

Key Competence Development in School Education in Europe

2012

KEYCONET'S REVIEW OF THE LITERATURE

A summary

<http://keyconet.eun.org>



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ABOUT KEYCONET



KeyCoNet (2012 – 2014) is a European policy network focused on identifying and analyzing initiatives on the implementation of key competences in primary and secondary school education.

On the basis of the evidence collected through literature reviews, case studies, peer learning visits, country overviews, videos and exchanges between network members, the project's final objective is to produce recommendations for policy and practice regarding the enablers and obstacles to a holistic implementation of key competence development.

Among KeyCoNet's current 18 partners in 10 countries (Austria, Belgium, Estonia, Finland, France, Ireland, Norway, Portugal, Spain and Sweden), are Ministries of Education/related agencies, universities/research institutes, European organizations, and practice related partners. KeyCoNet also has a growing number of associate members from other countries and stakeholder groups, steadily increasing our network's scope and influence.

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MAIN MESSAGES

- Key competences are combinations of knowledge, skills and attitudes, which facilitate the application of knowledge to real world contexts. International research suggests that individuals need them in order to function effectively in the 21st century.
- The European Reference Framework of Key Competences for Lifelong Learning (2006) specifies eight key competences as essential for all European citizens. These are: communication in the mother tongue, communication in (multiple) foreign languages, math competence and basic competences in science and technology, digital competences, learning to learn, social and civic competences, sense of initiative and entrepreneurship, and cultural awareness and expression.
- The most common approach to implementing key competences in national curricula is to specify them in terms of a cross-curricular framework, where they are present alongside all subjects.
- The implementation of key competences needs to be supported by changes in school culture, as a co-ordinated approach across subject areas is required. In some cases, schools partner with universities, social services, families and communities and other schools to implement key competences.
- A commonly recommended approach to teaching key competences is to provide interactive learning environments that facilitate active learning. These environments present open-ended problems and challenges to be solved through debate, experimentation, exploration and creativity, and are often collaborative and enhanced by technology.
- The implementation of key competences requires attention to the social context of learning, and consideration of all the influences upon a learner's ability to both acquire and transfer what they learn in school.
- Methods of assessment include standardised tests, e-assessment, attitudinal questionnaires, performance-based assessment and peer-and self-assessment. These methods should be used in combination to obtain a full picture of learners' key competences.
- The challenge for policy makers is how to widen schools' access to innovative practice that promotes key competence development. The challenge for schools is how to widen individual learner access to these practices. Key competence development may require investment in technology and human resources. The level of investment required will vary across countries and schools.
- School education across the EU should encourage and support learners to develop key competences.
- When designing a curriculum to incorporate key competences, decisions should be made about where they sit in relation to traditional school subjects, how they will be applied at the different levels of schooling, and whether different levels should be specified according to age or grade.
- Incorporating key competences into all aspects of the curriculum will help ensure that the greatest number of learners possible have access to them.
- In order to implement key competences, schools should focus their attention on changes to learning, learners' experiences, and ways to support learners and teachers.
- Schools should involve teachers in decision-making around implementing key competences.
- Teacher capacity in Information and Communication Technology (ICT) needs to be developed in order to support the meaningful uptake of technology-enhanced learning environments.
- The assessment of key competences should be given due attention by policy makers and practitioners and should be a key element of teacher training and development. Efforts should be made to pilot and evaluate different assessment methods.
- As a step towards widening access to technology-enhanced learning activities, schools should be supported in accessing open source computer programmes and applications, which are free of charge.
- Policy makers should design strategies that would widen schools' access to the necessary resources and continuing professional development of staff.

EXECUTIVE SUMMARY

This report is a summary of two literature reviews produced in 2012 by research partners and experts working within the framework of KeyCoNet – the European Policy Network on the Implementation of Key Competences in School Education. The literature reviews are focused on the implementation of key competence development and its assessment in school education in Europe. The original literature reviews were drafted by the following project partners: University of Helsinki, the European Institute of Education and Social Policy and the project expert, David Pepper. The network will update the literature reviews in 2013 and 2014.

KeyCoNet, the Key Competence Network on School Education, is a three year European Policy Network on the Implementation of Key Competences in School Education, co-ordinated by European Schoolnet. KeyCoNet identifies and analyses initiatives concerned with the implementation of key competences in primary and secondary school education across Europe. On the basis of the evidence collected through literature reviews, case studies, peer learning visits, and other outputs, the project's final objective is to produce recommendations for policy and practice regarding the enablers and obstacles to a holistic implementation of key competence development (KCD).

Using evidence in the literature reviews, this summary answers the following questions:

- What are key competences?
- How are key competences included in national curricula?
- How are key competences implemented in schools?
- What are the main methods for teaching key competences?
- How can key competences be assessed?
- What are the main obstacles to implementing key competences?

The aim of this summary is to provide a user-friendly version of the literature reviews that can aid policy makers and education practitioners in thinking about implementing key competences in school education. The views and recommendations presented reflect the conclusions drawn by the authors of the original literature reviews.

➤ WHAT ARE KEY COMPETENCES?

Key competences are described by the European Commission as combinations of knowledge, skills and attitudes, which facilitate the application of knowledge to real world contexts. Individuals need them in order to function effectively in the 21st century. Eight key competences are seen as essential by the European Framework; these are communication in the mother tongue, communication in (multiple) foreign languages, math competence and basic competences in science and technology, digital competences, learning to learn, social and civic competences, sense of initiative and entrepreneurship, and cultural awareness and expression. There is a range of terminology used to refer to “key competences” in EU member states, which sometimes reflects differences in emphasis and contexts. Alongside social and economic changes, there are three main theoretical influences that have shaped the development of key competences as a policy objective; these are a social perspective on education originally attributed to John Dewey; constructivist learning theories which argue for the importance of active learning, and ideas about workplace competences.

➤ HOW ARE KEY COMPETENCES INCLUDED IN NATIONAL CURRICULA?

Key competences came onto the policy agenda in EU member states at different times over the last two decades partly through the influence of European Commission and OECD research. Their particular manifestation is shaped by a member state's history, prevalent educational philosophy and educational structures. There has been some debate about the ideological focus of key competences. As such, there is no common model across EU member states for the incorporation of key competences into national curricula. They are often conceived of in terms of a cross-curricular approach, rather than treated as separate subjects. In order to integrate key competences into an existing curriculum, decisions need to be made about how they sit in relation to existing subjects; whether one set of key competences applies to all learners or whether different sets are needed according to age or grade; and whether key competences can be acquired in a cumulative fashion, and therefore whether progression routes should be specified.

➤ HOW ARE KEY COMPETENCES IMPLEMENTED IN SCHOOLS?

Implementation strategies vary according to school context. However, given their cross-curricular nature, key competences potentially touch the entirety of school life. Therefore introducing them should be thought of as a co-ordinated process, and, depending on the particular school context, may give rise to wider reform. Key competences may also provide a complement to innovative practice already taking place in schools. Schools need to think about learning environments, assessment, and ways to support learners and teachers. Paying attention to school culture is an important part of the process. Schools can collaborate with a range of partners in the implementation of key competences; for example, universities, social services, families and communities, and other schools. Schools can also use self-evaluation tools to monitor their progress in implementing key competences.

➤ WHAT ARE THE MAIN METHODS FOR TEACHING KEY COMPETENCES?

The main recommended approach to teaching key competences is through the provision of interactive learning environments in which learners do practical tasks. These learning environments, which promote collaborative and multi-disciplinary learning, are increasingly technology enhanced. They allow several key competences to be addressed simultaneously. However, the provision of interactive learning environments alone is not sufficient; activities need to be supported by scaffolding and by explicit instruction where relevant. In particular, learners need support to develop their ability to learn independently. Schools should consider learners' social and emotional wellbeing and allow learning to be more self-directed. Teachers need to be supported to develop these new methods, both through the re-orientation of initial teacher training frameworks, and through continuous learning and peer-to-peer support. Knowledge of ICT and familiarity with assessment methods are particular areas for development.

➤ HOW CAN KEY COMPETENCES BE ASSESSED?

Assessing key competences is challenging, since they refer to complex constructs that are not easily measurable. In light of this, assessment policy and practice at both school and national levels needs to be addressed. As a first step, learning outcomes need to be specified in sufficient detail, but also allow assessors and teachers some autonomy. Possible assessment methods include standardised tests, e-assessment, attitudinal questionnaires, performance-based assessment and peer- and self-assessment. These should be used in combination in order to gain a full picture of learners' competences.

➤ WHAT ARE THE MAIN CHALLENGES TO IMPLEMENTING KEY COMPETENCES?

Implementing key competences in school education may require substantial human resources and investment in technology. This presents a challenge particularly given resource inequalities between EU member states and between schools or regions. Policy makers must ensure that all schools have equal access to the resources and technology needed. Likewise, schools must ensure that all learners have equal access. One strategy is for schools to access open source software.

1. INTRODUCTION

KeyCoNet, the Key Competence Network on School Education, is a three year European Policy Network on the Implementation of Key Competences in School Education, coordinated by European Schoolnet.

The KeyCoNet project identifies and analyses initiatives concerned with the implementation of key competences in primary and secondary school education across Europe. On the basis of the evidence collected through literature reviews, case studies, peer learning visits, and other outputs, the project's final objective is to produce recommendations for policy and practice regarding the enablers and obstacles to a holistic implementation of key competence development (KCD).

KeyCoNet has conducted two literature reviews:

- Gordon, J., Rey, O., Siewiorek, A., Vivitsou, M., and von Reis Saari, J (2012) KeyCoNet 2012 Literature Review: Key competence development in school education in Europe. Brussels: European Schoolnet. Available: <http://keyconet.eun.org/literature-review>
- Pepper, D. (2012) KeyCoNet 2012 Literature Review: Assessment of Key Competences Brussels: European Schoolnet. Available: <http://keyconet.eun.org/literature-review>

Gordon et al. (2012) covers the definition and implementation of key competences in schools in Europe. Pepper (2012) focuses on the assessment of key competences, incorporating findings on computer-based assessment and e-assessment.

KeyCoNet commissioned the National Foundation for Educational Research (NFER) to produce this summary, which collates the findings of the above reviews. The aim is to highlight the main findings in an accessible way. The intended audience is policy makers at various levels (central/national, regional, local and institutional) as well as educational professionals. This summary provides insight into some of the enablers and obstacles involved in implementing key competences into school education in the context of different countries.

Specifically, this report:

- Provides a working definition of 'key competences' and outlines the relevance of this topic to the target audiences.
- Consolidates the key messages emerging from the research evidence consulted, in terms of curriculum, teaching and assessment of key competences.
- Provides targeted recommendations for policy makers and educational professionals based on the literature reviews.

Methods and evidence base

The methodology for this report consisted of identifying the key messages and recommendations from the original reviews and summarising these in an accessible format, keeping in mind what would be of practical use for the intended audiences. Views and recommendations presented in this report reflect the conclusions drawn by the literature review authors. Where this report refers to other authors (those cited by the literature review authors), these are included in the reference list as secondary references. Original sources used by the literature review authors, which included scientific reviews and books, reports from the EU and other international organisations, as well as national reports about relevant initiatives, were not re-consulted. External sources were occasionally consulted to obtain more detail on initiatives or practices mentioned by the authors.

Unless otherwise stated, the findings from Gordon et al. (2012) are summarised in chapters 1-5 and 7, while the findings from Pepper (2012) are mainly in Chapter 6. Hence page references refer to Gordon et al (2012) (in chapters 1-5 and 7) and Pepper (2012) (in chapter 6).

Key terminology is bolded and defined in the Glossary in Appendix 1. Italics and inverted commas indicate a direct quotation. Each chapter begins with key messages and recommendations, and throughout the boxes highlight key examples of initiatives or programmes in different EU member states.

2. INTRODUCING KEY COMPETENCES

KEY MESSAGES

- Key competences are ‘a complex combination of knowledge, skills, understanding, values, attitudes and desire which lead to effective, embodied human action in the world in a particular domain’. International research suggests that individuals need them in order to function effectively in the 21st century.
- The European Reference Framework of Key Competences for Lifelong Learning (2006) specifies eight key competences as essential for all European citizens. These may be interpreted differently by EU member states.
- In order to better prepare individuals for life and work, school education must enable them to develop key competences.

What are key competences?

The word ‘competence’ typically denotes a general ability, aptitude, or capability with a task. It implies effectiveness, in that a person is *competent* at doing something. However, in this context, ‘competence’ refers to:

‘a complex combination of knowledge, skills, understanding, values, attitudes and desire which lead to effective, embodied human action in the world in a particular domain’.

(Hoskins and Deakin Crick, 2010)

Competences enable knowledge to be applied to real world situations, to be translated into *effective*, embodied human action. The eight competences specified by the European Framework of Key Competences for Lifelong Learning¹ are:

- Communication in the mother tongue
- Communication in (multiple) foreign languages

¹ Similar sets or frameworks are sometimes referred to simply as ‘competences’ or ‘competencies’.

- Math competence and science and technology competences
- Digital competences
- Learning to learn
- Social and civic competences
- Sense of initiative and entrepreneurship
- Cultural awareness and expression

The following diagram summarises the social and economic influences on ideas about key competences (dark blue), and the main theoretical influences (light blue). This helps explain why they are needed, and where they came from.

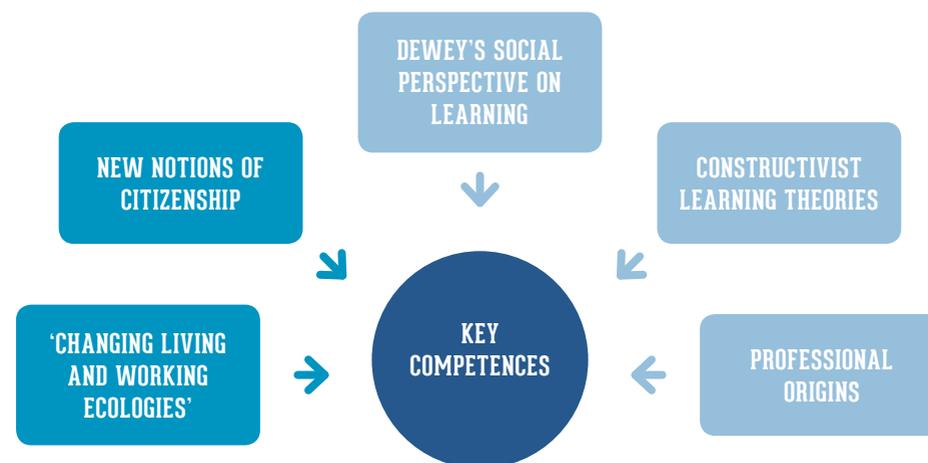


Diagram 1: Socio-economic and theoretical influences on key competences

Why are they needed?

- **Changing living and working ecologies:** There is a growing consensus in Europe that individuals need to be better prepared for ‘*the changing living and working ecologies of this 21st century*’ (p 7). Knowledge alone is not sufficient; a broader range of skills and abilities are needed to navigate a changed landscape characterised by the increasing importance of ICT, the decline of functional skills-based professions, and increasing competition.
- **New notions of citizenship and individual well-being:** Key competences are also linked to discussions about European citizenship (Dabrowski and Wisniewski, 2011). In 1996, the Council of Europe published a definition of ‘active citizenship’. This included the capacity to accept responsibilities, participate in group decisions, resolve conflicts, and exercise critical judgment. According to this definition, citizens are empowered when they can exercise critical judgment in relation to knowledge, and recognise its origin and uses. Key competences facilitate these processes.

Where did they come from?

In addition to social and economic motivations, there are some prominent theoretical traditions which highlight the need for key competences, and have influenced ideas about how they should be taught, for example:

- **Dewey’s social perspective:** The American philosopher, psychologist and educational reformer John Dewey (1859-1952) was the first to argue that learning occurs within a social system rather than being confined to mental processes. This focuses attention on the context in which knowledge is acquired, which has led to various ideas about how learning environments should be structured in order for learners to make connections between knowledge and the social world.
- **Constructivist learning theories:** Educational research has repeatedly addressed the issue of transfer – what is the most effective way to encourage learners to apply their knowledge to novel and real life situations? Constructivist learning theories suggest that effective transfer is more likely if learning is an active process. Rather than learning being a process of knowledge transfer from expert to learner, learners should construct knowledge themselves by interacting with the environment (Kriz, 2010). Researchers argue that this process ideally occurs in an environment that reflects the real world, wherein learners work actively on tasks.

- **Professional origins:** Reference to competences started to be made in the professional world in France in the 1970s to refer to what employees need beyond qualifications to act effectively in a range of work situations (Legendre, 2008). In the 1980s, competence-based approaches started to be developed in some countries for vocational education and training.

What is the European Reference Framework?

Since they refer to broad, multi-functional areas of human ability, key competences are difficult to define and organise in the same way as subject knowledge. A number of international bodies such as the OECD, the World Bank, UNESCO and the European Commission have undertaken research leading to the recognition of the importance of key competences and created frameworks intended as clarification and guidance for policy makers and educational professionals. Several non-governmental organizations have also developed frameworks for key competences, for example the Assessment and Teaching of 21st century skills (AT21CS)² consortium.

The European Reference Framework of Key Competences for Lifelong Learning was launched by the European Commission in 2006. It outlines eight key competences as necessary for personal fulfilment, active citizenship, social inclusion and employment. The framework includes competences in ‘traditional’ subjects, such as mother tongue literacy, numeracy, knowledge of foreign languages, science and IT skills. But it also covers other skills, such as learning to learn, social and civic competence, initiative-taking, entrepreneurship, cultural awareness and self-expression. The competences are considered to be critical to lifelong learning. Each competence is also linked to broader ‘transversal skills’ (see below). The European Commission states that ‘*initial education and training systems across the EU should support the development of these competences in all young people, and adult education and training need to give real opportunities for all adults to continually build and maintain their skills*’³. Please see Appendix 1 for more detail on the framework.

³ http://ec.europa.eu/education/lifelong-learning-policy/key_en.htm
[accessed 26 February 2013]

All of the competences in the European Framework incorporate knowledge, skills and attitudes. For example, for digital competence:

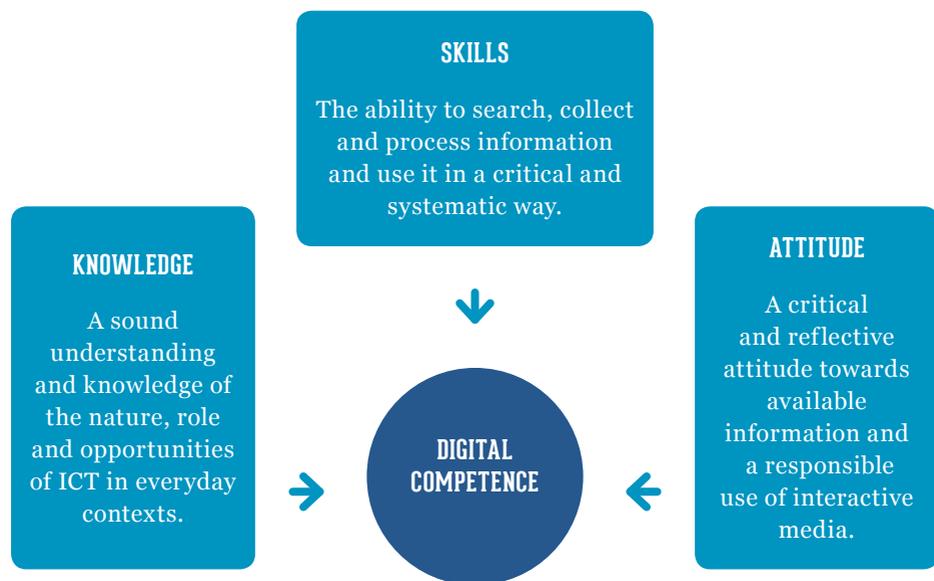


Diagram 2: Components of 'digital competence'

The European Commission also identifies the following 'transversal skills' that are relevant across the eight key competences:

- Critical thinking
- Creativity
- Initiative
- Problem solving
- Risk assessment
- Decision taking
- Communication
- Constructive management of feelings

3. DESIGNING A CURRICULUM TO ADDRESS KEY COMPETENCES

KEY MESSAGES

- ➔ International bodies, governments, academics and schools interact in various ways to place key competences on the policy agenda.
- ➔ Key competences may be described as tasks, objectives, goals, core abilities, skills, or even as separate subjects.
- ➔ Key competences are not subject-specific. The most common approach is to specify them in terms of a cross-curricular framework.
- ➔ Curriculum design should involve decisions about levels and progression routes, and should specify learning outcomes.

How have key competences been placed on the policy agenda? Examples from France, Poland and Spain.

The following three examples show the ways in which key competences have been introduced into national systems, in three very different European contexts. These can be characterised as follows:

Spain: A government-led approach, locally adapted by regions and schools.

Poland: A centralised approach strongly influenced by international bodies.

France: An iterative process over a long period, involving expert consultation and government steering.

SPAIN [TIANA ET AL., 2011]

Spain was one of the first EU member states to introduce key competences into legislation. They were introduced simultaneously in basic, compulsory and higher education. Prior to the mid-2000s, the notion of competence had been used in vocational training in Spain. Key competences had also been included in the qualification taken at the end of compulsory secondary education. However, they had not yet been formalised in policy.

A motivating factor was the Recommendation of the European Parliament on key competences for lifelong learning, in 2006, which coincided with the drafting of Spain's Organic Education Act. This specified the *enseñanzas mínimas*, or core curriculum. They are intended as the key competences that all learners must develop by the end of compulsory education. They consist of a general framework, including a description, purpose, and distinctive aspects of each key competence, as well as the level to be reached by all learners on completion of their basic education.

Guided by these core principles, semi-autonomous communities (regions) devise more detailed curricula for each school level, cycle, year, area and subject. Given the level of school autonomy in Spain, there is considerable freedom to translate this again into an implemented curriculum at the school level.

POLAND [DABROWSKI AND WISNIEWSKI, 2011]

The development of policy around key competences in Poland took place in the context of educational reform associated with major economic and social change in the 1990s. It coincided with a mounting conviction that the education system should promote democracy, freedom and tolerance. Discussions on key competences began in light of disappointing results for Poland in the International Adult Literacy Survey (IALS) in 1994. Poland then received support from the EU in the form of the Kreator project, in 1995. This aimed to develop a method with which to integrate key competences into the teaching of individual subjects.

The Council of Europe's 1996 symposium on Key Competences for Europe also had a strong influence in Poland. Competences brought onto the agenda included political and social competences, competences relating to life in a pluralist society, oral and written communication, competences associated with the information society, and lifelong learning.

Partly in response to these Europe-wide priorities, in 1997, experts in Poland developed Regulation number 8 on Core Curricula for Obligatory General Education

Subjects. This divided the education process into two or three year stages (instead of one year cycles), and introduced 21 subject areas, many of which were very new, for example, media education and information education. This reform was delayed due to political changes, but was implemented in a modified form in 1999.

FRANCE [LELIÈVRE, 2012]

In France, there has been a long running debate over what constitutes core knowledge. This has involved consultation with various sociologists and theorists, who over a thirty year period were asked by successive governments to define the fundamental principles of education. These have included, for example, the sociologist Pierre Bourdieu and the philosopher (and former Minister of Education), Luc Ferry.

In 2003, the French government established a commission tasked with determining the future of the education system. One result of this consultation was the French *socle commun de connaissances et de compétences*, the core curriculum of knowledge and competences, which came into law in 2005. A further decree in 2006 expressed this in terms of seven major competences, each divided into knowledge, skills and attitudes. France's framework is very similar to the European Framework, except that it replaces 'sense of initiative and entrepreneurship' with 'sense of initiative'. The French framework also raises 'humanistic culture' to the level of a key competence, whereas the European framework references culture only within 'cultural awareness and expression'.

THE KEY COMPETENCES DEBATE IN FRANCE

Although there is widespread consensus about the need for learners to be well equipped for their future life, there is not always unanimous agreement with the principles behind key competences.

In France, as in many other European countries, the notion of competence developed in the professional world. Indeed, several of the key competences, such as initiative and entrepreneurship, social and civic competences; as well as transversal skills such as critical thinking, problem solving and creativity are increasingly in demand in the workplace. This has led to concerns that their over-emphasis in school education could *'stifle educational ambition and [lead] to a utilitarian perspective'* (Crahay, 2006; Boutin, 2004). That is, if knowledge is only seen through the lens of its practical application, the pursuit of knowledge for its own sake is neglected, which can give rise to the view that key competences are driven by the demands of business and industry – and resentment of the idea that school is simply a training ground for the workplace, to the neglect of heritage or critical thinking.

There has also been some concern in France that knowledge could become 'watered down' when combined with the broad, at times rather vague key competences. In addition, some teachers have seen some of the key competences as problematic in themselves. For example, some have raised concerns that 'social and civic competences' and 'sense of initiative and entrepreneurialism' come too close to influencing attitudes and opinions, as opposed to teachers retaining an appropriate degree of objectivity in relation to learners.

However, others see key competences as representing a desirable bridge between school and wider society. Perrenoud (2008) argues that:

'If school prepares for life, changes in the world and to people's lives should logically be the main factor determining evolution of the curriculum...ultimately it should only be the knowledge that affects people's lives and their understanding of the world that should be the force behind changes to educational programmes'

(Gordon et al., 2012: 86).

How do EU member states approach key competences?

Depending on their particular education systems, the European Framework has been further interpreted by EU member states. EU member states have also developed approaches to key competences independently of the influence of the European framework, resulting in varying emphases. In some member states, there are national frameworks similar to the European Framework. In others, aspects of key competences have been added as a complement to particular parts of existing curricula. They are designed and organised in different ways depending on the prevailing ideas and priorities in a particular member state. These framings structure the ways in which key competences are implemented in national curricula and in schools.

Table 1 summarises the dominant framings of key competences in EU member states:

Dominant framing	EU member states
Mostly skills or competence-based	Cyprus, Germany, Ireland, Lithuania, Poland, Slovenia, and United Kingdom.
Mostly subject-based	Bulgaria, Italy, Malta and Portugal
Thematic approaches	×
Mostly through major issues of society	Denmark and Slovakia
Mostly through developing personal qualities	Austria (primary school), the Czech Republic, Greece, Hungary and Luxembourg
Goals and principles based	Finland, Latvia, the Netherlands and Sweden
Mixed approach (functional and thematic)	Belgium, Estonia and France

Table 1. EU member state framings of key competences

Source: Halasz and Michel (2011) (p. 46)

How do EU member states integrate key competences into curricula?

Part of the principle behind key competences is to break from 20th century structures which separate the transmission of knowledge into disciplines, thought by some to be an invention of teaching that does not reflect the worlds of culture, science or economics (Gauthier, 2006). While none of the EU member states have adopted a ‘subject-free’ approach, it is generally recognised that the majority of key competences are not tied to any particular subject and are needed alongside all areas of study. Hence developing a cross-curricular framework is the approach taken by most EU member states that have explicitly addressed key competences. This is also because key competences are not learned discretely but more than one may be developed at the same time.

This approach is challenging to implement, given that most European states tend to train teachers in single subjects, and school timetables tend to be based around single subject lessons. For example, this raises concerns about where and how cross-curricular competences will fit into the school day. Another consideration is the level of education at which key competences apply.

Diagram 3 shows some of the initial decisions that are needed in order to begin the process of integrating key competences into a curriculum. The order is indicative rather than prescriptive. The diagram shows the various choices at each stage in the decision-making process.

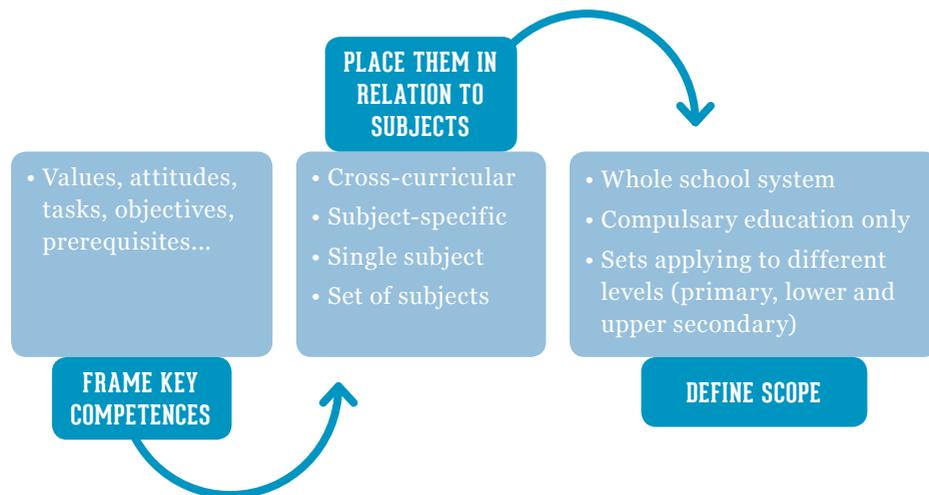


Diagram 3: Stages in integrating key competences into a curriculum

Progression routes

The process of building a curriculum for key competences must also involve the following decisions:

- How should the specification of key competences evolve as learners progress through their education?
- Should countries develop age/grade-appropriate adaptations of key competences?
- Furthermore, could reference levels be based other than on the year/grade (for example, could they cover several years or whole phases)?

The European Framework does not specify levels in the same way as, for example, the European Common Framework of References for Languages, which is a validation tool linked to assessment levels. Member states have taken different approaches to this issue. For example, Ireland’s ‘key skills’ are split into levels attainable by primary, junior secondary and senior learners, whereas Sweden has a set of objectives to be achieved and to strive for that are relevant from nursery school the end of secondary education.

While progression routes are possible, due to the cross-curricular, broad nature of key competences, specifying learning outcomes is a challenge. However, as argued in Chapter 6, learning outcomes are required in order for key competences to structure teaching and learning.

Table 2 summarises the scope of the key competences in different EU member states:

Scope	EU member states
Sets of broad cross-curricular skills or competences that are designed to ensure continuity across the formal learning system from early years education to higher education	None of the EU Member States.
Goals and/or cross curricular competences or skills that cover the whole school system (primary education to the end of secondary school)	Austria (social and personal competences), Belgium (NL), Bulgaria, Czech Republic, Estonia, Finland, Ireland (3 sets but similar), Sweden (early years, school and extra-curricular activities), UK: Wales (3 to 19 curriculum), Northern Ireland, Scotland

Cross-curricular competences that address specifically compulsory or basic education only or mainly	France, Belgium (FR), Luxembourg
Sets of key competences or skills or aims that address specific levels of the school systems (primary, lower secondary and upper secondary or basic/primary education and upper secondary)	Cyprus, Germany, Ireland, Netherlands, Portugal, Slovenia (VET only), Spain, UK (England)
Sets of key competences / cross-curricular key competences that are valid for students and for teachers	None of the EU Member States

Table 2: Scope of key competences in EU member states

4. IMPLEMENTING KEY COMPETENCES IN SCHOOLS

KEY MESSAGES

- ➔ There is no uniform approach to implementing key competences and approaches vary according to the education system and school context.
- ➔ The implementation of key competences can be supported by changes in school culture, since they apply across all school subjects and necessitate changes in curriculum, assessment, learning environments and the role of teachers.
- ➔ As an initial guide, schools could focus their attention on changes to learning, learners' experiences, and different ways to support learners and teachers.
- ➔ Schools should involve teachers in decision-making around implementing key competences.
- ➔ Schools should consider involving partners including universities, social services, other schools and families and communities, in the planning stages and on an ongoing basis.
- ➔ Schools should consider using self-evaluation tools to monitor their progress on implementing key competences.

How are key competences implemented in schools?

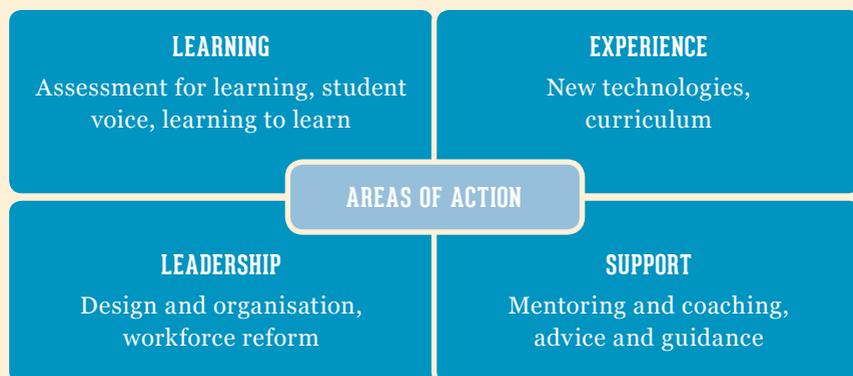
Implementing key competences in schools involves not only specifying them in curricula, but also developing appropriate structures and teaching methods. Given their cross-curricular nature, this involves interdisciplinary, cross-subject teaching and therefore whole-school planning. This also involves introducing recommended methods such as interactive learning environments, project based work and personalised approaches (see Chapter 5). Many of these approaches already coexist with the teaching of traditional school subjects, particularly in schools that experiment with different teaching methods.

A social perspective on educational systems, derived from Dewey amongst others, suggests for most schools, a shift in culture is needed to support the implementation of key competences (Vygotsky, 1978; Wertsch, 1991). Niemi et al (2012) found that success in implementing key competences was enabled by school cultures that valued sharing, teamwork and risk-taking. Also, it has been shown that it is not sufficient or effective to introduce new practices and technologies in a top-down, fragmented fashion. Schools should engage in continuous innovation rather than one-time reform.

However, no uniform approach has been identified that will work for every school. A plan for implementing key competences at the individual school level will recognise the particular context of that school. Schools need a shared vision about the role of key competences in the education they provide, from which to develop a co-ordinated approach across subject areas.

THE iNET PROJECT

An example of the kind of co-ordinated, whole-system approach required is that recommended by the iNet project. Although this project has a slightly different focus – it is about helping schools design strategies for implementing personalised learning – it has many similar objectives to the key competences movement. This could act as an initial guide to schools in the areas on which to focus their attention when starting the process of developing key competences, and includes examples of the kinds of practices, including sharing across schools, that could be considered within each area. These areas could be re-termed learning, learning environments, support for teachers and support for learners.



(adapted from Sims, 2006)

Reform is more likely to be successful if teachers are engaged in the process and see its value, and can feed back their teaching experiences into the process of curriculum development. Teachers also need to feel supported in implementing new approaches. This involves developing a welcoming environment for staff to explore new ways of working, and could include assembling groups of staff to form working groups on particular issues or developments (Smith et al., 2012). Schools should also find ways to link what they already do with key competences so that they provide a complement to existing practice (Boyd and Watson, 2006).

Collaboration

Schools are not alone in developing approaches to support learners in developing key competences, as there are many different bodies and organisations advancing this agenda. Collaboration and partnership approaches with other bodies, including universities and research centres, social services and the private sector, have been found useful in both planning and implementation stages.

UNIVERSITIES

Collaboration with universities can involve schools working with researchers to trial and adapt different teaching approaches. Design based research (similar to action research) has been found to be a good method for studying new technologies and complex learning environments – it is a *'methodology designed by and for educators that seeks to increase the impact, transfer, and translation of education research into improved practice'* (Anderson & Shattuck, 2012: 167).

SOCIAL SERVICES

One example is schools collaborating with health services to develop social and civic competences. The Scottish Curriculum of Excellence, which covers learners from 3 to 18, specifies health and wellbeing as foundational to learning. The inclusion of health and wellbeing objectives means that links are developed with practitioners in the health sector and in local authorities, who also have an stake in young people's health and wellbeing.

FAMILIES AND COMMUNITIES

Research on education and disadvantage highlights the importance of parental and family engagement as a preventative strategy against low achievement among more disadvantaged learners. Partnership with families and communities could enable civic competences, through learners getting involved in local causes or groups (Edelstein, 2011). Involving families in identifying educational priorities and progress also represents a holistic approach and could develop learning to learn and social competences.

Teacher learning communities, which develop links between teachers in different schools, provide teachers with the chance to work together to develop their practice around the teaching and assessment of key competences. Evidence suggests that teachers would welcome working with researchers and other teachers to develop their assessment practices (OECD, 2009), and such communities offer a forum for collaborative research and informal recognition of effectiveness and innovation.

Diagram 4: Potential partners for schools

RIVER CITY: A UNIVERSITY-SCHOOL COLLABORATION

The River City project, developed by researchers at Harvard University, is an interactive computer simulation for middle grades science learners to learn scientific inquiry and 21st century skills. It has the look and feel of a video game but explicitly embeds many of the 21st century skills as well as National Science Education Standards and National Educational Technology Standards [US education standards]. Developed by researchers at Harvard University, River City includes a pre-test and a research conference at the end of the unit. The River City Curriculum is interdisciplinary in scope, spanning the domains of ecology, health, biology, chemistry, earth science and history.

Three diseases simultaneously affect health in River City, based on historical, social, and geographical content. As learners explore these diseases, they learn how disease is spread and how human interactions can have effects far from the initial site. This situation allows learners to experience the realities of identifying a problem, investigating it, and delineating the multiple causes that underlie a complex phenomenon. Learners follow multiple threads that potentially lead to very different hypotheses and experiments. This helps refute the common belief that there is one right answer to any science experiment.

Researchers developed the programme and subsequently modified it for different school environments, developing ongoing relationships with educators and administrators.

Source: <http://muve.gse.harvard.edu/rivercityproject/curriculum.htm> [accessed 21 February 2013]

Self-evaluation

Self-evaluation tools for monitoring general school improvement and quality could additionally be used to assess schools' progress in implementing key competences. For example, The Bertelsmann Foundation⁴ has developed a self-evaluation tool for schools and includes a pupil survey which can monitor progress in areas like learning to learn, problem-solving, collaborative working, and promotion of health and wellbeing (p. 61). The ISSA (International Step by Step Association)'s *Competent Educators of the 21st century* framework for early childhood education includes objectives relating to key competences under the headings of interactions, family and community, inclusion, assessment and planning, teaching strategies, learning environment, and professional development (p. 59).

⁴ <http://www.bertelsmann-stiftung.de>

5. TEACHING KEY COMPETENCES

KEY MESSAGES

- ➔ The main approach to teaching key competences is through providing learning environments that facilitate active learning. These environments present open-ended problems and challenges to be solved through debate, experimentation, exploration and creativity.
 - ➔ Project-based learning is a popular method for teaching key competences.
- The teaching of key competences should be:
- ➔ **Task-based:** Learners should develop key competences through active, authentic, collaborative tasks.
 - ➔ **Interdisciplinary:** Taught through contexts that combine several subject areas.
 - ➔ **Both collaborative and individualised:** Learners must collaborate but also act autonomously and self-manage.
 - ➔ **Both learner and teacher-led:** While learning should focus primarily on learner experimentation and action, this should be combined with explicit teaching. Learners need support in developing their ability to learn independently.
 - ➔ **Technologically innovative:** Involve the pedagogically relevant use of ICT and mobile technology.
 - ➔ **Inside and outside school:** Teaching should harness the potential of extra-curricular activities and after school programmes.
 - ➔ **Alongside these methods, schools should support learners' social and emotional development, and explore and develop personalised learning approaches.**
 - ➔ **Teachers need to engage in continuous learning and peer-to-peer networking in order to apply these methods effectively.**

How can key competences be taught?

Learning environments

Traditional classroom learning environments may not be the most appropriate context for the effective development of key competences. Instead, learners need '*innovative, non-traditional avenues and venues*' (p. 15). As suggested by constructivist learning theories, learners can develop key competences, and therefore transfer their knowledge, if they learn through authentic activity, rather than solely through instruction. Learning environments should reflect real world contexts. Such simulation has three main purposes: it can motivate learners more than traditional approaches (Lepper and Henderlong, 2000; Garris, Ahlers and Driskell, 2002); learners are more likely to remember concepts they discover on their own (de Jong and van Joolingen, 1998); and it provides a meaningful environment for **problem-based learning** (McFarlane et al., 2002). Through games or other activities, learners can be presented with real life problems, which they can attempt to solve through debate, experimentation, exploration and creativity. Problems should be complex and with multiple solutions. The end product - the learners' solution - can take a variety of forms.

While interactive learning environments encourage learners to be active and autonomous, they also require collaboration between learners, developing social and communicative competences. A learning environment does not have to be classroom based. Virtual worlds like River City (see page 21) are also types of interactive learning environments.

After school programmes are potential sites for key competence development. These often have an applied focus and '*should be a site of experimentation and innovation, a place where educators catch up with the changing culture and teach new subjects that expand children's understanding of the world*' (Jenkins et al., 2006: 59). They may also enhance student engagement and promote collaborative learning, even at a young age (Denis and Hubert, 2001). In addition, using tools like mobile technology can connect learners' lives inside and outside school (Sharples, Taylor and Vavoula, 2005; 2007).

Learners' responses to real-world problems may be conceived of in terms of a longer term, cumulative activity that may take place individually or in groups, and usually requires a final practical outcome. This **project-based learning** is typically cross-curricular rather than subject-specific; projects may address several subjects and also several key competences and transversal skills simultaneously.

MARINA LAROVERKETSCHOOL

In Sweden, the advent of *friskolar* or free schools has coincided with many innovative practices. The Marina Laroverket school in Danderyd, Sweden, which was ranked the best school in Stockholm, uses project-based learning to simultaneously address key competences and provide vocational experiences. For example, the school sends learners to study aboard a sailing ship four weeks at a time, during which time they focus on learning subjects such as astronomy and marine biology, but also ways of working and self-management. While this example is not scalable and is heavily resource-dependent, it shows one school's success in creating a unique interdisciplinary learning environment.

A number of studies have been carried out to test whether project-based learning is a more effective learning method than traditional instruction. One study in the UK found that secondary school learners who used project-based instruction outperformed learners who used traditional instruction in mathematics skills, conceptual and applied knowledge (Boaler, 2002b). A number of schools that use project based learning as their main learning method have been shown to be highly effective in terms of achievement and attendance⁵.

However, it should be noted that placing learners in contexts and situations is not sufficient. **'Scaffolding'** and explicit teaching, particularly of ways of working and self-management skills, is critical to effective learning in learner-led, interactive learning environments, and can increase learner motivation (Repenning, 2012).

Social and emotional learning

In recent years there has been a growth of programmes in schools designed to develop competences such as social and emotional literacy, promote awareness of citizenship, health issues and human rights, and to support learners' social and emotional wellbeing.

This is important for two reasons. Firstly, social and emotional learning incorporates several of the key competences, for example social and civic competences, which include awareness of health and wellbeing; communication skills, relationship skills; learning to learn, which includes self-awareness and self-management; and sense of initiative and entrepreneurship. In addition, many of the 'transversal skills' have a social/emotional focus.

⁵ Examples cited in Gordon et al 2012 include Sherman Oaks Elementary in California, US and Marina Laroverket in Danderyd, Sweden.

Secondly, some researchers have argued that supporting learners' social and emotional needs stimulates well-rounded growth in learners, which forms a basis for development of the full range of key competences. Immordino-Yang and Damasio (2007) discuss

... 'the critical role of emotion... for the skills and knowledge acquired in school to transfer to novel situations and real life'

(Gordon et al., 2012: 78)

There is also a considerable evidence to suggest that a range of non-cognitive factors, such as academic perseverance, learning strategies and social skills, support educational attainment. Farrington et al (2012) highlight the importance of teachers developing an understanding of the relationship between classroom context and learner competences such as these, and suggest that teachers should have strategies for creating classrooms that promote positive academic mindsets.

Personalised learning

There have been moves in some schools to develop more a personalised approach to learning, wherein learners have more control and can progress at their own pace. This could be through personal learning plans and strategies or individual mentoring sessions, for example. In the French *lycée* (upper secondary school), learners attend separate individual sessions for personalised learning, where they monitor their progress in the development of key competences.

Though many schools will already working this way, efforts could be undertaken to infuse this ethos into all aspects of school life, as well as to use existing practices to address the key competences relating to social and emotional aspects more explicitly.

There is no definitive approach to teaching each of the key competences. The following provides illustrative examples of promising approaches from the literature reviewed.

Diagram 5: Example teaching activities

COMMUNICATION IN THE MOTHER TONGUE

'Mobile urban drama' is an activity in which individuals become the main character in a play that is presented via their mobile phone. Users can trigger different scenes through location-based technology. This can be used as a structured learning environment, for example students could learn biology framed as a thriller story in which they are characters. This and other innovative technologies have the potential to develop learners' communication skills in ways that are both engaging and applied (Hansen et al, 2012).

COMMUNICATION IN FOREIGN LANGUAGES

One project (Fisher, Evans and Esch, 2004) involved learners using communications technology in a structured way to enhance learning French. The aim was to engage students in language learning by allowing them to experience its usefulness. Learners in Belgium, England, France and Senegal communicated online. This allowed the learners to communicate with native speakers, as well as to develop self-management skills, collaborative skills, and intercultural learning.

MATHEMATICAL COMPETENCE AND BASIC COMPETENCE IN SCIENCE AND TECHNOLOGY

Realistic Mathematics Education (RME) is heavily influenced by the ideas of the Dutch mathematician Hans Freudenthal, developed in the 1960s and 1970s. Instead of subject matter to be transmitted, Freudenthal stressed the role of mathematics as a human activity. Education should give students the “guided” opportunity to “re-invent” mathematics by doing it.

Implemented in the majority of primary schools in the Netherlands, RME considers learners to be active participants in the learning process, and the starting points are contexts that are relevant and meaningful to learners, rather than concepts or topics. This makes learners more motivated and allows them to see how mathematics is relevant to daily life. It allows children to develop their own strategies for calculations rather than forcing a particular method. RME also uses models and diagrams heavily, as well as emphasising horizontal interaction (group work)

(Source: <http://www.slideshare.net/jdewaard/what-is-realistic-mathematics-education-national-mathematics-conference-swakopmund>, accessed 24 February 2013).

DIGITAL COMPETENCE

Approaches to developing digital competences typically involve going beyond the functional use and consumption of digital media, towards encouraging learners to become critical consumers and creators of media and technology. Students can create their own websites, games and programmes, for example, building a website for an online history museum (Zahn et al., 2010), as well as developing critical responses to information and ideas accessed online.

LEARNING TO LEARN

Learning to learn can be developed through personalised, self-regulatory approaches to learning, also known as ‘self-learning’. For example, one school in Scotland uses ‘personal learning plans’. This involves students coming up with their own projects and developing strategies for self and peer assessment.

Another example from Scotland is ‘My Transition Guide’. This is a tool that helps young people to plan their transition from school, by asking themselves questions about their skills and achievements and using these answers to identify areas for development and make future plans

SOCIAL AND CIVIC COMPETENCES

Social and civic competences can be developed using activities that build learners’ capacity to function in a pluralistic society. This may involve authentic social interaction and activities that develop awareness of social and civic issues. One group of students (Lombardo and Damiano, 2012) acted as guides at cultural heritage sites and used digital storytelling techniques to engage their audiences and develop social bonds.

Edelstein (2011) describes strategies for activities in the classroom that can promote principles of democracy. These are: classroom councils, community service projects, which can be organised by these councils, as well as attending civic engagement in community contexts.

SENSE OF INITIATIVE AND ENTREPRENEURSHIP

These competences can be developed in part through the provision of open-ended challenges and collaborative work. The classroom can serve as a ‘test-laboratory’ for these competences. They will also be supported by students developing self-confidence and self-efficacy, which should follow when learners’ social and emotional wellbeing is addressed.

CULTURAL AWARENESS AND EXPRESSION

Cultural Partnerships was a creative learning programme that ran from 2002 to 2011 in the UK. The programme brought creative workers such as artists, architects and scientists into schools to work with teachers to inspire young people and help them learn. The programme was found to have a positive impact on learners’ wellbeing as well as practices like incorporating student voices into the planning of activities (student voice).

(Source: <http://www.creative-partnerships.com/about-creative-partnerships/> accessed 26 February 2013)

The role of ICT

ICT and other technologies are central to many of the teaching approaches outlined above, though not necessarily obligatory for implementing key competences in the classroom. The following points may be useful when considering the adoption of ICT-driven activities.

A key factor is teacher buy-in. It is not only the technological skill of a teacher that is important, but *'the relevance of the tool to the teacher pedagogically'* (p 31). Teachers should be involved in decisions regarding what technologies would be appropriate in the classroom, and in all subsequent decision making.

In order to be creative and critical with ICT and digital media (in order to develop digital competence), learners need a relatively high level of technological skill, as well as self-efficacy with learning new media and mastering new tools. It is important that learners have a basic understanding of the underlying languages and processes in ICT, which could include computer coding and algorithmic thinking (Goode and Margolis, 2010). Schools could consider teaching these skills as a basis for the development of digital competences.

In addition, there are several practical challenges to technology-enhanced learning environments. These include: timetabling, teacher background, technical problems, and classroom management (Egenfeldt-Nielsen, 2004). These should all be considered in the planning stages. Also, due to the rapidly changing nature of ICT, teachers need to continuously update their knowledge.

Finally, there is no conclusive evidence relating the use of computers to learning outcomes (Dillenbourg, 2000). However, it is clear that the opportunities presented by ICT for active, problem-solving learning are unique and constantly evolving (Jaakkola, 2012; Veermans, de Jong and van Joolingen, 2006).

What policies can best support teachers to teach key competences?

'...teachers need support in continuous, iterative learning and the time and space to engage in peer-to-peer networking in order to take advantage of emerging programmes and learning opportunities for their learners' (p. 31)

Continuous, iterative learning

In order to effectively deliver learning activities to develop key competences, teachers must undergo explicit training. *'Intensive capacity building'* is also needed to support a teacher initial education framework that incorporates key competences (Halasz and Michel, 2011, cited in Pepper, 2012). However, training should also be seen as a continuous, iterative process. Teachers should themselves aim to develop key competences and apply these to their work. For example, encouraging teachers' sense of initiative and entrepreneurship could help them adopt new classroom practices.

Teachers can also take advantage of ICT and media training that may be on offer.

HELSINKI MEDIA CENTRE

The mission of Helsinki Media Centre, in Finland, is to develop media education and e-learning by supporting teachers' ICT skills and media competence in the following areas:

- web-based learning
- media education
- ICT and software in education

Teaching staff are offered in-service training on the use of ICT in teaching and media education, consultancy and school projects.

Source: <http://www.hel.fi/hki/Opev/en/Services/Media+Centre>

Another key factor is time. Teachers should be given time to experiment with technology and to experience for themselves the types of interactive learning opportunities they are providing to their learners (Somekh, 2008).

Peer-to-peer networking

New learning environments and teaching methods place a new set of demands on teachers. Many of the activities, in spite of being enabled by technology, are highly teacher-dependent, particularly those that promote interdisciplinary and transversal skills. Teachers can expand their knowledge of both teaching and assessment by sharing information and resources among teacher learning communities. These offer a non-threatening forum in which to share key examples, and develop their teaching and assessment practices.

6. ASSESSING KEY COMPETENCES

This chapter is based on Pepper (2012).

KEY MESSAGES

- ➔ Changes to curricula to incorporate key competences have not been fully reflected in changes to assessment practices. Assessments other than standardised testing require greater policy support.
- ➔ Assessment practices greatly influence teaching and learning, and can be developed through formal and informal training, networks and evaluation.
- ➔ Methods of assessment include standardised tests, e-assessment, attitudinal questionnaires, performance-based assessment and teacher, peer and self-assessment. These methods should be used in combination in order to gain a full picture of learners' competences.
- ➔ The assessment of key competences should be given due attention by policy makers and practitioners. Key competence assessment needs to be incorporated into teacher training and development, and efforts need to be made to trial and evaluate different assessment methods.
- ➔ Key competences should be specified in terms of learning outcomes, which should consist of knowledge, skills and attitudes, but these should not be over-specified and should allow teachers to adapt them to context.
- ➔ Assessments of key competences should serve summative and formative purposes; with summative assessments reporting outcomes at the end of a period of learning, and formative assessments informing next steps during teaching and learning.

Why do we need to assess key competences?

Assessment practices are known to strongly influence teaching and learning. Assessment is often assumed to identify the learning that is important; it therefore results in increased time and effort being spent on these aspects of learning. Changes in assessment thereby structure teaching priorities and methods; and in turn, impact on what learners learn and how they learn. Therefore assessing key competences has a dual role: to document learners' key competences, and to develop them.

A joint progress report of the European Council and the European Commission (European Commission, 2009) found that: *'A large number of countries are introducing reforms that explicitly use the Key Competences framework as a reference point. Good progress has been made in adapting school curricula. But there is still much to be done to support teachers' competence development, to update assessment methods, and to introduce new ways of organising learning'* (p. 2).

Although there are a variety of ways to assess key competences, methods other than standardised testing 'appear less widespread or systematic, and require more support through policy mechanisms such as teacher education and evaluation' (p.2).

Validity, reliability and equity are important to consider in relation to assessment, particularly in the assessment of complex outcomes (see diagram 6).

VALIDITY

A judgement of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores or other modes of assessment (Messick, 1989).

RELIABILITY

The extent to which the assessment, if repeated, would give the same result (Harlen, 2007).

EQUITY

Emphasises the social nature of assessment, and highlights the need to consider differences that are not the focus of an assessment but could influence the assessment. For example, assessments can be developed or modified to ensure that when a learners' disability is not relevant, it is not assessed (Pepper, 2007; Pepper, 2012)

Diagram 6: Key aspects of assessment

Whilst ensuring equity, assessment often involves a balance between validity and reliability. The balance reflects the purpose of the assessment, with summative assessment emphasising reliability and formative assessment emphasising validity.

SUMMATIVE ASSESSMENT

Often explained as ‘*assessment of learning*’ - reports on an individual’s learning at the end of a period of instruction (Pepper, 2012).

FORMATIVE ASSESSMENT

Often called ‘*assessment for learning*’, because it is concerned with using assessment information to promote an individual’s learning *during* a period of instruction. (Pepper, 2012).

Diagram 7: Types of assessment

How should learning outcomes be specified?

Learning outcomes are statements of what a learner should be able to do, or be. The European Reference Framework defines the eight key competences that learners should develop by the end of initial education, but does not go as far as ‘*prescribing the contexts in which learners should develop key competences, the knowledge, skills and attitudes they require for particular contexts or the levels of competences they should develop as they progress through initial education*’ (p. 4). This is because the Framework is intended to be interpreted to suit the particular circumstances of each member state’s education system.

Learning outcomes provide a basis for focusing teaching, learning and assessment. One approach to specifying learning outcomes is to first describe the intermediary learning processes relating to a competence. For example, the OECD’s PISA 2012 study defines the following learning processes in relation to problem solving: exploring and understanding, representing and formulating, planning and executing, and monitoring and reflecting. Learning outcomes can be specified within each of these sub-domains. Learning outcomes should consist not only of knowledge and skills, but also attitudes. With reference to social competences, these could be attitudes that support self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (Haggerty et al., 2012).

Whilst the degree of specification of learning outcomes reflects the assessment

purpose, evidence suggests that highly-specified learning outcomes should be avoided. Assessors need to be able to exercise their judgement in any given set of circumstances, interpreting learning outcomes relevant to individual contexts. Teachers should have scope to adapt curriculum and pedagogy to their own learners and local contexts. All those involved in assessment should develop a shared understanding of learning outcomes in use in a particular assessment, so that they can be applied consistently.

How can key competences be assessed?

A number of approaches have been identified which purport to assess key competences. Because of the complex nature of the underlying constructs, no single, definitive approach has yet emerged. Furthermore, the approach depends largely on the purpose of the assessment – whether formative or summative. In order to ensure a broad and comprehensive perspective, it is important to consider a range of assessment methods.

Standardised tests

Eurydice (2009) found that of the eight key competences, only the three that are linked to individual subjects were the ones most commonly assessed in national **standardised tests**. These were: communication in the mother tongue; communication in foreign languages; and mathematical competences and basic competences in science and technology. A few member states develop standardised tests for social and civic competences, but there were none for the remaining key competences: learning to learn, sense of initiative and entrepreneurship or cultural awareness and expression.

Standardised tests can contribute to the assessment of key competences if they include questions with:

- Structure and content that reproduce real-life contexts authentically
- Multiple steps requiring a chain of reasoning and a range of competences
- A range of formats allowing responses that require different competences.

However, standardised tests can only provide a limited picture of learner performance, because they:

- Assess performance infrequently
- Sample one part of a domain at any one time
- Reproduce a limited range of contexts authentically
- Only require certain response types.

(Morris, 2011)

E-assessment

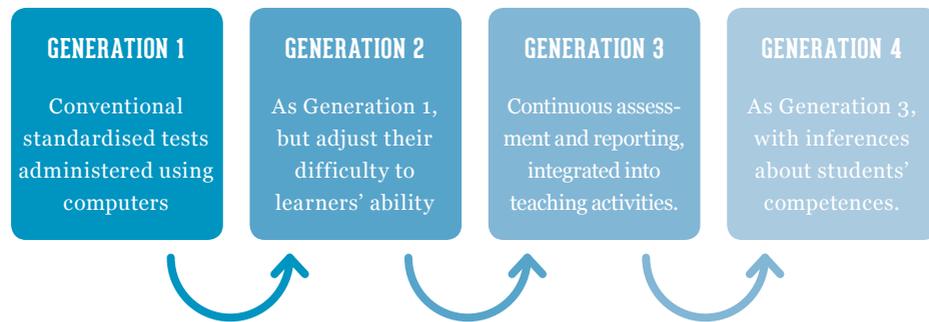


Diagram 8: Four generations of E-assessment(Bunderson et al., 1989)

First and second generation e-assessments offer efficiency gains in test administration; and third and fourth generation e-assessment introduce new possibilities for assessing complex processes, offering *'particular hope for context simulation and dynamic interaction'* (p. 11). These types of e-assessment present new possibilities for gathering information on the scope of learners' key competences, and offer new opportunities to interact with learners, requiring them to make sense of contexts themselves. One example is the use of games like River City (see page 21) which represent social and political context of a real-world problem as a virtual model.

For the moment, e-assessment must be combined with other instruments to build methods of assessing key competences, for *'unless or until e-assessment is ready to provide the basis for a quantum leap in our conception of tests and assessment instruments more generally, then multiple sources of information about learners' competences are likely to be needed'* (p. 11-12).

Attitudinal questionnaires

Studies of educational achievement, such as PISA, employ questionnaires to survey learners' social and emotional competences, such as attitudes to learning, in order to help explain their performance. These are often oriented towards, *'assessing risk factors rather than learning outcomes'* (p. 13). They would therefore require re-orientation to assess social competences as learning outcomes.

ASSESSING 'LEARNING TO LEARN'

Fredriksson and Hoskins (2008) describe the development of an assessment for 'learning to learn' using questionnaires. These instruments were piloted with learners aged 14 in eight European countries in 2008. The most complex items on the test appeared to assess the affective aspects of learning to learn as well as the cognitive aspects, and many learners opted not to attempt these questions. This could be seen as 'strategic test-taking behaviour, with learners focusing on questions that appear more likely to lead to success' (p.12). This provides an example of the difficulty of trying to assess cognitive and affective aspects of learning simultaneously.

Many instruments of this kind require **self-reporting** and, particularly for social competences, include a large number of questions (in some cases, well in excess of 100), which raises two issues:

- The inclusion of so many questions may result in respondents reflecting less on the issues raised by each one; and,
- Survey questions cannot always be varied enough to capture varied social contexts and, or make reference to specific contexts and experiences.

Performance-based assessment

Performance-based assessment of key competences could involve teachers observing learners over a certain period of time and using a range of tasks. It can be for **formative** or **summative** purposes. Variation in teachers' judgements both within and between schools poses a risk, but evidence suggests that this can be managed with training and moderation (Looney, 2011; Stanley et al., 2009). Two examples of moderation include: social moderation based on samples of assessed work, and statistical moderation requiring additional assessments to be compared with the performance-based assessment judgement.

PORTFOLIO ASSESSMENT

A portfolio is a place to store data compiled over time, intended to be representative of a learner's progress. These entries can contain information about learners' performances on tasks in real-life contexts. E-portfolios expand the range of possibilities; audio-visual files and internet links can be included, and internet social networks can facilitate dialogue. Developing and reviewing e-portfolios can help learners to develop digital competence, social competence, learning to learn and problem-solving skills.

The use of e-portfolio assessment has been seen in Austria, Belgium, Bulgaria, France, Greece, Iceland, Portugal, Romania, Turkey, UK and USA. One concern with this as an assessment measure is its reliability for summative assessment purposes. The technology for assessing their content and complex learning outcomes is still in development.

Teacher, peer and self-assessment

Teacher feedback is one aspect of formative assessment. Evidence suggests that feedback explaining *why* something is incorrect is more effective than feedback that only identifies errors (Pellegrino and Hilton, 2012). The timing of feedback is crucial; *'if feedback is given before learners have an opportunity for reflection, the opportunity for independent learning is negated'* (p. 18). Although some computer-based assessment software can offer corrections and explanations, the technology is still some way from judging and adjusting feedback, or offering questioning or dialogue (Black and William, 2009).

Self-assessment has been identified as a key aspect of successful formative assessment (Black and Wiliam, 1998); to internalise teachers' feedback, learners need to reflect on their learning. Peer and self-assessment practices are seen as important features of assessment for learning as a strategy to promote 'learning to learn' (James et al., 2007). These practices involve learners working first with others, then alone, to make judgements about how they have fulfilled learning outcomes.

ONLINE FORUMS FOR PEER- AND SELF- ASSESSMENT

School intranet or internet forums offer potential for peer and self-assessment, involving social networking, blogs or wikis. Virtual meeting points can enable learners to communicate with others, share multimedia content and take part in collaborative activities. These forums link to social competences and learning to learn.

What policies can best support teachers in assessing key competences?

The development of assessment methods for key competences 'should *take the shape of a development process involving the specification of learning outcomes followed by the development of assessment and accompanied by the alignment of related policy areas'* (p. 24).

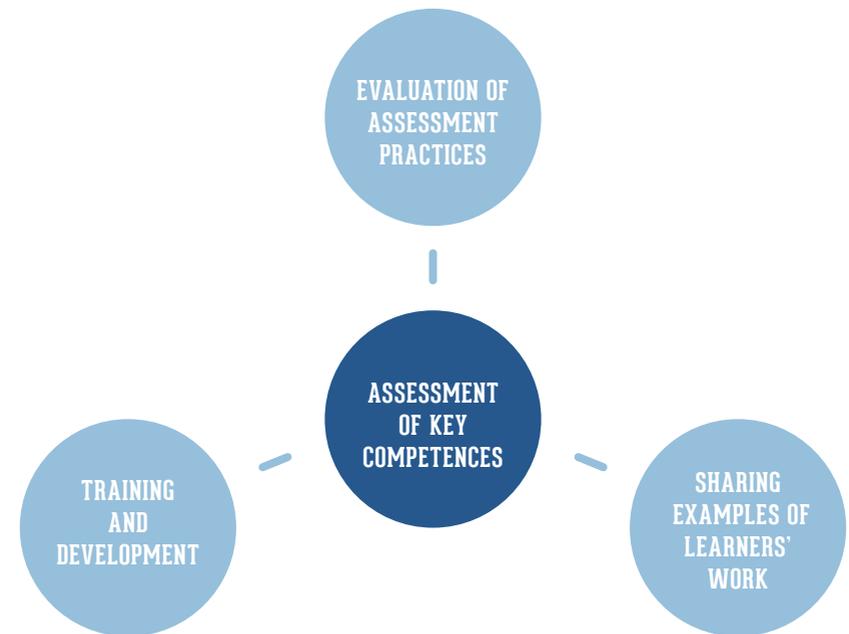


Diagram 9: Policies that support the development of key competence assessments

Evaluation of policies and practices: Evaluations can be used to inform the initial development, piloting and refinement of assessment policies and practices. Key criteria for effectiveness are validity, reliability and equity (Morris, 2011).

Training and development: Formal training and opportunities to discuss and explore the concepts are essential for those developing, using or reviewing assessments. These should be accessible to teachers, examiners, learners, parents and employers. Within teacher education frameworks, learning outcomes for teachers should be developed with assessment-specific elements, such as: formulating learning outcomes, using a range of techniques for formative and summative assessment, facilitating peer and self-assessment, using assessment information effectively and responsibly, and, developing attitudes that support these assessment practices (p. 21).

Sharing examples of learners' work: Portfolios of learners' work could be a useful resource for sharing examples of assessing key competences: *'A portfolio can serve as each pupil's own record of their achievements, and can also be a documentary basis for comparison, between teachers in the same school, and between different schools, to ensure comparability in their standards'* (Black, 2010).

7. CHALLENGES TO IMPLEMENTATION

KEY MESSAGES

- ⇒ **The challenge for policy makers is how to widen schools' access to innovative practices that promote key competence development. The challenge for schools is how to widen *individual learners'* access to these.**
- ⇒ **Key competence development may require investment in human resources and technology, which will vary according to the level of resources across countries and schools.**
- ⇒ **Strategies should be designed to widen schools' access to the necessary resources, training and teacher networks.**
- ⇒ **Instilling key competences into all aspects of the curriculum will ensure that the greatest number of learners possible have access to them.**
- ⇒ **Schools should be supported to use open source computer programmes and applications, which are free of charge.**

How can we ensure equal access to key competences?

The implementation of technology-enhanced, innovative learning environments and assessments can present a challenge to school systems, especially in a time of austerity, given the need for investment in technology and human resources. Resources vary widely between European countries as well as between schools within countries, potentially leading to unequal access. This is shown by the case of *friskolarin* Sweden, where increasing innovation in schools coincided with increasing inequality of access, as 'navigating the educational choices, and the quality of new programs became more taxing for families with less resources' (p. 29) (Skolverket, 2003).

One solution is for schools to access open-source software, which is free of charge. These exist for almost all commercially available computer programmes and operating systems. Other free tools online for video conferencing, video editing and so on may be helpful. Also, access to mobile technology will increase as smart phones decrease in cost.

However, accessing these implies not only the availability of computers and mobile devices, but of knowledgeable teachers who have time in their curriculum to make use of them. This entails well-structured and sufficient continuing professional development for school staff and for teacher trainers. Affluent schools may find this easy; the challenge for policy makers is how to support less affluent schools. The Swedish government's response to this was tighter regulation (Skolverket, 2003). More broadly, strategies should be designed that would widen schools' access to the necessary resources, training and teacher networks.

In addition to school resources, learner exposure to innovative learning tools, environments and opportunities can often be dependent on individual interest, time and resources. For example, some will take part in extra-curricular activities which have a strong applied focus. One example of this is participatory science, where individuals assist in data collection and reporting for real-life science projects, often via online communities or location-based mobile technology. Activities such as these allow learners to experience applied knowledge in action, while fostering civic engagement. The challenge for schools is how to widen access to activities such as these at the individual learner level.

This highlights the importance of a cross-curricular framework for key competences – including them in all school subjects so that the greatest number of learners possible have access to them (Repenning, 2012). There is also a need to harness the potential of learners' out-of-school activities within the school environment.

8. SUMMARY AND CONCLUSIONS

Key competences are the essential abilities individuals need in order to apply knowledge to real-world contexts. If school education is to prepare individuals for life, citizenship and work, it needs to develop their key competences.

While the motivation behind the move towards key competences in school education is largely social and economic, their entry into education policies represents the mainstreaming of several long-running themes in educational and social research. Among others, these concern the social aspects of learning, theories about the most effective ways to transfer knowledge, and theories about the competences individuals need to work effectively.

Although some key competences refer to subject knowledge, they are essentially cross-curricular in nature, and hence can be developed through every school subject. This is challenging given that schools in most EU member states, particularly secondary schools, are structured according to subjects. There is no uniform approach to integrating key competences into school curricula, which requires decisions about how to identify, define and frame key competences, including specifying the ways in which they are relevant to different levels of schooling. Implementation at the national level will depend on educational philosophies, historical context, outside influences and a range of other factors.

The implementation of key competences in schools can require a shift in culture because they require addressing as part of every subject, rather than being standalone. This is also because successful implementation requires buy-in from all school staff. Research from Finland indicates that school cultures that are conducive to the uptake of innovative practice tend to be open to risk-taking and teamwork (Niemi, 2012).

A frequently recommended method for teaching key competences is the provision of interactive learning environments. These may be enhanced by technology and typically require learners working both autonomously and collaboratively to apply creativity, problem-solving and exploration to real-life, multi-disciplinary problems. These environments allow several key competences to be developed simultaneously. Project-based learning is another way to teach key competences. Alongside these environments, it is important for schools to support learners' social and emotional development, in order to develop their social and civic competences and encourage positive attitudes to learning.

Assessing key competences is challenging given that they refer to complex constructs that are not easy to measure in the same way as ability in a particular discipline might be. However, developing valid and effective assessments is an important aspect of key competence development, particularly given evidence that assessments strongly influence teaching and learning. Learning outcomes need to be adequately specified, but leave room for assessor and teacher autonomy. Possible methods of assessment include standardised testing, e-assessment, attitudinal questionnaires, performance-based assessment and self- and peer-assessment. These should be used in combination to gain a full picture of learners' competences.

Challenges to implementing key competences in school education include investing in human resources and technology, as well as ensuring equal access to key competences among all schools and learners in the EU.

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APPENDIX 1: EUROPEAN REFERENCE FRAMEWORK OF KEY COMPETENCES FOR LIFELONG LEARNING

COMMUNICATION IN THE MOTHER TONGUE

The ability to express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing).

COMMUNICATION IN FOREIGN LANGUAGES

The ability to understand, express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing)

Individuals need to interact appropriately in a range of societal and cultural contexts. Communication in foreign languages also calls for skills such as mediation and intercultural understanding.

MATHEMATICAL COMPETENCE AND BASIC COMPETENCES IN SCIENCE AND TECHNOLOGY

Math competence is the ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situations.

Basic competence in science refers to the ability and willingness to use the body of knowledge and methodology employed to explain the natural world, in order to identify questions and to draw evidence-based conclusions.

Competence in technology is the application of that knowledge and methodology in response to perceived human wants or needs.

Competence in science and technology also involves an understanding of the changes caused by human activity and responsibility as an individual citizen.

LEARNING TO LEARN

The ability to pursue and persist in learning, to organise one's own learning, including through effective management of time and information, both individually and in groups. This is essential to lifelong learning.

DIGITAL COMPETENCE

The application of critical thinking and creative skills to the use of digital media.

Through developing this competence, individuals become 'effective receivers and creators in the digital realm' (Gordon et al 2012: 17).

SOCIAL AND CIVIC COMPETENCES

Social competences include personal, interpersonal and intercultural skills.

Civic competence is based on knowledge of the concepts of democracy, justice, equality, citizenship, and civil rights.

Social competences equip individuals to participate in an effective and constructive way in social and working life. Civic competence equips individuals to fully participate in civic life, based on knowledge of social and political concepts and structures and a commitment to active and democratic participation.

SENSE OF INITIATIVE AND ENTREPRENEURSHIP

The ability to turn ideas into action. It includes creativity, innovation and risk-taking, as well as the ability to plan and manage projects in order to achieve objectives.

This supports individuals, not only in their everyday lives at home and in society, but also in the workplace in being aware of the context of their work and being able to seize opportunities, and is a foundation for more specific skills and knowledge needed by those establishing or contributing to social or commercial activity.

CULTURAL AWARENESS AND EXPRESSION

Appreciation of the importance of the creative expression of ideas, experiences and emotions in a range of media, including music, performing arts, literature, and the visual arts.

APPENDIX 2: GLOSSARY

21st century skills: Learning to collaborate with others and connect through technology are essential skills in a knowledge-based economy (Assessment and Teaching of 21st Century Skills consortium)

Action research: An approach that involves practitioners in examining their own practice, systematically evaluating the consequences of educational decisions, and adjusting practice to maximise effectiveness (NFER Library Thesaurus).

Assessment: The process of making inferences about an individual's knowledge, skills, attitudes or other constructs using information from one or more methods such as tests, observations, interviews, projects or portfolios with reference to pre-defined criteria. (Gipps, 1994; Mislevy, 1994; and, CEDEFOP, 2008b; cited in Pepper, 2012).

Attitudinal questionnaires: Surveys of students' attitudes to learning, normally used to help explain their individual performance (Pepper, 2012).

Computer-based assessment: Assessment using information and communication technology to present information or record, analyse, report or feedback on responses (Busuttil-Reynaud and Winkley, 2006; cited in Pepper, 2012).

Constructivist learning theories: Constructivist learning theories posit that knowledge is built by the learner, not supplied by the teacher (Gordon et al 2012: 22).

Design-based research: A 'methodology designed by and for educators that seeks to increase the impact, transfer, and translation of education research into improved practice' (Anderson & Shattuck, 2012: 167 cited in Gordon et al., 2012).

Equity: Emphasises the social nature of assessment, and highlights the need to consider differences that are not the focus of an assessment but could influence the assessment. For example, assessments can be developed or modified to ensure that when a learner's disability is not relevant, it is not assessed (Pepper, 2007; Pepper, 2012).

Formative assessment: Often called 'assessment for learning', because it is concerned with using assessment information to promote an individual's learning during a period of instruction (Pepper, 2012).

Interactive learning environments: Learning environments that support active learning i.e. learning with simulation and games, learning with mobile devices and with mobile social media (Gordon et al., 2012: 22).

Learning outcomes: Statements of what a learner should be able to do or be and contrast with learning inputs such as time, location and method (CEDEFOP, 2008a; Leney, Gordon and Adam, 2008; cited in Pepper, 2012).

OECD: The Organisation for Economic Co-operation and Development.

PISA (Programme for International Student Assessment): PISA is an international study that was launched by the OECD in 1997. It aims to evaluate education systems worldwide every three years by assessing 15-year-olds' competencies in the key subjects: reading, mathematics and science (<http://www.oecd.org/pisa/>).

Problem-based learning: Problem based learning aims to prepare students to encounter ill-structured problems normally encountered in real life. Such problems are usually complex and can have multiple solutions (Gordon et al., 2012: 19).

Reliability: The extent to which an assessment, if repeated, would give the same result' (Harlen, 2007; cited in Pepper, 2012).

Scaffolding: 'An instructional technique in which the teacher breaks a complex task into smaller tasks, models the desired learning strategy or task, provides support as students learn to do the task, and then gradually shifts responsibility to the students. In this manner, a teacher enables students to accomplish as much of a task as possible without adult assistance' (NCREL Glossary of Education Terms and Acronyms).

Standardised tests: Tests that are developed, administered, scored and graded according to uniform procedures designed to ensure consistent outcomes that can be meaningfully compared across a population (Morris, 2011; cited in Pepper, 2012).

Student voice: Enabling students to have their views recognized and contribute to decision making (Gordon et al., 2012: 79).

Teacher learning communities: Professional networks of teachers as a forum for sharing teaching practices (Pepper, 2012).

UNESCO: United Nations Educational, Scientific and Cultural Organization (<http://en.unesco.org/>).

Validity: An integrated evaluative judgement of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores or other modes of assessment (Messick, 1989; cited in Pepper, 2012).

Performance-based assessment: ‘Authentic’ tasks such as exhibitions, experiments, group work, interviews, plays, presentations, projects and role plays in real or realistic contexts. May involve the use of listening and observation, or portfolios and diaries to collate information about performances. This term is also occasionally used with reference to open-ended tasks in standardised tests in order to contrast them with multiple-choice items (Pepper, 2012).

Self-regulated learning: Learners monitoring and controlling their learning practices and outcomes; this is seen as central to lifelong learning (Dignath and Buttner, 2008, cited in Pepper, 2012).

Summative assessment: Often explained as ‘assessment of learning’ - reports on an individual’s learning at the end of a period of instruction (Pepper, 2012).

Self-reporting: A report about one’s behaviour provided especially by one who is a subject of research (Merriam-Webster online dictionary).

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<http://www.cicero.fi>



<https://www.jyu.fi/en/>

PRACTICE-RELATED PARTNERS



<http://www.ja-ye.eu>



<http://www.rektorsakademien.se>

ABOUT EUROPEAN SCHOOLNET



European Schoolnet is the coordinator of the KeyCoNet Project.

European Schoolnet is the network of 30 European Ministries of Education, based in Brussels. As a not-for-profit organisation, we aim to bring innovation in teaching and learning to our key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners.

Since its founding in 1997, European Schoolnet has used its links with education ministries to help schools make effective use of educational technologies, equipping both teachers and pupils with the skills to achieve in the knowledge society.

In particular, European Schoolnet pledges to:

- Support schools in achieving effective use of ICT in teaching and learning
- Improve and raise the quality of education in Europe
- Promote the European dimension in education

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<http://keyconet.eun.org>

