec1115_en.pdf.

According to Eurostat data (2009), in 2008, 19.5 million third-country nationals were residing in the EU, 3.9% of the overall population. Net migration, ranging between 0.5 and 1 million per year for most of the 1990s, has increased to levels ranging between 1.5 and 2 million since 2002 and is the main factor accounting for EU demographic growth.[73] Also, mobility among European Member States leads to increasing numbers of EU citizens living in other EU Member States. In 2008, 11.3 million EU citizens, i.e. 2.7% of the total EU27 population, were living in EU Member States that they were not nationals of. Thus, according to Eurostat estimates, more than 30 million people in total were living as foreigners in the EU27 in 2008.

While immigration can significantly contribute to employment, growth and prosperity in Europe,[74] the integration of a growing immigrant population remains a long-term challenge for Europe.[75] Responding to the importance and significance of (third-country) immigration, the Council of the European Union (2004) and Commission (2003; 2005a) called on the EU Member States to step up their efforts to integrate immigrants and encouraged them to develop comprehensive national integration strategies. The Hague Programme and the Common Basic Principles adopted by the Council of the European Union (2004a; 2004b) in November 2004 acknowledged the need for greater co-ordination of national integration policies and EU initiatives in the field of immigration and underlined the importance of a holistic approach to integration. A common framework, which aimed to integrate a wide range of EU policies, was set up and further developed[76] with mechanisms for monitoring policy developments and exchanging information and good practice.[77]

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73 European Commission 2007a.
74 European Commission 2008a.
75 European Commission 2009a.
76 European Commission 2005a; 2007a.
77 cf. European Commission, 2007b.

The European Commission (2007a) emphasizes the following factors, among others, as the key to successful integration and social participation of immigrants in society: the need to increase efforts in formal education, to address the specific needs of immigrant children and youth at an early stage, and to empower them to become active participants in society.

The impact of immigration on school education in particular is significant. PISA 2006 data show that at least 10% of the school population aged 15 (within the old Member States) was either born abroad or has both parents born in another country. This figure increases to almost 15% at the fourth grade of primary school.[78] Furthermore, in some metropolitan areas the share of migrant pupils in public primary schools is substantially higher.[79] Education is the key to ensuring that these pupils are equipped to become integrated, successful and productive citizens of their host country.[80]

There is clear and consistent evidence that many children of migrants have lower levels of educational attainment than their peers.[81] Migrant students are disadvantaged in terms of enrolment in type of school, duration of attending school, indicators of achievement, drop-out rates and types of school diploma reached.[82] The EU average early school leaving rate for migrant first generation youth is double that of natives: in some countries more than 40% of migrant youth are early school leavers.[83]

There are many different factors accounting for the current educational disadvantage – among them, most prominently, socio-economic conditions and language barriers. However, the performance of migrant students of the same origin varies between European countries, even where

patterns of migration are similar,[84] indicating that policies and educational approaches can have an impact on educational attainment.[85]

Responding to these findings, the European Commission (2008b) published a Green Paper on "Migration and Mobility: Challenges and Opportunities for EU Education Systems", to open the debate on how education policies could better address the challenges posed by immigration and internal EU mobility flows. The Green Paper is part of a package of measures accompanying the Renewed Social Agenda, which intends to reinforce access, opportunities and solidarity among all EU citizens.[86] The Green Paper and the contributions to the ensuing public consultation[87] emphasized a need for schools to be inclusive and multicultural, to update the skills and competencies of teachers and to strengthen contacts with parents and communities. The Council of the European Union (2009b) conclusions on the education of children with a migrant background called upon Member States to take appropriate measures to increase the permeability of education pathways and remove barriers within school systems.

Furthermore, the Council Resolution on new skills for new jobs (2007) argues that to equip people for new jobs within the knowledge society, attention has to be paid to raising the skills levels of those at risk of economic and social exclusion, including, in particular, migrants. The 2011 Council Recommendation on Early School Leaving explicitly encourages Member States to help children with different mother tongues to improve their proficiency in the teaching language. This would improve the educational achievements of children with migrant background and reduce the risk of early school leaving. In particular, it underlines the fact that providing high quality early childhood

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78 OECD, 2007.
79 European Commission 2008c.
80 European Commission, 2008b.
81 European Commission 2008b; 2008c.
82 NESSE, 2008.
83 European Commission, 2011a.

84 OECD, 2006.
85 European Commission, 2008b.
86 European Commission, 2008.
87 European Commission 2009b.

education and care is especially relevant for those from migrant backgrounds.

4.2.2 Future challenges and their implications

Due to declining birth rates and an ageing society, Europe's economy and prosperity will increasingly depend on immigration. Most European countries are still welcoming foreigners, but tolerance towards immigration has been declining for a number of years.[88] European countries have also become more demanding as far as integration is concerned. Immigration comes with challenges and schools will increasingly have children from migrant backgrounds that may not have sufficient language skills to follow the curricula in their new country's language.

A majority (71%) of experts believe that, in the future, multicultural classrooms will have become the norm, thus requiring new strategies for teaching and learning. As a consequence of this, 70% of the experts believe that cultural awareness and inter-cultural communication will become an important subject in school education. Furthermore, 64% believe that schools will have to substantially improve their efforts to accommodate the needs of children from foreign origins, by offering language support.

Thus, in the future,

- There will be a higher proportion of migrant children in increasingly *multicultural and heterogeneous classrooms*. Thus, multicultural classrooms will become the norm, which requires *new strategies for teaching and learning*.
- E&T will have to support primary *language acquisition* and offer targeted support for migrants to enable them to overcome language barriers and develop their talents;
- E&T will need to actively address and promote integration and make *multicultural education* part of the curriculum.

4.2.3 A desirable future for Chanta

In a perfect future world, the school would pool all available resources that could benefit Chanta to (1) enable her to become an active and responsible member of the host society, furthering her wellbeing and progress and that of society (*integration*); (2) to fully develop her talents and attain a high level of educational *achievement*; and (3) to develop her personal cultural identity in a globalised, multicultural world, which respects different cultural origins and outlooks on life (*multiculturality*).

Initially, in the adaptation period, E&T will encourage and enable Chanta to participate actively in class, make friends and feel at home in her new environment. A personalised learning programme will furthermore enable her to quickly and effectively acquire basic language skills in a playful and engaging way. All learning material offered in class will be accompanied with dedicated support that will enable her to overcome language barriers and perform well in subjects that are not primarily language related. In this way, she will receive personalised attention and assistance while participating in normal class activities and developing further her language and cultural skills in interaction with her peers, who will also receive personalised support for common activities.

In the longer term, Chanta will be offered opportunities to keep in contact with her host culture and language, while living in the new cultural environment. Thus, certain dedicated learning projects and materials will focus on Cambodia's history and lifestyle. Virtual (and real life) study exchanges and field trips together with collaborative learning projects with Cambodian children in virtual networks and online communities will enable her to develop her cultural identity at the crossroads of the two cultures she belongs to. Eventually, she would also be given the opportunity to improve her language skills in Khmer, to ensure that she will also command her native language in reading and writing. This, in a globalized world, will be an asset for her further professional development.

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88 http://cordis.europa.eu/fetch?CALLER=EN_NEWS&ACTION=D&SESSION=&RCN=27170

Ideally her two mother tongues will jointly reinforce one another; learning advances in one of the two languages will be accompanied by strategies that will also lever the other language to a higher level.

Integration would also go the other way. All pupils would benefit from the presence of migrant children like Chanta in their classrooms. Chanta's biography would become a learning opportunity for her peers, who would learn that they live in a globalised and diverse world with different languages and cultures which deserve their respect. Thus heterogeneity would become an asset and a learning opportunity fostering the acquisition of important civic and cultural competences.

4.2.4 Priority areas

Effective learning strategies for heterogeneous learning groups. Learning groups will become increasingly diverse in the future, with respect to the language abilities and requirements of students, their cultural roots and civic attitudes, and also their attitudes to learning, their behaviour and their educational needs. Pedagogical strategies will need to respond to the specific needs of each individual student, while at the same time encouraging collaboration and peer learning. ICT will be a key ingredient enabling teachers to reconcile these two opposing strategies.

Language learning. Despite the availability of real time translation technologies like *Babelfish* and *Google translate*, the overwhelming majority of experts consulted believe that language skills will still be important in 2025. Technologies are expected to lever the potential of the following learning strategies:

Multicultural education. To improve the social integration and inclusion of migrants, it is necessary not only to accommodate a wider range of mother tongues, cultural perspectives and attainments in the classroom; but also to include intercultural education in curricula and to foster

all students' intercultural competences.[89] ICT tools constitute a very versatile means of making learning and teaching material on intercultural themes generally and openly available. Teachers and education institutions can be directly addressed and assisted in including intercultural education in their curriculum.

4.2.5 The potential of ICT

Personalised and interconnected electronic learning environments. ICT will enable the setting up of personalised learning plans that will allow for diagnostic and formative assessment and align learning strategies and assignments to student progress. These will be integrated in interactive learning environments with electronic tutors - available in different languages and personalities - which guide learners through their assignments, offer feedback and select appropriate learning tasks for each individual learner, thus complementing support offered by teachers. These individual learning environments will be interconnected, allowing for collaborative projects to be implemented.

Translation technologies can be a useful tool for overcoming language barriers that impede the participation of migrant children in normal class activities and progress in other subjects. Together with iconographic representations and technological applications that convey knowledge in a non-language-based way, such as (interactive) games and self-explanatory learning materials, they allow teachers to make learning material understandable to students who are not yet able to grasp new concepts and tasks in the host country's language. They also allow students to collaborate on a project while offering each student specific language support to facilitate interaction.

Tandem methods and networked learning. As a consequence of globalisation, some, like Chanta and her family, need to learn the language

89 European Commission 2008b; 2009b.

of their host countries, while others need to learn Chanta's native language as a foreign language, especially since Cambodia's economy, like other emerging Asian economies, is projected to grow.[90] Thus, tandem methods and peer learning can be a valuable source for language learning in a practical, cultural context, which is also highlighted by the great majority of experts who advocate collaborative learning strategies for Chanta. Although language "tandem" methods are not new, modern technologies can improve their effectiveness and scale. Especially translation technologies – and by 2025 perhaps even augmented reality systems that provide real-time translation assistance – can make the start easier. Social networks, skype and other communication and collaboration tools that will be available in the future can support communication across geographical barriers and embed language learning in a real life context.

Virtual worlds and simulations, online games and multicultural communities. Today there are a number of collaborative virtual reality games that allow for language learning, simulation of intercultural conflicts and global and geo-political phenomena.[91] Virtual worlds allow learners to assume different (cultural) personalities and create new living environments. The personal feel of the virtual environment will increase the empathy and understanding of other cultures, life-styles and outlooks on life. Online learning communities and international knowledge exchange networks will enable children and young adults to interact with people their age from different socio-cultural backgrounds. They can thus train their intercultural and language skills and develop their social,

interpersonal, critical and reflective skills. Group debates, multiplayer games and encounters in virtual worlds further develop their ability assume different roles and perspectives and to understand and sympathise with different opinions and positions.

4.3 Challenge 2: Early School Learning

4.3.1 Persona presentation

Bruno is in the 9th grade of a public school in Milan. He is living with his mother and his two sisters, aged 17 and 11. His parents separated a year ago and his father just had a baby with his new partner. Bruno's mother is trying hard to support her family. She finds it difficult to give all three children the attention they need and, because of her long working hours, has to leave the children more to themselves than she would like to.

Bruno always used to be an introverted child who found it difficult to link with others. He never really enjoyed school, but didn't have any learning difficulties. He used to be an average, normal pupil. Lately, however, he has taken a negative attitude towards learning and his grades have dropped. He has withdrawn into himself more and more, away from his teachers and peers and has started skipping lessons.

Key Policy Documents

- European Commission (2011a). Proposal for a Council Recommendation: On policies to reduce early school leaving.
- European Commission (2011b). Commission staff working document: Reducing Early School Leaving.

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90 http://www.unescap.org/unis/press/2010/jun/g30.asp

91 "The Tower of Babel" is an alternate reality game for language learning (cf. http://arg.paisley.ac.uk/index.php?option=com_content&task=view&id=19&Itemid=51); the "PeaceMaker Game" (http://www.peacemakergame.com/game.php) is designed to teach concepts in diplomacy and foreign relations; Mass Extinction (http://shass.mit.edu/research/cms_game) deals with the consequences of climate change; "World Without Oil" (http://www.worldwithoutoil.org/) is a collaborative and social imagining of the first 32 weeks of a global oil crisis; "Superstruct" similarly puts players in a future world facing daunting environmental, political, and health challenges (http://archive.superstructgame.net/).

Early school leaving (ESL) has been increasingly recognised as one of the main challenges faced by European societies. Reducing ESL to less than 10% by 2020 is a headline target for achieving a number of key objectives in the Europe 2020 strategy and one of the five benchmarks of the strategic framework for European cooperation in education and training (ET 2020).[92]

At EU level ESL rates are defined by the proportion of the population aged 18-24 with only lower secondary education or less and no longer in education or training.[93] Currently, around 6 million young people in the EU leave school with only lower secondary education or less,[94] thus, in 2009, 14.4% of EU citizens between 18 and 24 years had left school without having completed secondary education.[95]

There are many and diverse reasons – often highly individual – why some young people give up education and training prematurely, such as learning difficulties, social problems or a lack of motivation, guidance or support".[96] Although ESLers are not a homogeneous group, they are more likely to come from workless households; be male rather than female; come from vulnerable groups, and to be concentrated in particular areas.[97] In many cases, more than one of these risks is present, and multiple disadvantages increase significantly the likelihood of negative outcomes.

Early school leavers are more likely to be unemployed, to be in precarious and low-paid jobs, and to draw on welfare and other social programmes throughout their lives.[98] They thus face increased risks of unemployment, poverty and social exclusion.[99] Additionally there are indications that early school leavers have a significantly reduced life expectancy and higher rates of cardiovascular illnesses, diabetes and other ailments.[100] Considering that nine out of ten new jobs in Europe will require medium or high level qualifications,[101] it will become even more difficult for people who left education prematurely to find a job.

The European Agenda for New Skills and Jobs underlines the need to raise overall skill levels and to give priority to the education and training of those at risk of economic and social exclusion, in particular early school leavers.[102] High rates of ESL are perceived as "a bottleneck for smart and inclusive growth" and drastically reducing the numbers of ESLers is considered a key investment in the future prosperity and social cohesion of the EU.[103]

The recent proposal for a Council Recommendation[104] follows a comprehensive approach towards reducing ESL, proposing a series of *prevention*, *intervention* and *compensation* mechanisms. The prevention policies outlined in the document range from adapting early childhood education to increasing the flexibility and permeability of educational pathways. The intervention policies proposed comprise suggestions on how to react to early warning signs and to provide targeted support to pupils or groups of pupils at risk of dropping out. At the institutional level, it is suggested that institutional strategies for ESL be developed, involving parents, increasing networking with the local community, empowering teachers, and investing in extra-curricular activities. At the individual level, it is suggested that mentoring, guidance, counselling, and personalised learning

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92 Council of the European Union, 2009a; European Commission, 2010a.

93 Council of the European Union, 2003. The OECD defines early school leavers as 20-24 year olds with education below upper secondary level.

94 European Commission, 2011a.

95 Eurostat Labour Force Survey 2010.

96 http://ec.europa.eu/education/school-education/doc2268_en.htm

97 NESSE, 2009a.

98 NESSE, 2009a.

99 European Commission, 2011a.

100 NESSE, 2010b.

101 Cedefop, 2010d.

102 European Commission, 2010c.

103 European Commission, 2011a.

104 European Commission, 2011a.

be fostered – and that financial incentives could possibly given for attending school. Compensatory measures include offering a variety of tailor-made second chance programmes, targeted individual support (including financial incentives) and recognising informally and non-formally attained competences.

4.3.2 Future challenges and their implications

In the future, even more jobs will require a medium or high level of qualifications, making it even more difficult for ESLer to actively contribute to society. It is estimated that, in 2020, 31.5% of all jobs will need tertiary-level qualifications and 18.5% of jobs will need no or only low level qualifications.[105] Thus, low-skilled workers and especially people who dropped out of school without degrees will find it hard to compete in the global low-skilled labour markets and will be increasingly faced with unemployment.[106]

Especially at the lower end of the employment ladder, job profiles and requirements will change and higher skills levels will be needed.[107] Thus, all citizens, and in particular those with low qualifications, will need to become lifelong learners who continuously update their skills and flexibly respond to new job requirements. However, early school leavers are less likely to be 'active citizens' and much less likely to become involved in lifelong learning.[108] Apart from lacking relevant qualifications, they tend to experience learning less positively, enjoyable and enriching and are therefore ill-equipped for life in the 21st century knowledge-based society.

With a view to the future, the following challenges emerge:
- *Paving the way for a new learning culture:* To enable all citizens to become lifelong learners and avoid some learners becoming disengaged at a crucial time in their life when they develop their personality and lay the groundwork for their future outlooks on life, the learning culture in (secondary) schools needs to change. Learning needs to be re-discovered as an engaging, enjoyable and enriching activity. It should be understood as an opportunity and a way of participating in society and developing personal interests and talents in interaction with others.
- *Resources and strategies for prevention and early intervention*: Schools currently lack the resources and expertise to diagnose students at risk and to effectively promote their re-engagement in learning. With increasing heterogeneity in European schools in the future, it could become even more difficult for educators to give students at risk the personal attention and support they need not to drop out.
- *Breaking the vicious circle of disengagement*: Attending school is not only a way of acquiring knowledge and skills and the main entry point into the labour market, but also a playing field for social interaction that mirrors society. Once students drop out, they also tend to become disengaged from society al large and risk creating a life on the margins of society. Re-engaging those who have dropped out and enabling them to become active citizens will also remain a key challenge in the future.

4.3.3 A desirable future for Bruno

Since early school leaving can have very different and very individual reasons,[109] and needs to be tackled individually, on a case-by-case basis, personalised education and learner-centred learning, coupled with teaching strategies that focus on mentoring and guiding students in self-regulated learning endeavours, will be important elements for re-engaging Bruno in school activities. In parallel to

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105   Cedefop, 2010c.
106   Schlotter et al., 2008.
107   Cedefop, 2010b.
108   NESSE, 2010b.

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109   http://ec.europa.eu/education/school-education/doc2268_en.htm

making learning enjoyable and relevant to Bruno again, teachers, (school) psychiatrists and social workers will work together with Bruno and his family to help Bruno understand and overcome his frustration and de-motivation.

A personal learning plan will be set up which will take Bruno's interests and talents as a starting point for personalised assignments. Once Bruno has regained self-confidence and interest in learning, more challenging tasks will be added to his portfolio and his personal learning objectives will be aligned with the general learning objectives for his age group. His learning plan will be revised and adapted regularly and on a collaborative basis, respecting Bruno's preferences and encouraging him to take responsibility for his learning journey.

If all efforts fail to reintegrate Bruno in the school environment, his counsellors will together with him and his family select the most adequate alternative learning pathway, among the many and diverse training courses and learning opportunities available, which will also include practical modules, volunteering work, work experience and apprenticeships. He will be able to build up a learning portfolio based on small modules which he can select with a certain degree of freedom and which will, once he has completed the assignments in his own time and with personalised guidance and assistance from trained teachers and from his peers, be formally recognised and accredited to allow him to pass on to further training or enter the labour market. The choice of learning modules and strategies will be based on Bruno's preferences and needs, based on diagnostic tests and accompanied by continuous monitoring and guiding. At the same time, the strategy will be learner-centred in the sense that Bruno will be responsible and accountable for his progress.

4.3.4 Priority areas

A new learning culture. To enable young people to become lifelong learners who actively update their skills and develop their professional profiles over the full course of their lifetimes, and not get disengaged at an early age already, learning has to be experienced as being enjoyable, relevant and enriching. Young people need to be empowered through learning and working relationships that value them as resourceful individuals.[110] Tailor-made learning trajectories can contribute to making school education more interesting, aligning the learning content with the individual's skills, interests and learning needs, and thus prevent early school leaving.

Re-connecting Education and Employment. Partnerships with the industry and increased collaboration between schools and employers can make learning experiences and activities more relevant and interesting for learners. Embedded work experiences, excursions, dedicated assignments with practical modules etc can raise student interest in learning and can help them identify career opportunities. In particular, students at risk can profit from a dedicated time away from school in a work environment that brings new skills to the fore and allows them to build up self-confidence. ICT can facilitate the transition between the different working and learning environments and the integration of their work experiences into their learning portfolios.

New learning opportunities outside E&T institutions. Not all early school leaving can be prevented. To support dropouts at a later stage in their work and life situation it is important to provide and recognise informal learning opportunities and related qualifications. The Youth on the Move flagship initiative acknowledges that Europe needs to develop more flexible learning pathways that to allow people to move between different education levels, attracting non-traditional learners. It must also extend and broaden learning opportunities for young people, including supporting the acquisition of skills through non-formal educational activities.[111]

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110   Cedefop, 2010d.
111   European Commission, 2010d.

According to experts, informal learning will (need to) be better recognised in the future and practical experiences will become more important as job qualifications. These are opportunities, particularly for early school leavers.

4.3.5 The potential of ICT

Immersive 3D environments and (serious) games. Especially for adolescent boys, who have a higher incidence of dropping out of school than girls,[112] computer games and 3D animations exert a high attraction and are a natural "learning" environment. In the near future, a greater variety of increasingly sophisticated and interesting computer games will be available for educational purposes.[113] Thus, computer games can assist in offering students at risk a learning environment that catches their interest and gets them engaged in learning activities.

Web 2.0 tools: social networking, (micro-) blogging, messaging and chatting. These technologies are being used widely by adolescents and are for them a natural way of communicating and interacting. At the same time, technology-based interaction and collaboration is the basis of many knowledge-based jobs. These tools therefore allow students to acquire relevant skills for their future professional lives in a way that is natural and attractive for them.

Personalised electronic learning environments. As in the case of Chanta, ICT will enable the setting up of personalised learning plans, which, apart from responding to individual learning needs, will, in the case of secondary school education, allow students to assume responsibility for their individual progress. While performance will be closely monitored by the system, allowing teachers to intervene whenever necessary and to early detect student disengagement and react appropriately, students will be given room for experimentation

and choice. They will be able to use the system to identify their learning needs and most appropriate learning strategies and will be offered a choice between different interactive and engaging learning contexts which adapt to the speed of their progress and challenge them in an entertaining way. Data mining technologies will allow teachers to immediately detect and react to disengagement, inappropriate use and under-performance.

Informal learning opportunities. Experts believe that in 10-20 years' time, there will be a variety of ways in which degrees can be obtained and students with different needs and interests will more easily find a learning option that suits them. Electronic tutors, collaborative learning environments and sophisticated autodidactic training programmes and tools will make it easier for students acquire knowledge in a chosen field without the direct support of a teacher. Alternative grading and certification systems and (e-)Portfolio based learning opportunities, will allow students to qualify for a job without necessarily having to follow a formal course. Virtual simulations and games will allow the acquisition of knowledge and skills in an entertaining and engaging way and data mining technologies will support the assessment of tacit knowledge and generic skills acquired in these environments.

4.4 Challenge 3: Fostering Talent

4.4.1 Persona presentation

Emma is a 17-year-old girl who lives in Munich, Germany and is in her last year of high school (German Gymnasium). Lately, Emma has found herself disliking school, as she is bored and finds her school curriculum not challenging enough. Her change of attitude has been recognised and her parents

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112   European Commission, 2008f.
113   Johnson et al., 2011.

and teachers are getting worried that she might lose interest in school altogether if she is not sufficiently stimulated.

Her teachers see her as a very talented student, but are a little worried about her social skills. Being an overachiever, Emma has found it difficult to connect to her fellow pupils at school. And whereas her Gymnasium has provided her with the skills to master complex problem solving and gain factual knowledge, she lacks social and self-management skills, which has prevented her from being proactive.

Key Policy Documents:

• European Commission (2010d). Youth on the Move. An initiative to unleash the potential of young people to achieve smart, sustainable and inclusive growth in the European Union.
• Council of the European Union (2009a) Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training ('ET 2020').

It is generally acknowledged that high quality education and training systems which are both efficient and equitable are crucial for Europe's success and for enhancing employability.[114]

The Europe 2020 strategy emphasises that education, innovation, and creativity are the key ingredients for future growth. In order to develop a 'smart' economy based on knowledge and innovation, it calls for more investment in R&D and sets the benchmark of at least 40% of the younger generation to have a tertiary degree.[115] To increase the number – and also the performance – of university graduates, it is important that young people are encouraged and enabled to successfully follow a relevant tertiary education pathway.

Research suggests that different people learn in different ways to achieve their best performance and possess individual preferences which influence their motivation and engagement in learning.[116] In the past, however, school education has been limited to offering a one-size-fits-all approach to learning, which made it unavoidable that some students performed below their abilities. If the talents of these students are not identified and fostered, European societies will fail to make the best of the human resources available.

If more young people are to successfully complete tertiary education, more needs to be done in secondary and primary schools to enable teachers and learners to identify and develop hidden talents, exploit each learner's strengths, to effectively respond to learning needs and deficits, and to jointly develop and anticipate career choices. To compete with emerging nations like China who have a vast pool of human resources from which to develop excellence, Europe has to invest in developing talent on a broad basis, by implementing mechanisms that cherish innovation and foster excellence throughout formal E&T.

4.4.2 Future challenges and their implications

Labour market shifts. By 2020, it is estimated that 35% of all jobs will require high-level qualifications, compared to 29% today. This means 15 million more jobs requiring high-level qualifications.[117] However, in Europe only 31% of the population have a higher education degree, compared to 40% in the US and over 50% in Japan. Europe also has a lower share of researchers.[118]

Global power shifts. Globally, economic power is shifting from developed to emerging economies.[119] Europe will be increasingly competing with much younger societies whose

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114   Council of the European Union, 2009a.
115   European Commission, 2010a.

116   http://www.learning-styles-online.com/overview/
117   Cedefop, 2010a.
118   European Comission, 2010a.
119   Talwar & Hancock, 2010.

vast pools of young talent out-number Europe's.[120] By some estimates, China already has more engineers graduating now than the rest of the world combined.[121] It has increased R&D investment by 10% each year for the last 10 years, and, according to recent estimates,[122] will invest $154 billion in R&D in 2011, surpassing Japan (at $144) and increasing its global share of R&D investment from 11% in 2009 to 13% in 2011.[123] Currently, only 27 European universities, rank among the best 100 universities worldwide, compared to 57 in the US.[124] Though nearly a million Chinese and Indian students will be studying abroad by 2025, bringing a wealth of talent and experience back to their Asian homelands, few European students are internationally mobile.[125]

To remain competitive and respond to these challenges, European societies must take targeted measures to ensure that through innovation and excellence Europe will be able to maintain its prosperity and defend its social welfare states.[126].

4.4.3 A desirable future for Emma

Emma is already at an age where she can and should take responsibility for her own learning journey. Her mentors will therefore encourage her to identify the cause of her frustration and decide which subjects and subject areas she is most interested in and can perform best in. A series of diagnostic tools will enable Emma to better recognize her strengths and weaknesses and to understand why certain (soft) skills that she might consider irrelevant for her individual progress will be important for her in the future and are therefore worth investing in. Based on these insights, she will together with her mentors

decide on her learning objectives and draw up a learning plan that is not constrained by the learning opportunities offered at her local school, but aims to reach higher in areas in which she wants to press ahead and looks for innovative ways of developing her more weaker areas.

Based on her academic career plan and her individual learning plan, Emma will together with her mentors select a number of university modules or courses offered by a local or online university that she will take instead of following the school curriculum in the corresponding subject. This strategy is covered by an agreement between secondary and tertiary education institutions that allows high achieving secondary school students to enrol in university courses, which will be counted towards her secondary school certificate and her university degree. This way, Emma can already get a glimpse of university study, which will allow her to re-consider her study plans and speed up her career, if she decides to continue this career path.

Furthermore, she will be encouraged to improve her language and intercultural skills by joining a virtual Erasmus programme that offers discussion groups and learning communities on different topics and encourages learners from different countries all over the world to exchange their knowledge and views and learn from each others experiences.

Additionally, her mentors will suggest that Emma engages in voluntary work, possibly related to her future career choice, to encourage her to collaborate in a team with others in a context that is not related to individual achievement. The different learning contexts and activities will all contribute to her learning portfolio. Mechanisms will be put in place that encourage Emma to reflect on her progress, help her in experimenting with different communication, collaboration and learning strategies, and in re-aligning her learning objectives.

4.4.4 Priority areas

Improved diagnostics on individual learners' training needs and preferences will become

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120   Linton & Schuchhard, 2009.
121   Talwar & Hancock, 2010.
122   Battelle, 2010.
123   http://theenergycollective.com/ breakthroughinstitut/51021/china-rd-investment-grow- faster-us
124   Relfection Group, 2010.
125   Reflection Group, 2010.
126   Hofheinz, 2009; Linton & Schuchhard, 2009; Fingar, 2008.

available in the future, but schools will not necessarily have the resources, facilities, materials and innovative teaching methodologies that would allow them to put personalised learning into practice. However, due to the availability of diverse and dynamic ICT tools and solutions, personalised learning could become a reality in the future.

To develop all students' talents and foster excellence, E&T has to allow for different learning paces, contents, strategies and styles (*personalised learning*); seek *collaboration* with universities, research institutions and industry; be free to follow *innovative strategies* that contribute to the personal development of the learner and can trigger innovation, creativity and social engagement; implement suitable *certification and accreditation* mechanisms that allow for the integration of different (kind of) learning modules; and provide qualified *support and guidance*.

Personalised learning. As we have seen in the cases of Chanta and Bruno, individual learning needs must be accompanied by individual learning plans. There is an overwhelming agreement among surveyed experts that personalised learning plans are the way forward and that by 2025 they will have become a feasible option for schools. With 78% agreement, a vast majority of respondents to the pilot survey expect personal learning plans to be implemented by 2025 and that these will take into account individual needs, interests and preferences. An even higher percentage of 85% thinks that technology will allow schools and educators to create tailor-made learning experiences which will increase learning outcomes. To allow for genuinely tailor-made learning experiences that foster excellence and innovation, learning plans must be open and flexible, allowing for the integration of different learning sources and resources, of different learning communities, interactions and learning styles.

Collaboration between different learning providers. Excellence can only be fostered if talented students can seize learning opportunities that transcend the remit of secondary education.

Thus, 76% of experts consulted online believe that, in the future, talented students will be able to design their own learning trajectory, combining face-to-face tuition at school with online university courses and online learning communities. In particular, collaboration between secondary schools and universities on school subjects and choices will make it easier for schools to select adequate tertiary level learning material and courses for talented students. This collaboration could take different shapes. Perhaps, students will not be enrolled at a single school, but combine courses and resources from different educational institutions and decide themselves which local and virtual learning communities to join, as affirmed by almost half of the experts consulted online. Perhaps decentralised accreditation bodies will help E&T institutions, who will remain the central learning coordinator, in identifying the right level of course for each individual student at different local or remote E&T organisations, as suggested at the expert workshop.

Opening up schools to society. Especially talented students often tend to be more "absorbed" in educational activities than socialising, and may not be that well accepted by peers or even risk health problems which could persist if their general attitudes continue.[127] It is therefore important that students like Emma are not only supported in their academic progress, but also in their personal and inter-personal development. For each individual case, a creative individual solution has to be developed, therefore schools must become open and flexible to these, sometimes unorthodox, ways of fostering social and civic skills.

Among the experts consulted online, there was a high agreement (90%) that schools have to increase their efforts to open up to society and integrate real life experiences into their teaching practices. As future strategies for teenagers like Emma who want to go beyond the boundaries of conventional school education, participation

127 http://health.usf.edu/NR/rdonlyres/10EABB4A-FE44-4C9A-AED3-335F1E23DF97/0/HELPS_200810.pdf

and wider engagement in extra-curricular and voluntary activities was advocated by over 70% of respondents. Work experience, team sports or a study exchange abroad were equally mentioned as ways of getting Emma engaged in society and developing her soft skills.

Certification and accreditation. While a majority of 61% of respondents to the online consultation think that standardised degrees and testing will not disappear, all experts consulted emphasise that assessment and certification schemes will change and will have to change to allow for personalised learning strategies. However, with the integration of extra-curricula learning courses and experiences into learning pathways, the validation and accreditation of courses with respect to a certain learning and performance level will become a challenge.

Support and guidance. Personalised learning is only possible if there are sufficient and adequate mechanisms for detecting and diagnosing learning needs and corresponding mechanisms for responding to these needs. At the moment this is not the case, as confirmed by 88% of the experts consulted online who think that education and training institutions have to implement better monitoring and assessment mechanisms which detect individual learning needs. However, personalised learning also requires guidance and support concerning the selection of adequate learning opportunities and assessment strategies.

4.4.5 The potential of ICT

Personalised learning spaces. An overwhelming majority of 92% thinks that technological possibilities need to be exploited better to enable more personalisation in schools. ICT can support access to diverse learning opportunities and the integration of different and diverse learning elements into a coherent learning portfolio. Self- and peer-assessment tools, interactive tests supporting formative and diagnostic assessment and facilitating the choice of most adequate learning modules and levels, electronic tutors, feedback loops and data-mining tools detecting disengagement and under-performance will be integrated to allow students to freely choose their preferred learning opportunities from a wide variety of options, while ensuring that these correspond to their learning needs.

Online courses, learning modules and educational resources. Today, the internet already makes it easy for interested students to access university material or other relevant material while still at school. Even courses from prestigious universities are already accessible, e.g. via YouTube, and some universities also offer live streaming of lectures. In the future, this development is likely to continue and make learning material at all levels and for all needs and purposes available to interested students.

Data-mining technologies. Data mining tools will allow for the categorisation of learning activities; self-assessment tools and peer-assessment will support formative assessment; diagnostic tests will allow students to determine their level of competence and actively work towards raising it. Thus students will be enabled to monitor and adjust their own learning journeys, in collaboration with peers and teachers.

ePortfolios. (e-)Portfolios are one means of allowing diverse learning experiences to be considered for a standardised degree. In the future, ePortfolios will be far more the virtual archives for showcasing work. They will be interactive, collaborative, dynamic and highly personal learning spaces which will allow learners to access and integrate different and diverse learning communities and environments from a central place. In the case of highly formalised study, such as in secondary school education, mechanisms can be put in place to ensure that students can choose from a wide variety of learning opportunities while respecting the study requirements, so that their learning gains become recognised and accredited.

Open curricula. Currently, the challenge for E&T institutions lies in integrating different resources into curricula and training plans and validating their adequacy and relevance. In the future, alternative certification schemes will be available to allow for flexible and personalised learning. As experts at the workshop pointed out, international qualification frameworks and accreditation standards could be developed that allow for the integration of different learning modules into flexible and personalised learning plans. Rather than prescribing learning contents, curricula would then provide indications for the selection of appropriate learning modules that are eligible for recognition for entering tertiary education.

Teachers as mentors and guides. A very high majority of 86% of experts doubts that, in 2025, online resources and digital tools will be so powerful that teachers are no longer needed. However, a high majority (71%, with only 13% disagreeing) believe that, in 2025, the role of teachers will be different; they will be guides, mentors, friends and partners in self-regulated, personalised and collaborative learning processes. Thus, while technologies will open up new learning opportunities and allow for personalised learning plans to be implemented, teachers acting as mentors and guides will play an important role in enabling students to use their freedom actively and adequately to best develop their talents.

4.5 A Normative Vision of the Future of Initial E&T

The major challenge for the future of initial Education and Training will be for schools to develop and implement new formats and strategies for learning and teaching to be able to continue to offer relevant, effective and high quality learning experiences. At the same time, schools will need to react more effectively and promptly to changing job requirements and societal trends. They will need to again become bridges and mediators between the world of education and the world of work.

The main objective of schools will not change: like today, future schools will seek to enable all students to actively, responsibly and successfully participate in society, support them in developing their talents and prepare them for a professional career of their choice and liking. However, because of changing living, working and learning patterns, meeting this objective will require new organisational and pedagogical approaches and strategies. In 2025, the main task of schools will be to empower young people to become lifelong learners who actively develop their learning biographies. Administering pre-defined learning content to student groups aggregated by age will not serve this purpose. While curricula will continue to guide teachers and learners

Figure 22:   Conceptual map of the future of initial Education and Training
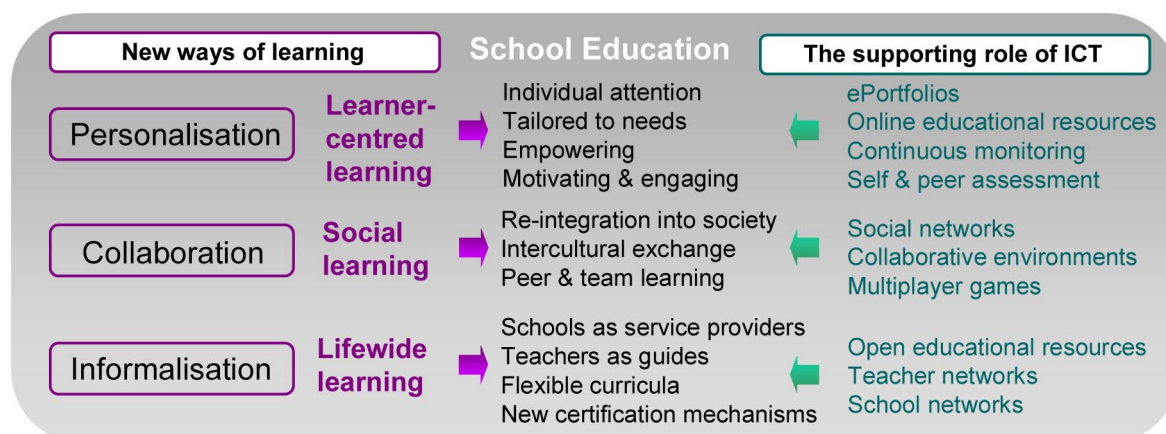
in their choices, learning methods, tools and strategies will respect individual learning needs and changing societal demands.

Thus, learner-centred, decentralised, and tailor-made learning strategies will prevail, which will (need to) be accompanied by corresponding pedagogies and teaching strategies as well as flexible curricula, modified assessment and validation mechanisms and closer collaboration with other societal players, including tertiary education providers and prospective future employers.

Personalisation. The key for unlocking the future of learning will be the promotion of personalised learning plans and tailor-made learning activities. Personalised learning will facilitate the social and cultural integration of migrant children and help them to overcome language barriers. It will enable teachers to detect students at risk of dropping out, help them in diagnosing the problems and learning needs and in offering a re-engagement strategy. It will also help develop talent and foster excellence by providing more engaging and challenging learning opportunities. A mix of different technologies will support personalisation, by allowing for a diversity of learning activities, tools and materials; by providing tools which support continuous monitoring and support diagnostic, formative and summative assessment strategies; by making educational resources openly available; by allowing for the implementation of collaborative projects; by offering learning opportunities that are motivating, engaging and even playful; and by supporting multilingual environments.

Collaboration. E&T institutions need to re-connect with society to better align learning objectives and societal needs. In the future, European societies will be more inter-cultural and flexible. Young people need advice and guidance to come to terms with the increasing rate of change and find their way in a complex world. Schools must offer them the orientation they need and promote mutual understanding

and active citizenship, in direct interaction with society. Thus, collaboration not only within the classroom, as it is (or should be) practiced today, but also with the community at large, and with people from other social, cultural or age groups, will become increasingly important to enable learners to come to terms with life in an ever more diverse and uncertain world. Virtual study exchange programmes, internet-based intercultural exchange projects, online massive multiplayer games, simulations and other internet-based services can assist schools in allowing learners to experience, understand and reflect upon societal developments in a safe and protected environment.

Informalisation. In the past, one of the major roles of schools was to make knowledge accessible to all citizens. Information was stored in dedicated places and restricted to publications that not everybody had access to. Today information has become a commodity that is available anytime and anywhere. A range of reliable education resources, courses, and training materials is already available online, some of it free of charge. In the future, a vast amount and variety of adequate, effective and interesting learning materials will be available. Thus, the future role of schools will be to guide students in identifying and selecting learning opportunities that best fit their learning styles and objectives; to monitor progress, realign learning objectives and choices and intervene when difficulties arise; and to implement viable assessment, certification and accreditation mechanisms. Schools will become learning hubs which offer guidance and support for learner-centred learning pathways, tailored to individual learning needs, paces, modes and preferences. Achieving this requires flexible curricula; teachers who are trained to effectively guide and coach students in their learning endeavours; competence-based assessment strategies that are to a certain extent independent of the concrete learning content; and certification mechanisms that allow alternative learning experiences to be integrated into school education.

■ 5 Gaining and Retaining Employment

5.1 Introduction

The Bruges Communiqué (2010) on enhanced European Cooperation in Vocational Education and Training (VET) acknowledges that there will be an increased need for lifelong learning which requires more flexible modes of delivery, tailored training offers and well-established systems of validation of non-formal and informal learning. In the future, learning will (need to) become a natural activity of all citizens that accompanies them throughout their lives and smoothly blends in with their lives. Looking at 2020-2030, one can say that a paradigm shift towards the full-scale implementation of lifelong and life-wide learning is required across all areas of society.[128]

However, currently there are a number of challenges that need to be overcome for lifelong learning to become a reality and for lifelong learning strategies to become targeted enough to facilitate gaining and retaining employment. These include the following:

- **Transition from school to work:** Currently, young people, graduating from secondary, tertiary and vocational education and training, often lack the skills and competences needed to make a rapid and successful transition to employment. Existing barriers between the worlds of work and education need to be overcome to ensure that the qualifications people obtain are actually of value to them on the labour market.[129] While it will be necessary to better align skills developed in E&T and labour market needs, given the speed of change of labour market requirements, it will also be necessary to envisage lifelong learning strategies for young people to effectively supplement and complement their qualifications to address newly emerging skill needs and actively facilitate their integration into the labour market.

- **Re-entering the labour market:** The longer the absence from the labour market the more difficult it may be to re-enter workforce. Especially the long-term unemployed face more difficulties in finding a job.[130] This applies in particular to fast changing areas where constant knowledge updates are necessary. Here the question arises as to how these people can be re-integrated, especially in the context of the ageing society, in which it will become increasingly important to pool human resources and make the best of all talents available.

- **Re-skilling:** It is expected that by 2025 some of today's jobs may no longer exist, and that totally new ones will be created.[131] One important challenge will therefore be to enable all citizens to keep their competences updated and quickly respond and adjust to possibly fast changing work environments. The recent economic crisis has taught us that no sector of society is immune to labour market ruptures and that all workers, even highly qualified ones, could be required to look for a new field of employment, changing and adapting their professional profiles substantially.
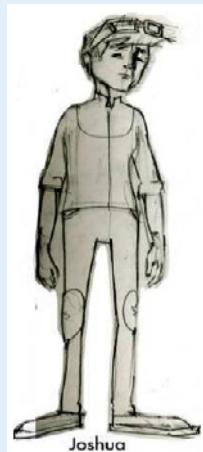
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128   European Commission, 2009a.
129   European Commission, 2010b.

130   http://www.handelsblatt.com/politik/konjunktur-nachrichten/studie-zur-jobkrise-nur-die-langzeitarbeitslosen-sind-ein-problem;2544855
131   Cedefop, 2010a.

5.2 Challenge 4: Transition from school to work

5.2.1 Persona presentation

Joshua lives in suburban England. After finishing secondary school he finished a three-year vocational training programme focusing on the hotel industry. However, when he graduated he found that his training was insufficient to meet the demands of Britain's hospitality industry in 2025. Robotics and new business models had ensured that most hotels except those in the luxury segment did not require staff with Joshua's skills.

Joshua has applied for various jobs at high-end hotels but has been repeatedly turned down because language skills and competences in cultural etiquette and customs, especially related to China, India and Arab countries, are considered essential. He also has to compete with English-speaking migrants who are acquainted to Asian and Middle Eastern customs.

Key Policy Documents:

- OECD (2010). Learning for Jobs.
- The Bruges Communiqué (2010) on enhanced European Cooperation in Vocational Education and Training for the period 2011-2020.

It is generally acknowledged that E&T institutions must ensure that young people, graduating from secondary and tertiary education, possess the skills and competences needed to make a rapid and successful transition to employment.[132] Currently, however, there is a pronounced need to improve transitions from education and training to work, and between jobs, and to foster career management skills, for both young people and adults.[133] The labour market is characterised by a mismatch between persistent unemployment and difficulties in recruiting in certain sectors.[134] In 2010, youth unemployment at almost 21% was more than twice as high as it was in overall unemployment,[135] i.e. one out of every five young people in the labour force was unemployed and looking and available for work.[136]

Furthermore, the growing globalisation of trade and lengthening of the period of active employment are increasingly requiring individuals to adapt their skills, in order to remain ahead of foreseeable or necessary changes and to safeguard their career paths.[137] The enlargement of the European Union has increased the potential for mobility in education and training, as well as in the labour market, thereby creating the need to prepare EU citizens to develop their learning and professional pathways in a broader geographical context.[138]

Increasingly, countries are recognising that good initial vocational education and training has a major contribution to make to economic competitiveness.[139] As skills mismatches impede productivity, growth and competitiveness, it is necessary to anticipate skills needs and shortfalls at all levels of qualification, and to transfer the results into policy and practice, with a view to improving the match between VET provision and the needs of the economy, citizens and society at large.[140] Thus, the Council (2010) proposes

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132 European Commission, 2010b.
133 Bruges Communiqué, 2010.
134 Council of the European Union, 2008.
135 Eurostat data, June 2010, for young people under the age of 25 years.
136 Eurostat (2011).
137 Council of the European Union, 2008.
138 Council of the European Union, 2008.
139 OECD, 2010a.
140 Council of the European Union, 2010.

the enhancement of the labour market relevance of VET and the employability of VET graduates through partnerships between social partners, enterprises, education and training provider and VET curricula that are outcome-oriented and more responsive to labour market needs.

Lifelong learning policies across Europe aim to improve permeability between different education and training systems, so that people can progress vertically (raise the level of their qualifications and competences) or horizontally (broaden their achievements, re-qualify or change learning pathways).[141] In order to ease the transition from training to employment, the Council (2010) considers it desirable to improve this permeability and foster the continuity of learning paths between VET, general education and higher education; enhance labour market integration; and improve guidance and counselling services. Additionally, to support young people and in particular those not in employment, education or training, Member States in cooperation with the social partners, should set up schemes to help recent graduates find initial employment or further education and training opportunities, including apprenticeships, and intervene rapidly when young people become unemployed.[142]

5.2.2 Future challenges and their implications

Increased labour market dynamics. It is expected that the future will be characterised by an increasing rate of change, forcing labour markets to more flexibly react towards new demands and developments. 88% of experts consulted online think that it will be impossible to anticipate all changes to jobs and markets and that it will therefore be normal that people will need to supplement their official qualifications with additional on-the-job training.

Collaboration between education and employment. There is general agreement that currently there is a gap between skill supply and demand and that this gap will widen in the future, if the competences developed in E&T are not better aligned with labour market needs. However, experts consulted in this project are optimistic that by 2025 a growing number of schools, universities and job training centres will be closely cooperating with firms and industries in order to design curricula and training programmes that avoid skills mismatches and enable a seamless transition from school to work.

Self-responsibility and key skills. Rapidly changing developments in the labour markets also requires that learners themselves take responsibility for keeping abreast of them. Basic and generic skills will come to the fore. A majority of 66% of the respondents in the online consultation thinks that more attention should be paid to general competences and transversal skills since job requirements will change so frequently that special skills will be quickly outdated. A slight majority (52%) of the respondents to the online consultation believes that employers will not expect recent graduates to possess job-relevant competences. They will thus train their staff themselves and select graduates on the basis of their basic skills.

Job competition. In the future, young people will increasingly compete globally for the most attractive jobs. Their experiences and competences will be compared with those of young people of foreign origin, who speak several languages, have international experience and are highly ambitious and motivated to work in Europe. Today, learning mobility is already recognised as an important way in which young people can strengthen their future employability.[143] In the future, it will become more important for young people to invest in language skills and intercultural competences

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141 Cedefop, 2010h.
142 European Commission, 2010f.

143 European Commission, 2010d.

to be able to qualify for a job in an increasingly interrelated and interconnected world.

5.2.3 A desirable future for Joshua

Ideally, Joshua should not be faced with the situation he is in, because E&T should have anticipated that in the hospitality sector language and cultural skills will become more important and should have trained him accordingly. However, for the sake of argument, we will assume that the trend to automated hotels had not been foreseeable and that it led to an unexpected market upheaval in that sector in early 2025, which unfortunately coincided with Joshua's graduation.

There are several strategies Joshua could follow to respond to the changed expectations. He could start in a job below his qualifications in order to gain work experience and at the same time acquire the missing skills, as advocated by 49% of respondents to the online consultation. Volunteering in a development aid programme (in India or China) to gain practical insights was appreciated by 47%, and 44% favoured virtual reality trips to Asia and online games which simulate cultural conflicts as a means of training occupational skills.

Experts at the workshop pointed out that, while all these and more options are feasible ways in which Joshua can complement his qualifications with relevant language and intercultural skills, most importantly, Joshua will need to assume responsibility for his professional development and pro-actively seek out training opportunities, which are expected to be widely and freely available to him. Joshua will be able to set up a portfolio, or add different professional and personal experiences to his existing portfolio, which documents his engagement in a variety of training opportunities. This portfolio will contain his engagement in an online tandem learning community with Chinese students, his performance in a self-learning course in Indian etiquette, his progress in an online collaborative

game in which he interacted with different international teams and represented the Muslim community in a negotiation exercise and several videos, essays and exercises documenting his success in Mandarin.

5.2.4 Priority areas

Improved anticipation and closer collaboration between education and industry. There is high agreement (81%) among experts responding to the online survey that education and training institutions have to work more closely together with industry to align learning objectives. This process requires strong political guidance and greater stakeholder involvement, which may not be restricted to industries, but may also include societal representatives. The experts note that, as a result of this coordination process, new educational concepts could arise that focus more on transversal skills, such as learning how to learn, entrepreneurship and initiative and on "how to obtain and interpret or process relevant information", rather than on specific factual information.

As a first step, vocational and tertiary education and training institutions should take more responsibility to avoid skills mismatches, by better aligning their curricula with the job-reality; by integrating collaboration projects with industry into their syllabi; and by fostering students' self-management, reflection and learning-to-learn skills. However, experts consulted at the workshop repeatedly emphasized that learning objectives must not become "purely market-driven". Rather, educational reform should be embedded in a reflective dialogue on social and societal values. Learners should be enabled to become active and responsible citizens, who not only respond to labour market demands, but pro-actively, critically and creatively drive change to further innovation and competitiveness.

Individual flexibility and self-responsibility. Almost 90% of the respondents to the online consultation believe that it will be impossible

to anticipate all future changes to jobs and markets. Keeping abreast of rapidly changing developments in the labour markets will therefore also require more self-responsibility on the part of the learners. Here technologies can play an important role in 2025, e.g. by allowing for worldwide access to latest information as well as simulations and training programmes where learners can experience the state of the art within their professions and online networks and communities in which they can exchange knowledge and ideas.

5.2.5 The potential of ICT

Networks fostering dialogue and collaboration between education and industry. ICT can contribute to establishing and maintaining an intensive and extensive dialogue between stakeholders from education and industry by providing a range of online platforms, networks and environments that can be used for targeted consultation and collaboration with different interest groups. ICT can thus enable a more effective, timely and targeted exchange which allows education and training providers to better anticipate changing skill needs.

Context-aware simulation, virtual reality and interactive games will allow young people like Joshua to practice language and cultural skills. Similarly, other practical skills relevant for a given job profile can be trained using simulations and interactive environments. Today, interactive simulation tools are already used to train skills in medical surgery[144] or legal practice.[145] In the future, there will be many more virtual training environments that replicate vocational practice and thus facilitate the transition between higher education and vocational training to the workplace.

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144 Cf. John, 2007.
145 Cf. http://www.gla.ac.uk/services/
synergy/synergycollaborations/teaching/
glasgowgraduateschooloflaw/.

Autodidactic training courses will enable learners to quickly acquire the skills they lack in an engaging and motivating environment that dynamically adapts to their learning pace and level. Future ICT-enabled training programmes and modules will provide learners with a range of tools that enable them to diagnose and understand their training needs; to monitor their progress, and to identify areas for improvement and address them effectively.

Online learning communities will provide learners with a social environment for their individual learning endeavours that will help them to remain motivated and stay focused. International learning communities furthermore enable learners to interact with people from different cultural backgrounds and to improve their inter-cultural and language skills.

5.3 Challenge 5: Re-entering the Labour Market

5.3.1 Persona presentation
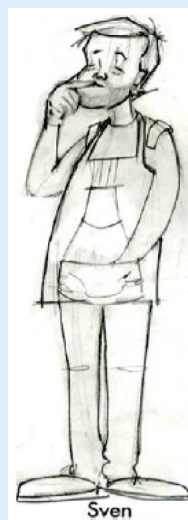
Sven is a 42-year-old father who lives with his wife and two children on a beautiful and big old farm, in the Swedish town of Katrineholm. His only education is the Grundskola (comprehensive school), which he finished at 16, after which he started as technician at the nearby car factory. However, when the factory closed in 2014, he lost his job.

Since his wife had a well paid and secure job in medical technology, he decided to stay home and take care of the two children since they always wanted to have at least one stay-at-home parent.

Sven has done this with great pleasure and raised the children well. But since they started secondary education in September 2025, Sven decided that it was time to re-enter the workforce. He discovered, however, that it is difficult to re-enter the job market as technician, after 12 years of absence from the labour market. Also, through his engagement as a father his interests have changed and he would very much prefer to work in the social sector.

Key Policy Documents

- The Bruges Communiqué (2010) on enhanced European Cooperation in Vocational Education and Training for the period 2011-2020.
- Council of the European Union (2008). Council Resolution on better integrating lifelong guidance into lifelong learning strategies.

The longer the (voluntary or involuntary) absence from the labour market, the more difficult it may get to re-enter the workforce.[146] In 2010, 9.6% of the EU27 working population were unemployed; 3% of the labour force had been without a job for longer than one year; 1.5% for more than two years.[147] Some people choose to leave the active labour market for some time, e.g. to raise children, which is reflected in the fact that female employment rates (58.6%) are substantially lower than male rates (70.7%) in the EU-27 in 2009.[148]

In the future, higher labour market participation will be required to compensate for demographic trends. For Europe to reach its 2020 employment rate target of 75%, more people, particularly women and people with low education levels, must find jobs. This will require greater emphasis on continuing training and adult learning.[149] However, the 76 million people who currently have low level qualifications[150] will be facing difficulties in qualifying for a job, as it is expected that, by 2025, 31.5% of all jobs will need tertiary-level qualifications and only 18.5% of jobs will need no or only low level qualifications.[151] Additionally, even occupations that used to require mostly low-level skills are increasingly requiring medium or even high-level qualifications.[152]

European policy acknowledges that, in the future, VET has to become easily accessible for people in different life situations, by offering flexible, "à la carte" concepts coupled with appropriate financial incentives; by offering integrated guidance and counselling services to facilitate transitions and learning and career choices; and by providing a high degree of validation of non-formal and informal learning.[153] Effective incentives for lifelong learning and second-chance opportunities are needed, coupled with systems for recognising acquired competencies, and a focus on efforts supporting those with low skills.[154]

5.3.2 Future challenges and their implications

Increased labour market dynamics. In general, it is expected that by 2025 people will change their professions more frequently. 76% of survey respondents think that, by then, it will be common for citizens to change their professional profiles completely, even repeatedly, over the course of their lives. This evidence is in line with Cedefop (2010a) findings that point towards more rapidly changing job profiles, requirements and skill needs.

146 http://www.handelsblatt.com/politik/konjunktur-nachrichten/studie-zur-jobkrise-nur-die-langzeitarbeitslosen-sind-ein-problem;2544855
147 Eurostat (2011): http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Unemployment_statistics.
148 http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/3-04082010-BP/EN/3-04082010-BP-EN.PDF

149 Cedefop, 2010e.
150 European Commission, 2011d.
151 Cedefop, 2010a.
152 Bruges Communiqué, 2010.
153 European Commission, 2010e.
154 European Commission, 2010f.

More self-responsibility. The vast majority of respondents to the online survey believe that, due to labour market dynamics, in 2025, people will need to become increasingly responsible for their own qualifications.

Higher participation rates. Due to demographic change, a higher share of the working-age population will need to be employed to ensure the sustainability of our social systems. It will therefore become increasingly important to also enable those who have been without a job for an extended period of time to re-enter the labour market. However, almost half of survey participants think that people who are out of the workforce for some time will find it even more difficult to re-enter in 2025 than today.

Management of scarce human resources. To better exploit the human capital available and to better match demand and supply of skills, it will become even more important that European societies seek to enable the long-term unemployed to understand their abilities and preferences and to create incentives for workers to remain employed and actively develop their professional careers.

Learning begets learning. There is evidence that those who have low levels of education and training are less likely to engage in further training and lifelong learning[155] and that, in the future, an increasing number of jobs will require medium to high qualifications.[156] For those with low qualifications and a lack of professional work experience it will therefore become even more difficult than it is today to qualify for a job and re-enter the labour market.

5.3.3 A desirable future for Sven

By 2025, public support programmes will have been put in place to assist people like Sven in identifying their career options and training

needs. Thus, Sven will be allocated a personal job guide who will help him assess his skills and competences and identify a suitable job profile. Through a series of self-assessment tests and real world simulations, in which Sven works with a number of avatars on seemingly unrelated tasks, he will be able to better understand his skills and preferences and to identify potentially interesting job profiles.

This skills audit indicates that Sven is particularly skilled in financial bookkeeping, having done this for years for his children's judo club. Furthermore, Sven's high scores in child development, dietary knowledge and hygiene reflect his active engagement as a caring parent. When discussing these outcomes with the job guide, Sven shares his long-term wish of starting his own small-scale child care centre. This would allow him to combine his entrepreneurial spirit with his love for children. In addition, he could install the child care centre on his farm so he could still be close to his own children when they are home. Since there is a lack of childcare services in his area, a government funded programme for new entrepreneurs will assist him with shouldering the financial burden of this endeavour.

His job guide helps Sven identify the required qualifications and compares these with his current competences. The competences that Sven scored high on can be certified by taking an external examination at the national education board. For the additional competences required, a personal training plan is compiled that combines different modules and courses and assists Sven in integrating his learning schedule in his daily life. The training plan combines open courseware, interactive learning environments, self-assessment tools and support at a local training centre in such a way that in a years' time Sven will be able to open his day-care centre, on a preliminary licence, subject to the subsequent successful completion of the full training course. While he is preparing for his own business, he will start working part-time as an educational assistant in

155 EENEE & NESSE, 2008.
156 Cedefop 2010a.

a kindergarten, a professional experience that is documented in his training portfolio and counted towards his qualification as an integral part of the training.

Additionally, Sven joins an online network of social entrepreneurs, most of whom are in similar situations to him, to better understand the administrative and legal requirements for his planned enterprise and to exchange experiences and tips. He also uses the interactive administration tool to submit and manage his business plan and quite enjoys playing the officially recommended online entrepreneur-game, in which he already had to file for bankruptcy several times. Now at least he knows better what the pitfalls of opening your own business are and how to avoid them.

5.3.4 Priority areas

Targeted and tailor-made training. In general, skill mismatches and over- or under-qualification are detrimental to job satisfaction and can negatively affect performance and engagement.[157] In the case of people who have been unemployed for an extended period of time, it is particularly important to ensure that skills, interests and preferences are respected and addressed to keep these people motivated and engaged in employment. Equally important is to understand that these people, because of their patchy learning biographies, need more support and guidance in reaching their learning goals. Alongside the more traditional face-to-face guidance services offered in education and employment, recently Internet-based information, advice and guidance provision is increasing in Europe.[158] In the future, ICT together with direct personal support, local face-to-face training and (online) peer support networks can lever the dormant talents of people like Sven and assist them in self-confidently setting and reaching their own training goals.

Validation of informally acquired skills. More self-responsibility also requires adjustments in certification systems. Learners who will increasingly need to complement and supplement their formally acquired qualifications with special vocational skill training need to receive some kind of validation and recognition of the skills they have acquired for them to become relevant for prospective employers. In all the consultation exercises, there was a strong agreement that, in the future, skills and competences obtained in non-formal ways need to be better recognised. Experts underlined repeatedly that, while informal learning opportunities will increase, formal certification of skills will remain important and will become more difficult to obtain for these more fluid competences. This impression is further undermined by the strong belief of experts that, while practical experiences will become more important than formal qualifications, there is a need to receive formal certification or accreditation for these skills.

Recognition of non-formal and informal learning outcomes is already on policy agendas.[159] Recently, EU Member States have started offering support to validate and recognise formal, non-formal and informal learning outcomes, and to upgrade and recognise employee skills.[160] However, in many cases, recognition processes remain marginal, small-scale and even precarious.[161] The European Inventory on validation of non-formal and informal learning shows that while great strides are being made in developing validation processes, overall take up is low and the low skilled, older workers and migrants targeted by the Action Plan are not their primary beneficiaries.[162] According to findings of an exhaustive assessment undertaken by the OECD (2010b), there is scope to simplify and strengthen the procedures for recognition; for

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157 Cedefop, 2010g.
158 Cedefop, 2010f.

159 OECD, 2010b.
160 Cedefop, 2010f.
161 OECD, 2010b.
162 European Commission, 2011d.

enlarging the range of competences that can be assessed through recognition processes and for integrating recognition processes within existing qualification standards.

5.3.5 The potential of ICT

Interactive games and real-life simulations can provide learners with practical situations that require them to react appropriately and develop their practical vocational skills in an engaging and motivating way and without recourse to higher level reading skills. Especially with learners with low qualifications and patchy learning biographies, these environments are an effective way of building up self-esteem and motivation, thus allowing them to perceive learning and training as something meaningful and interesting, as something they want to do and are good at.

Online peer networks allow learners to share experiences and tips and to slowly build up expertise in their newly chosen field of knowledge, without being subjected to test situations or feeling the pressure of having to perform well. Passing on their newly acquired knowledge to others and helping each other out can further boost self-esteem and allow learners to reflect upon their learning journey.

Autodidactic training courses allow learners to follow formal courses - that might be pre-requisite for their career choice - at their own speed and with frequent feedback loops that build up their self-confidence. Responsive and adaptive training systems employing learning materials and media that respect prior knowledge and learning styles will make learning more effective and efficient. Self-assessment tools allow them to keep control of their learning journey and to feel well-prepared when going into obligatory exams.

5.4 Challenge 6: Re-skilling

5.4.1 Persona presentation

Martina, now 59, is a highly qualified and specialized programmer who lives in the Czech capital of Prague. At the end of 2024, her company had to file for bankruptcy as they failed to foresee the rapid rise of quantum computing and neural self-correcting networks that made their applied programming methods and software concepts obsolete within less than a year.

The sudden loss of her job came quite as a shock to Martina who had believed that her expertise would always be needed. Since her work required her to continuously update and develop her specialised skills, she never developed a profile or interest in the newly emerging techniques. She is now worried that she might not be able to find an adequate job again, especially since she is almost 60.

Key Policy Documents

- The Bruges Communiqué (2010) on enhanced European Cooperation in Vocational Education and Training for the period 2011-2020.
- European Commission (2011d). Action Plan on Adult Learning: Achievements and results 2008-2010.

There is general agreement that the rapid and accelerating pace of change of labour market needs may overtake the skills of Europe's ageing workforce, requiring people to update, upgrade and broaden their competences in order to perform well in jobs which are likely to become more skill intensive and demanding at all

levels.[163] The number of people aged 60 or above will increase to 25% of the population by 2013 and to 30% by 2027, while the overall working population will shrink.[164] Thus, older workers will increasingly be called upon to engage in continuing VET.[165]

However, while senior citizens need to continue learning in order to master social changes, to prevent an ever growing gap between generations, to remain actively involved in the fast changing knowledge society and to remain active citizens,[166] training incidence declines substantially with age.[167] According to a study undertaken by Cedefop (2009), policies to increase silver workers' labour market participation should have a dual focus: remove barriers preventing older people from successfully engaging in working longer; and promote ageing workers' employability, by focusing on opportunities to acquire or update skills and competences.

The Bruges Communiqué (2010) recognizes that, to enable workers to up-date their competences and adapt to changing skill needs and to promote access to training in different life situations, tailored training offers supporting flexible learning pathways and training arrangements are needed, including flexible and modularised training courses, work-based learning and e-learning.

5.4.2 Future challenges and their implications

Unexpected labour market disturbances. In the face of advancing and changing technologies and rapidly developing social movements, jobs that require specialised high qualifications and expert knowledge may suddenly and unexpectedly become obsolete, as has recently happened in the financial, construction and nuclear energy sectors. Thus, a large majority

(78%) of the survey respondents believes that in 2025 an increasing number of today's jobs will become obsolete and an increasing number of totally new jobs will be created.

Lifelong learning. 59% of survey respondents think that, in the future, all workers will re-skill and re-invent themselves several times over the course of their lives. 75% agree that by 2025 there will be abundant training and employment opportunities that assist specialists who suddenly find themselves without a job in converting experiences and personal skills into competences that are relevant for new job profiles.

Self-responsibility. While 58% of survey respondents think that employers and employees need to anticipate technological and societal developments to keep up and change strategy, just as in the case of Joshua, there is a strong belief that not all changes are foreseeable and that therefore workers will have to assume responsibility for their own learning and training to prevent and respond to changing skill requirements.

Silver workers. Due to demographic change, European societies will increasingly depend on older workers remaining active in the labour market as long as possible. While changing job and career profile at a later stage in life is almost impossible currently, in the future silver workers will need to be kept on board. Thus, a high share (44%) of the survey respondents believe in the possibility to qualify for a new job and basically 'start from scratch' at the age of 59, as in Martina's case. However 33% consider this rather difficult and 23% are not inclined either way.

5.4.3 A desirable future for Martina

At the age of 59, Martina has at least 13 more years of work ahead of her before she can retire. For her, the main question is not how she will manage financially (although this is also important), but how she wants to spend these years. She needs to find a job that she is capable of doing; that she will still be able to do

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163   Cedefop, 2010e.
164   European Commission, 2011d.
165   Council of the European Union, 2010.
166   European Commission, 2011d.
167   EENEE & NESSE, 2008.

physically in 10-13 years' time; and, ideally, a job that reflects what she knows and what she is competent in, so that she will enjoy doing it and will do it well.

As part of the insolvency plan, Martina's company contracts a private consulting firm specialising in career guidance to advise all former staff on future career options and jointly develop and implement individual career and training plans with them, enabling them to find adequate new employment opportunities as quickly as possible. The training managers compile a set of training materials that allow all staff to better understand the labour market and recent developments within their sector, which also includes a two week intensive training course on quantum computing and neural self-correcting networks, based on open educational resources, and two-day practical workshop in one of the new enterprises which are already using and further refining these techniques.

Several of Martina's younger colleagues decide to re-qualify to enter this new job field and some even find employers who agree to take them on board, initially as advisors helping them in making the transition from the old system to the new one. Martina, however realises that, while the new technologies are fascinating, she is not prepared to spend three stressful years re-qualifying and working in parallel. Rather, when visiting the new company, she realises that these firms are full of young, creative and dynamic minds, but lack professional management, thorough planning and strategic thinking – competences that she has acquired through her professional life. She starts to understand that she has quite an extensive experience from which younger people could benefit and learn.

The concept of intergenerational learning has recently become more widely implemented, giving rise to the new job profile of "business trainer", who in many sectors replaced the more traditional strategic business consultant. Instead of presenting ready-made business solutions,

business trainers aim to empower company staff to find efficient, effective and innovative solutions for the particular problems their company faces themselves, thus laying the ground for sustainable business innovation.

However, intergenerational learning has not yet been used widely in high-tech sectors. This is how Martina develops the idea of becoming a business trainer for enterprises in the new IT market: with her knowledge of the sector she used to work in and with a basic understanding of the new computing methods she will be the ideal person for advising these inexperienced companies and improving their business strategies.

Realising what a rich human resource senior workers from the high-tech sector are for strategic business consultancy, the firm who had been advising Martina and her colleagues in the course of the insolvency is happy to take her and two of her colleagues on board to be able to provide services to the newly emerging market. Before Martina can start as a business trainer, however, she has to be trained herself on how to provide targeted and tailor-made training that addresses both, the specific business needs of the particular enterprises which will be requiring her services, but also the individual training needs of the employees that she will need to train in hands-on business strategy.

She is now following modules for teacher training. In particular the interactive communication training using a 3D environment is very useful for her, as it enables her to reflect on different teaching strategies and gives her instant feedback on the effect different communication strategies have on the learners. Participating in the knowledge exchange on the corporate peer learning network helps her to further understand how she can best empower people to innovatively drive their businesses forward. Additionally, she decides to work her way into the basics of quantum computing and neural self-correcting networks as a basis for understanding the subject

matter of the sector she will be offering her training services to, with the help of online peer learning communities and open educational resources.

5.4.4 Priority areas

Making lifelong learning a reality. Nearly 60% of respondents to the online survey think that it will be normal by 2025 that workers re-skill themselves over the course of their life; 78% believe that an increasing number of today's jobs will become obsolete and an increasing number of totally new jobs will be created. Thus, in the future, effective and efficient strategies for lifelong learning must be put in place that not only enable all citizens to continuously update and upgrade their skills but also allow them to effectively re-qualify for a new job profile, building upon the professional experience they have gained. As already acknowledged by the Bruges Communiqué (2010), ICT can be used to boost adult education and training through distance learning. In the future, ICT will play an increasingly important role in providing effective and efficient training opportunities that enable quick transitions between different jobs.

Tapping into the tacit knowledge of senior workers. For the knowledge-based society of the 21st century it is of utmost importance that the knowledge and professional expertise of experienced workers is not lost, but passed on to following generations. Thus, 87% of the experts consulted online believe that, since older as well as younger people have their specific competences and knowledge, an open exchange between both will become important. As knowledge is expected to be outdated faster due to shorter innovation circles, pure memorisation of hard facts may become secondary to genuine understanding of general principles and "how-to" knowledge. In a society characterised by accelerating change, where working procedures will continually evolve, the living memory of

those who have experienced these changes, who understand the patterns underlying them and are aware of the factors that have remained constant over time, is a valuable knowledge resource. In this respect, demographic change can be turned into an opportunity for European societies, if effective mechanisms promoting intergenerational learning are developed.

Enterprises will have increased responsibility for providing training. While, in the future, employees will increasingly become self-responsible for their own qualifications, as confirmed by 87% of respondents to the online survey, experts and policy-makers participating in the different workshops repeatedly and consistently emphasise that industry in general and employers in particular need to assume more responsibility for the training of their workers. Nearly 60% of respondents to the online survey think that companies will be responsible for keeping themselves and their employees updated with regard to new knowledge, new requirements and new technologies. In the future, employers will realise that money invested in training is well-spent and beneficial for their enterprise. Consequently the number and quality of different training services and formats aimed at continuing professional development will also rise, as will the societal value attributed to lifelong learning.

Formalising lifelong learning. The increased importance of lifelong learning not only brings informal and non-formal learning opportunities to the fore, calling for a better validation and recognition of informal learning outcomes, but it also requires the implementation of viable formal learning and training strategies that are supported by training professionals and competent training services providers, which are accredited and recognized. Today, the status of the adult learning professional as an independent profession has not yet been established in most countries[168] and

168   European Commission, 2011d.

while there are numerous learning opportunities available on the market, there is a lack of quality assurance and accreditation mechanisms. In the future, with the rise of ubiquitous lifelong learning, trainers will need to receive better training and recognition of the value of the services they deliver, which will also serve as a means of quality assurance.

5.4.5 The potential of ICT

Online educational resources (OER) allow people to quickly gain a basic understanding of a certain subject area and allow those who are interested in attaining a deeper understanding to self-train themselves in this new field of study.

Online/ distance university and vocational training courses allow workers to study a subject in depth and attain formal qualification of their competences in a way that is adapted to their particular learning pace and allows them to combine work and study and offers them targeted support and guidance.

Online social networks allow workers who are novices in a field to tap the tacit knowledge of those who have been working in the field for a longer time, thus speeding up their practical knowledge and skills acquisition. Internet mediated professional groups and professional networking can also contribute to keeping oneself

updated in regard to new developments in special areas as well as their general surrounding to help with re-orientation, re- and up-skilling.

Simulations, 3D virtual worlds and interactive games are particularly useful for training social, communication and practical skills. Simulating a real life situation in a virtual environment in which the learner interacts with other (electronic or real) players, they allow learners to try different problem solving strategies and thus enable them to enhance and amplify communication strategies.

5.5 Normative Vision for Future Lifelong Learning Strategies

In the future, people are likely to change their professions more frequently throughout their life and they are remaining longer within the workforce due to demographic changes and higher life expectancy. According to experts, it will be common for all citizens – whether they are at the beginning or end of their careers, whether they are highly skilled or do not have any relevant qualifications – to continuously update their skills. Professional careers will become more flexible and dynamic and all citizens, no matter how highly qualified, will need to pro-actively design and promote their careers by seizing relevant training opportunities. ICT will play an important

■ *Figure 23: Conceptual map of future lifelong learning strategies*
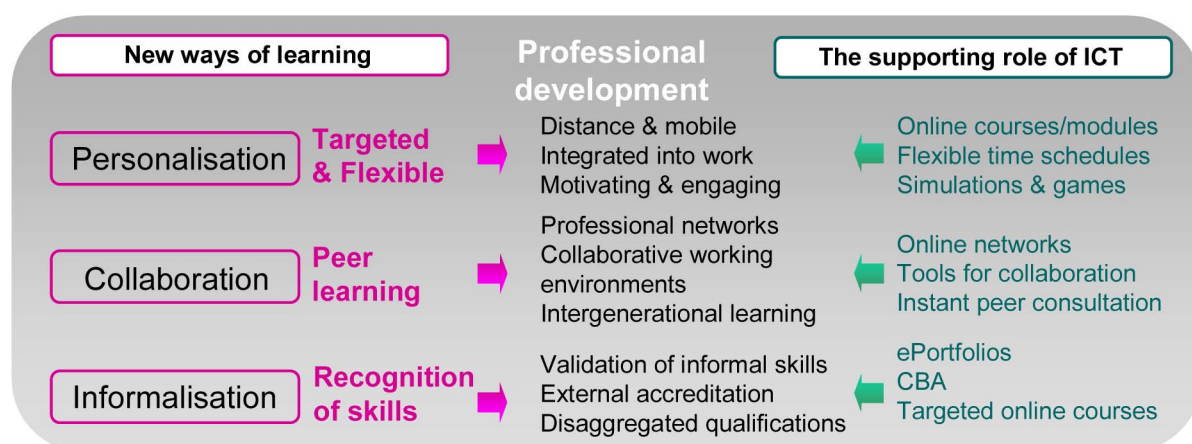
role in facilitating lifelong learning opportunities, as, in the future, a range of sophisticated and adaptive learning tools and programmes will be available which should make it easy for people to upgrade their skills and pro-actively drive their professional careers.

Personalisation. Due to increased labour market dynamics, people will have to assume responsibility for their qualifications and pro-actively develop their professional careers. However, to improve the match of skill supply and demand and to make training targeted, effective and efficient, industry will also need to get more involved in shaping training and encouraging workers to participate in lifelong learning. In the interest of both, employers and (prospective) employees, training opportunities will become targeted and tailor-made. Technological advances will contribute to making a great number and variety of opportunities for re-skilling and changing professional profile available, which will make targeted and tailor-made lifelong learning far easier than it is today, by allowing anybody to learn effectively anywhere and anytime. Different learning modules, tools and environments will be combined to allow people to effectively and efficiently (re-)qualify for a job of their choosing, by identifying and addressing their particular training needs and offering learning strategies that are tailored to their level of competence, their (future) job requirements, and their learning styles and objectives.

Collaboration. Professional relationships will increasingly be characterised by an open knowledge exchange, not only between colleagues and peers with similar professional profiles and learning needs, but also between older and younger, experienced and inexperienced workers. To enable citizens to quickly and effectively upgrade their professional and practical skills, ICT based peer learning networks and communities, which allow workers to mutual benefit from each others' specific knowledge and experiences, will become an important tool for lifelong learning.

Furthermore, intergenerational learning will become an important source for continuing professional development, as it allows younger workers to tap the tacit knowledge of more senior workers whose professional experiences will become better recognised as a valuable source of knowledge in a fast-changing work environment, while, at the same time, allowing more senior workers to continuously update themselves on the fresh knowledge younger people bring into the workplace. ICT can support these developments by providing environments that scaffold, document and archive this learning process and thus convert knowledge exchange into an accessible learning resource that is available anywhere and anytime.

Informalisation. 75% of experts consulted online think that, in 2025, there will be abundant training and employment opportunities that assist people in converting professional experiences and personal skills into competences that are relevant for (new) job profiles. As concerns in particular tertiary education and vocational training, a vast majority of 87% of experts believe that it will become normal for university graduates to supplement their official qualifications to qualify for a job. However, not all of these training opportunities will lead to formally recognised qualifications. Similarly, professional experiences acquired in previous jobs give rise to a number of diverse competences that are seldom officially acknowledged or recognised. Thus, experts repeatedly and almost unanimously (with only 6% opposing) underline that for meeting future employment needs in view of increasing labour market dynamics, informally acquired skills need to become better recognised and mechanisms will have to be put in place that allow people to obtain formal recognition for their experiences and skills. ICT can support the documentation and validation of informally acquired skills. However, accreditation frameworks and mechanisms need to be developed to make individuals' learning portfolios relevant and valuable for their career development.

■ 6 Conclusions and Policy Implications

6.1 A Vision of the Future of Learning

This study aimed to identify, understand and visualise major changes to learning in the future. It developed a *descriptive vision* of the future, based on existing trends and drivers, and a *normative vision* outlining how future learning opportunities should be developed to contribute to social cohesion, socio-economic inclusion and economic growth.

The overall vision is that **personalisation**, **collaboration** and **informalisation** (informal learning) are at the core of learning in the future. These terms are not new in education and training but will have to become the central guiding principle for organising learning and teaching in the future. The central learning paradigm is characterised by lifelong and life-wide learning, shaped by the ubiquity of **Information and Communication Technologies** (ICT). At the same time, due to fast advances in technology and structural changes to European labour markets that are related to demographic change, globalisation and immigration, **generic and transversal skills** will become more important. These skills will help citizens to become lifelong learners who flexibly respond to change, are able to pro-actively develop their competences and thrive in collaborative learning and working environments.

Along with changing **pedagogies, assessment strategies and curricula** will also need to change, and, most importantly, **traditional E&T institutions** – schools and universities, vocational and adult training providers – **will need to reposition themselves in the emerging future learning landscape.** They will need to experiment with new formats and strategies for learning and teaching to be able to offer relevant, effective and high quality learning experiences in the future. In

particular, they will need to respond more flexibly to individual learners' needs and changing labour market requirements.

Six major challenges for the future of learning have been identified and discussed. Initial Education and Training institutions have to deal with multicultural integration to address immigration and demographic change, with reducing early school leaving to combat unemployment and to promote a better educated workforce for competitiveness and economic growth, and with fostering talent to develop a 'smart' economy based on knowledge and innovation and to let people develop themselves as reflective and responsible persons. The challenges for lifelong learning are also three-fold: promote a rapid and more fluent transition from school to work in order to reduce the barriers between the worlds of work and education; facilitate re-entrance to the labour market, especially to tackle long-term unemployment and to focus on permanent re-skilling to enable all citizens to keep their competences updated and quickly respond and adjust to possibly fast changing work environments.

6.2 Priority Areas

6.2.1 Initial Education and Training

Schools, universities and vocational education institutions will need to react more effectively and promptly to changing job requirements and societal trends. The current gap between the world of education and the world of work will need to be better addressed and overcome. In the future, learner-centred, decentralised, and tailor-made learning strategies will prevail. These will (need to) be accompanied by corresponding pedagogies and teaching strategies and also flexible curricula,

modified assessment and validation mechanisms and closer collaboration with other societal players, including tertiary education providers and prospective future employers.

E&T has to allow for different learning paces, contents, strategies and styles (*personalised learning*); seek *collaboration* with universities, research institutions and industry; be free to follow *innovative strategies* that contribute to the personal and professional development of learner and teachers; can trigger innovation, creativity and social engagement; implement suitable *certification and accreditation* mechanisms that allow for the integration of different (kind of) learning modules; and provide qualified *support and guidance*.

Priority areas for policy attention include the following:

Personalisation

Personalised learning. Tailor-made learning trajectories can contribute to making school education more valuable to learners, by aligning the learning content with the individual's skills, interests and learning needs, and thus prevent early school leaving and foster excellence at the same time. To allow for genuinely tailor-made learning experiences that benefit all learner groups, learning plans must be open and flexible, allowing for the integration of different learning sources and resources, of different learning communities, interactions and learning styles.

A new learning culture. To enable young people to become lifelong learners who actively update their skills and develop their professional profiles over the full course of their lifetime, and not get disengaged at an early age already, learning has to be experienced as being enjoyable, relevant and enriching. Young people need to be empowered through learning and working relationships that value them as resourceful individuals.

Effective learning strategies for heterogeneous learning groups. Pedagogical strategies will need to respond to the specific needs of each individual student, while at the same time encouraging collaboration and peer learning. ICT will be a key ingredient enabling teachers to reconcile these two opposing strategies.

Language learning and multicultural integration. To improve the social integration and inclusion of an increasing number of migrants, it is necessary to support (early) language acquisition; to accommodate a wider range of mother tongues, cultural perspectives and attainments in the classroom; and to include intercultural education in curricula and to foster all students' intercultural competences.

The important role of teachers as mentors and guides. Personalised learning requires guidance and support. While ICT will improve diagnostics and provide personalised learning materials, teachers play an increasingly important role in strategically developing individual learning pathways and in supporting and guiding students in their learning endeavours.

Collaboration

Re-connecting education and employment. Partnerships with the industry and an increased collaboration between schools and employers can make learning experiences and activities more relevant and interesting for learners. In particular, students at risk can profit from a dedicated time away from school in a work environment that brings new skills to the fore and allows them to build up self-confidence. ICT can facilitate the transition between the different working and learning environments.

Collaboration between different learning providers. Excellence can only be fostered if talented students can seize learning opportunities that transcend the remit of secondary education. In particular, collaboration between secondary schools and universities on school subjects and

choices will make it easier for schools to select adequate tertiary level learning material and courses for talented students.

Teacher networks and collaboration. In the future, teachers will need to continuously update their skills to adapt to changing learning and teaching patterns and strategies. ICT medicated teacher networks fostering the informal exchange of good practice will become an important source for professional development. These networks will enable teachers to collaboratively develop their skills; offer each other support; tap the tacit knowledge of their peers; and facilitate the knowledge exchange between older and younger teachers.

Informalisation

Learning opportunities outside E&T institutions. More flexible learning pathways need to be provided that allow people to move between different education levels, attracting also non-traditional learners, and to extend and broaden learning opportunities for young people. Informal learning opportunities, practical experiences and informally acquired skills need to be better recognised.

Opening up schools to society. Real life experiences allow students to develop the generic and transversal skills that are expected to become increasingly important in the future. Schools should therefore increase their efforts to open up to society and integrate real life experiences into their teaching practices to better prepare students for their future life.

Certification and accreditation. Assessment and certification schemes will need to change to better reflect both, individual competences and relevant competences for specific job profiles. To implement personalised learning strategies that integrate extra-curricula learning courses and experiences and better align students' competences with future job demands, new assessment, qualification, validation and accreditation mechanisms must be developed.

6.2.2 Lifelong learning

Lifelong Learning will become even more important in the future. People are likely to change their professions more frequently throughout their life and they are remaining longer within the workforce due to demographic changes and higher life expectancy. According to experts, it will be common for all citizens – whether they are at the beginning or end of their careers, whether they are highly skilled or do not have any relevant qualifications – to continuously update their skills. Professional careers will become more flexible and dynamic and all citizens, no matter how highly qualified, will need to pro-actively design and promote their careers by seizing relevant training opportunities. ICT will play an important role in facilitating lifelong learning opportunities, as, in the future, a range of sophisticated and adaptive learning tools and programs will be available which will make it easy for people to upgrade their skills and pro-actively drive their professional careers.

Priority areas for policy attention include the following:

Personalisation

Making lifelong learning a reality. In the future, effective and efficient strategies for lifelong learning must be put in place that not only enable all citizens to continuously update and upgrade their skills but also allow them to effectively re-qualify for a new job profile, building upon the professional experience they have gained. Lifelong learning programmes have to become more flexible, more responsive to individual training needs and more targeted to specific job profiles and employment opportunities.

Personalised guidance and support. For re-skilling and up-skilling programmes in particular, it is important to ensure that skills, interests and preferences are respected and addressed to keep learners motivated and engaged in employment. Targeted and personalised support and guidance is needed to improve employability.

Individual flexibility and self-responsibility. Keeping abreast of rapidly changing developments in the labour markets will require more self-responsibility on the part of the learners. However, support and guidance has to be offered to enable citizens to regularly monitor their learning needs and progress, and to identify suitable learning opportunities.

Collaboration

Improved anticipation and closer collaboration between education and industry. Education and Training institutions have to work more closely together with industry to align learning objectives. This process requires strong political guidance and greater stakeholder involvement, which may not be restricted to industries, but may also include societal representatives.

Increased responsibility of training providers. Vocational and tertiary education and training institutions should take more responsibility to avoid skills mismatches, by better aligning their curricula with the job-reality; by integrating collaboration projects with industry into their syllabi; and by fostering students' self-management, reflection and learning-to-learn skills. Learners should be enabled to become active and responsible citizens, who not only respond to labour market demands, but pro-actively, critically and creatively drive change to further innovation and competitiveness.

Increased responsibility of enterprises for providing training. While, in the future, employees will increasingly become self-responsible for their own qualifications, the industry in general and employers in particular also need to assume more responsibility for the training of their staff.

Informalisation

Validation of informally acquired skills. Learners who will increasingly need to complement and supplement their formally acquired qualifications with special vocational skill training need to receive some kind of validation and recognition of the skills they have acquired for these to become relevant for prospective employers. Recognition of non-formal and informal learning outcomes is already on policy agendas.[169] However, there is scope to simplify and strengthen the procedures for recognition; for enlarging the range of competences that can be assessed through recognition processes; and for integrating recognition processes within existing qualification standards.[170]

Fostering informal knowledge exchange. In a society characterised by accelerating change, where working procedures continually evolve, the knowledge exchange between younger and older, experienced staff and fresh minds, is a valuable resource. Companies should therefore encourage intergenerational learning, informal knowledge exchange and collaboration among their staff to better benefit from different competences, profiles and experiences.

Training and recognising trainers. The increased importance of lifelong learning does not only bring informal and non-formal learning opportunities to the fore, calling for a better validation and recognition of informal learning outcomes, it also requires the implementation of viable formal learning and training strategies that are supported by training professionals and competent training services providers, which are accredited and recognized. With the rise of ubiquitous lifelong learning, trainers will need to receive better training and recognition of

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169   OECD, 2010b; Cedefop, 2010f; European Commission, 2011d
170   OECD, 2010b.

the value of the services they deliver, also as a means of quality assurance.

6.3 The Role of ICT

ICT will change *what, how, where* and *when* people learn. Due to the ubiquity of technology and its power to facilitate highly dynamic, adaptable and engaging virtual learning environments, personalised lifelong learning opportunities will become feasible. ICT will enable teachers to better respond to diversity and heterogeneity in the classroom and to adapt learning material and objectives to individual students' learning needs. ICT will furthermore support lifelong learning opportunities that smoothly integrate into people's lives and allow them to adapt their training objectives, schedule and pace to individual needs and preferences.

However, to realise the potential of ICT in promoting tailor-made collaborative learning opportunities that are adaptable, challenging, relevant and enjoyable, open access and basic digital skills need to be fostered. Policy makers need to ensure that all citizens will be able to benefit from the opportunities offered and

that more vulnerable groups are equipped with the necessary skills to participate in learning activities that are more and more technology-based. Similarly, E&T institutions will need to be provided with the necessary ICT infrastructure and tools to become e-mature. Teachers and trainers need to receive targeted training, enabling them to align pedagogy and technology to the benefit of their learners. Guidance is needed for educators, learners and parents alike on how to best use technology.

6.4 In Conclusion

Many of the changes depicted have been foreseen for some time but they now come together in such a way that it becomes urgent and pressing for policymakers to consider them and to propose and implement a **fundamental shift in the learning paradigm for the 21st century digital world and economy.** To reach the goals of personalised, collaborative and informalised learning, holistic changes need to be made and mechanisms need to be put in place which make flexible and targeted lifelong learning a reality, and support the recognition of informally acquired skills.

■ 7 References and Resources

7.1 Primary Data

Primary data for assessment:
- Online Consultation Survey I (OC I) N = 94 respondents
- Online Consultation Survey II (OC II) N = 151 respondents
- Online Consultation Survey III (OC III) N = 101 respondents
- Group Concept Mapping (GCM)
- Expert Workshop (EW)

Primary data for ideas generation:
- Qualitative scoping survey (QS)
- Qualitative Online Pilot Survey (PS)
- Internal literature review on foresight studies

An overview of the statistical outcomes and original comments from the quantitative online consultation surveys (OC I, OC II and OC III) and the qualitative pilot surveys (PS and QS can be found here:

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Abstract

This report aims to identify, understand and visualise major changes to learning in the future. It developed a descriptive vision of the future, based on existing trends and drivers, and a normative vision outlining how future learning opportunities should be developed to contribute to social cohesion, socio-economic inclusion and economic growth.

The overall vision is that personalisation, collaboration and informalisation (informal learning) are at the core of learning in the future. These terms are not new in education and training but will have to become the central guiding principle for organising learning and teaching in the future. The central learning paradigm is thereby characterised by lifelong and life-wide learning, shaped by the ubiquity of Information and Communication Technologies (ICT). At the same time, due to fast advances in technology and structural changes to European labour markets that are related to demographic change, globalisation and immigration, generic and transversal skills become more important, which support citizens in becoming lifelong learners who flexibly respond to change, are able to pro-actively develop their competences and thrive in collaborative learning and working environments.

Many of the changes depicted have been foreseen for some time but they now come together in such a way that is becomes urgent and pressing for policymakers to consider them and to propose and implement a fundamental shift in the learning paradigm for the 21st century digital world and economy. To reach the goals of personalised, collaborative and informalised learning, holistic changes need to be made (curricula, pedagogies, assessment, leadership, teacher training, etc.) and mechanisms need to be put in place which make flexible and targeted lifelong learning a reality and support the recognition of informally acquired skills.

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