Developing Key Competences

KEYCONET
Key Competence Network on School Education

TEACHER GUIDE

Using Project-Based Learning to Develop Students' Key Competences

European Schoolnet

AUTHOR

Amanda Harper
(National Foundation for Educational Research)

EDITORS

Jean Gordon
(Universal Education Foundation - Learning for Well-being)

Caroline Kearney
(European Schoolnet)

Janet Looney
(European Institute for Education and Social Policy)

PUBLISHER

European Schoolnet
Rue de Trèves 61
B1040 Brussels
www.europeanschoolnet.org
info@eun.org

DESIGN

Dogstudio

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. It is a constantly growing network of more than 100 members from 30 countries gathering together Ministries of Education/related agencies, universities/research institutes, European organizations, and practice related partners.

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.

CONTENTS

KEYCONET'S REACH ACROSS COUNTRIES AND STAKEHOLDERS

COUNTRIES:

- Founding countries of KeyCoNet in 2012: Austria, Belgium, Estonia, Ireland, France, Finland, Norway, Portugal,Sweden
- Countries which joined the network in 2013: Spain, UK, Poland, Albania, Romania, Greece, Luxembourg
- Countries which joined the network in 2014: Croatia, Italy, Lithuania, Latvia, Denmark, Cyprus, Slovakia, Bulgaria, Slovenia, Czech Republic, Germany, Malta, Netherlands and Hungary

STAKEHOLDERS:

- Ministries of Education/Related agencies
- Regional entities
- Universities/Research organisations
- Teacher training institutions
- National & European networks
- Non-governmental organisations
- Primary & secondary schools

1. INTRODUCTION AND CONTEXT OF KEY COMPETENCES IN SCHOOL

1.1 Purpose and scope

Equipping children and young people with key competences – the knowledge, skills and attitudes which facilitate the application of knowledge to the fast-changing real-world contexts of the 21st century – is a universal challenge faced by schools. This short teacher guide focuses on project-based learning as a teaching method schools can use to help their students develop key competences.

This document is one of a series of teacher guides commissioned by KeyCoNet, the European Policy Network on Key Competences in School Education. It was compiled by the National Foundation for Educational Research in England in support of European Schoolnet's online course for teachers on competences for 21st century schools (*http://www.europeanschoolnetacademy.eu/web/keyconet*). It draws upon two literature reviews developed by KeyCoNet:

Arjomand, G., Erstad, O., Gilje, O., Gordon, J., Kallunki, V., Kearney, C., Rey, O., Siewiorek, A., Vivitsou, M. and von Reis Saari, J. (2013). *KeyCoNet 2013 Literature Review: Key Competence Development in School Education in Europe* [online]. Available: *http://keyconet.eun.org/literature-review* [26 June, 2014].

Pepper, D. (2013). *KeyCoNet 2013 Literature Review: Assessment of Key Competences* [online]. Available: *http://keyconet.eun.org/literature-review* [26 June, 2014].

Arjomand *et al.* (2013) cover the definition and implementation of key competences in schools in Europe. Pepper (2013) focuses on the assessment of key competences.

These literature reviews were originally published in 2012 and updated in 2013.

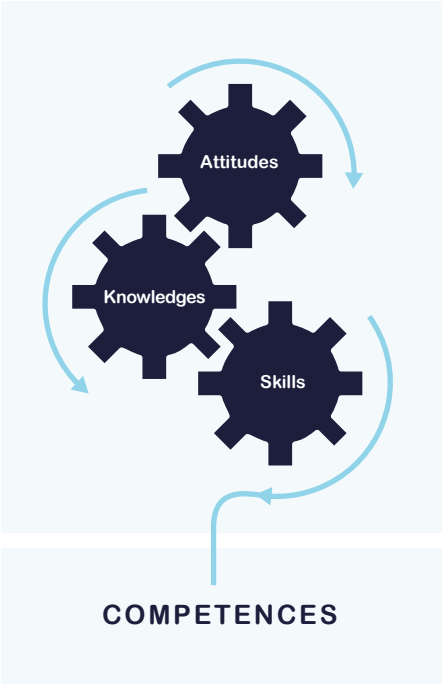
1.2 Context and background on key competences

The European Reference Framework on Key Competences for Lifelong Learning (European Commission, 2006) identifies eight key competences which it is considered combine the knowledge, skills and attitudes necessary for personal fulfilment, active citizenship, social inclusion and employment. The framework also sets out the key themes or transversal skills which underpin each competence. These can be seen in the following image.

Key competences have grown in prominence in European education systems in recent years and most European countries have made significant progress towards incorporating the key competences into national curricula and other frameworks (European Commission *et al.*, 2012). There is a growing trend towards curricula based on key competences or similar conceptions, which combine knowledge with the skills and attitudes needed in a wide range of real-life contexts (Gordon et al.,

2009). Beyond this, the development of key competences is intended to foster lifelong learning, enabling students to use what they have learned in schools and to continue learning throughout their lives.

Internationally the concept of '21st century skills' has grown in recent years and is allied to the concept of key competences. The Australia-led international ATC21S project, for example, groups 21st century skills in four broad categories:



- **Ways of thinking: creativity, critical thinking, problem-solving, decision-making and learning.**
- **Ways of working: communication and collaboration.**
- **Tools for working: information and communications technology (ICT) and information literacy.**
- **Skills for living in the world: citizenship, life and career, and personal and social responsibility.**

Similarly the US Partnership for 21st Century Skills (P21) has developed the Framework for 21st Century Learning which sets out student outcomes alongside support systems:

- **Student outcomes:**
  - **Learning and innovation skills – 4Cs (critical thinking, communication, collaboration, creativity).**
  - **Core subjects (English, reading or language arts; world languages; arts; mathematics; economics; science; geography; history; and government and civics) and 21st century themes (global awareness; financial, economic, business and entrepreneurial literacy; civic literacy; health literacy; and environmental literacy).**
  - **Information, media and technology skills (information literacy; media literacy; and ICT literacy).**
  - **Life and career skills.**
- **Support systems: standards and assessments; curriculum and instruction; professional developments; and learning environments.**

2. PROJECT-BASED LEARNING AND KEY COMPETENCES

2.1 What is project-based learning?

Traditional classroom learning environments may not be the most appropriate context for the effective development of key competences (Cook and Weaving, 2013). Teaching methods which have been identified as conducive to the development of key competences include interdisciplinary, cross-subject teaching, team oriented learning, individualised approaches (e.g., individual study plans) and project-based work (Gordon *et al*., 2009).

Project-based learning can be regarded as:

> *Learners' responses to real-world problems.....in terms of a longer term, cumulative activity that may take place individually or in groups, and usually requires a final practical outcome* (Cook and Weaving, 2013).

The Buck Institute for Education (BIE), a US not-for-profit organisation which helps teachers implement project-based learning in US schools, defines project-based learning as:

> *a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to a complex question, problem, or challenge* (BIE, 2014a).

Project-based learning has been identified as a popular and effective method to teach key competences (Ravitz *et al*., 2012). One reason for this is that it is typically cross-curricular, rather than based within a specific subject, meaning that it can address multiple subjects, key competences and transversal skills at the same time. Another is that project-based learning provides opportunities for students to gain deep content knowledge alongside '21st century skills' (ibid).

At system level, school curricula and assessment frameworks need to be flexible in order to accommodate and take account of complex project work. In addition, like all teaching methods, teachers need support to effectively implement project-based learning. Arjomand *et al*. (2013) note that whilst project-based learning is used by many educators, widespread implementation will mean a change in culture for many schools, particularly schools in challenging environments.

2.2 What does the research tell us?

The *KeyCoNet 2013 Literature Review: Key Competence Development in School Education in Europe* (Arjomand *et al*., 2013) and other research have highlighted interesting findings which support project-based learning as an effective teaching method for the development of a range of key competences and the key themes which underpin them. Three examples are:

Example 1: mathematical competence in secondary school

A study of 300 students in two British secondary schools over a three-year period compared an open-ended, project-based teaching approach with a traditional procedural, skills-based approach in mathematics. Both schools were situated in low-income areas and the majority of students at both schools were white and working class. At age 13 the attainment of students at both schools was comparable. However, after three years the students at the project-based school scored significantly higher grades on a range of assessments, including the national examination at age 16. This was despite extra time the students at the traditional school spent 'on task'. The examination results of the students at the school with the open-ended, project-based approach were also higher than the national average despite being situated in one of the poorest areas of the country. The project-based approach was also linked to reduced gender and social class inequalities in attainment (Boaler, 1997 cited in Boaler, 2002).

Example 2: learning to learn; social and civic competence; competences in science and technology; and cultural awareness and expression in primary school

A small-scale study of 70 Year 4 primary pupils (aged nine to ten) from six mixed ability and multi-ethnic classes in urban areas of Greece explored the effectiveness of project-based learning in terms of pupils' content knowledge and attitudes to learning. The topic of the project, which involved two to four teaching hours each week over an eight- to 12-week period, was 'sea animals'. The children had not previously been exposed to a project-based teaching approach. Units of the topic which involved hands-on, field-based activities and experiential learning were seen to particularly enrich and expand pupils' knowledge. In terms of attitudes to learning, the study found that the project-based learning approach helped pupils to value group work and experiential learning and to enhance their engagement in the learning process. Through the group work the pupils felt they had developed positive attitudes towards classmates with learning difficulties and those from different ethnic backgrounds (the latter being significant in the Greek context as the researchers discuss difficulties around the acceptance of Roma children in the Greek classroom) (Kaldi *et al*., 2011).

Example 3: communication in foreign languages; cultural awareness and understanding; digital competence in secondary school

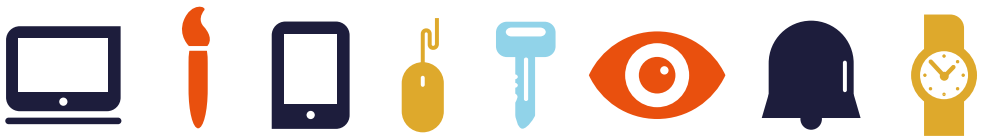
An international project of 152 students mostly aged 15 years across six secondary schools (three in England and one each in France, Belgium and Senegal) harnessed the students' computer literacy and enthusiasm for internet communications to develop linguistic and cultural skills through an online message board. The project gave the students autonomy in communicating with each other alongside scaffolding and stimulated activities to inspire their work. Researchers found that the students developed self-management skills, collaborative skills and intercultural learning. As this was a qualitative study it is difficult to gauge the exact extent of the students' gains in terms of linguistic competence. However, they read and responded to messages and were exposed to a far wider range of 'real world' linguistic contexts (including flirting, arguing and agreeing) than they would normally experience in the classroom (Fisher, Evans and Esch, 2004).

2.3 Case studies

The *KeyCoNet 2013 Literature Review: Key Competence Development in School Education in Europe* (Arjomand *et al*., 2013) identifies a number of international case studies which demonstrate the project-based learning approach, some of which are described below. These are illustrative of the many examples of project-based learning underway across Europe and beyond.

Case study school/ organisation/project	Main knowledge, skill or attitude	Project-based learning approach
Junior Achievement Young Enterprise (JA-YE) entrepreneurship programmes	Entrepreneurship	JA-YE is Europe's largest provider of entrepreneurship education programmes, which are based on project-based learning and develop young people's entrepreneurship skills, foreign language skills and collaborative problem solving. In the Company Programme, students in upper secondary education work with mini-companies over a year culminating in regional and national competitions. In the Global Enterprise Project (GEP), secondary school students between the ages of 15 and 18 learn about various industries, create and manage their own real enterprises with peers in other countries, strengthen their entrepreneurial know-how and apply their academic skills in new ways. Teachers work closely with business professionals who share their experience, expertise and raise awareness of the variety of career opportunities that exist in today's global environment.
Les Savanturiers, France	Learning to learn/ competence in science	Les Savanturiers is a Paris-based programme which focuses on pupils learning science through being researchers. Pupils participate in workshops at their school which are run by Masters or doctoral students supported by the programme's team. The workshops introduce pupils to scientific research and then pupils undertake their own research, experimenting and adapting their assumptions based on their results. Pupils have the opportunity to present their findings at events and conferences. The programme offers the dual benefits of developing research skills whilst encouraging pupils to pursue scientific studies and careers.

Applied Learning Academy, Fort Worth, Texas	Real-world experience	This US all-year-round school gives students an opportunity to learn through real-world experience in an environment that 'fosters critical thinking, creativity, and collaboration with Fort Worth's arts, business, and scientific communities'. Students create portfolios; design high-tech projects; collaborate with a local theatre company; and produce and field test documents for the school district.
Marina Laroverket school, Danderyd, Sweden	Key competences/ vocational experience	This friskola or free school 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 for four weeks at a time, during which 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.
River City project, Harvard University, USA	Science and technology	River City is an interactive computer simulation for middle grade science students to learn scientific enquiry and 21st century skills. The River City curriculum covers 17 hours of learning and includes a pre-test and a research conference at the end of the unit. The project's curriculum is designed to replace existing lessons.
Sherman Oaks Elementary, USA	Project-based curriculum / dual language immersion programme	This Californian elementary school features a dual immersion English/Spanish language programme and project-based learning, culminating in widely-attended student exhibitions. According to the school, the Sherman Oaks programme focuses on 'strong academics built around real-life learning' and has 'significantly raised student achievement levels'.



2.4 Project-based learning and key competences in schools

So what does effective project-based learning look like in schools? The US not-for-profit organisation BIE suggests that the following essential elements need to be in place at school level for project-based learning to be effective:

Essential elements for project-based learning:

- **Significant content – At its core the project is focused on teaching students important knowledge and skills, derived from standards and key concepts at the heart of academic subjects.**
- **21st century competences – Students build competences valuable for today's world, such as problem-solving, critical thinking, collaboration, communication, and creativity/innovation, which are explicitly taught and assessed.**
- **In-depth enquiry – Students are engaged in an extended, rigorous process of asking questions, using resources and developing answers.**
- **Driving question – Project work is focused by an open-ended question that students understand and find intriguing which captures their task or frames their exploration.**
- **Need to know – Students see the need to gain knowledge, understand concepts, and apply skills in order to answer the 'driving question' and create project products, beginning with an 'entry event' that generates interest and curiosity.**
- **Voice and choice – Students are allowed to make some choices about the products to be created, how they work, and how they use their time, guided by the teacher and depending on their age and experience of project-based learning.**
- **Critique and revision – The project includes processes for students to give and receive feedback on the quality of their work, leading them to make revisions or conduct further enquiry.**
- **Public audience – Students present their work to other people, beyond their classmates and teacher.**

(BIE, 2014a)

How can this all be translated into a project? Using an example project drawn from BIE's project databank we can see how a project can cover an element of the curriculum and a wide range of key competences/21st century skills, whilst giving students some control over their work and the opportunity to present their work to an audience.

Project:

High school students took on the key roles of Chief Financial Officer, the Director of Research and Development and the Director of Marketing in a company making stuffed animals. They research the marketability of various stuffed animals, setting this data out in a matrix and answering questions from their CEO. They prepare a presentation of their research and their recommendations including TV and radio commercials.

In this example the significant content relates to the use of matrices to represent data and to solve problems. The 21st century skills or key competences include mathematical and digital competences and a wide range of skills such as problem-solving, critical thinking, team work and creativity. The students use a variety of ways to communicate their findings: oral, written and multimedia.

(based on the 'Cuddles' project found via BIE's Project Search – BIE, 2014b)

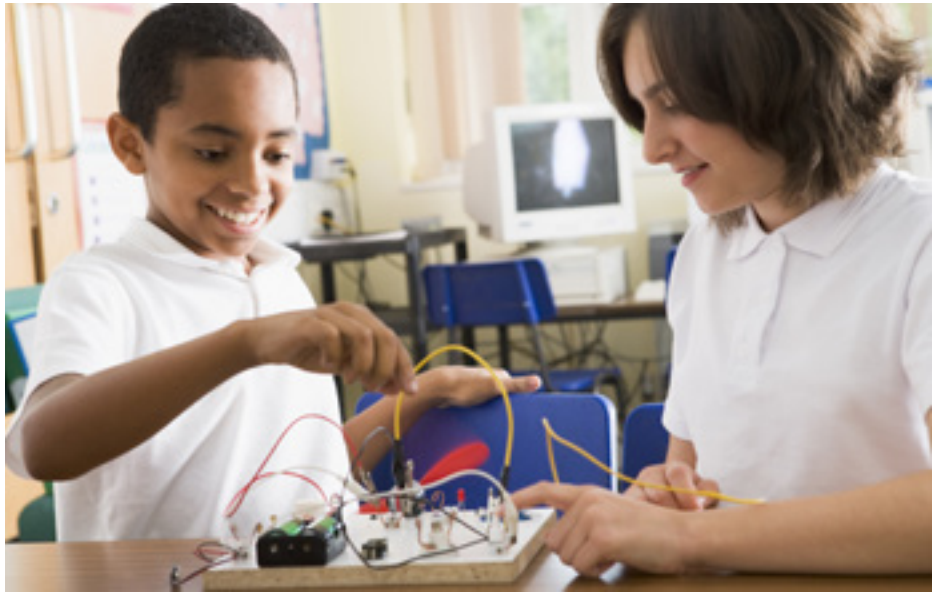
3. DEVELOPING YOUR PROJECT-BASED LEARNING COMPETENCE

Getting started with project-based learning may seem quite daunting but it doesn't have to be. There are lots of online resources you can draw on to learn from more experienced practitioners.

A good place to start is The Teachers' Guide to Project- based Learning (Patton, 2012) by the Innovation Unit (a not-for-profit social enterprise based in the UK which seeks to promote innovation in public services). The first section provides some 'inspiration' with examples of projects for different age groups, for different lengths of time and in different subjects. It then goes on to stress the 'three keys to successful projects', which will impact on your classroom culture and your students' work ethic, that you should bear in mind (even for your first project however simple):

- **Key 1: Exhibition – students know from the outset that the product of the project will be displayed and viewed by others.**
- **Key 2: Multiple drafts – review your students' work at various stages in the project, giving them valuable feedback and you the opportunity to see the improvement in their work.**
- **Key 3: Critique – build formal critique sessions into the multiple drafts approach: be kind, be specific, be helpful.**

The guide then takes you through the project process step-by-step, with detailed advice and top tips from getting an idea, designing and tuning the project, carrying it out and exhibiting the results. It also acknowledges the teething troubles and frustrations you may encounter and provides advice on how to build a culture of project-based learning in your classroom. Perhaps the most important message of all is to let ideas for project-based learning be sparked from passion – either your own, your students' or your colleagues'.



Other sources of inspiration and advice to get you started include:

- **The 'TRANSIt Project' funded by the European Commission which is developing a teacher training approach in line with key competence-based education. Join the TRANSIt community at *http://www.transit-project.eu*. Once registered you will be able to access the training modules and ePortfolio tool developed by the project.**
- **The 'Real Projects' project and numerous blog entries from teachers who have implemented project-based learning (as well as the teacher's**

guide mentioned above) from the UK's Innovation Unit: *http://www.innovationunit.org*

- The project-based learning resources, including a project search, of the US-based organisation, the Buck Institute for Education (BIE): *http://bie.org and http://bie.org/project_search*
- The Edutopia resource bank (from the US-based George Lucas Foundation): *http://www.edutopia.org*
- KeyCoNet's French node has created an online platform where teachers can share and exchange about competence-based education and various ways of engaging in it, also through project-based learning. If you are a teacher in France you can join the community here: *http://ife.ens-lyon.fr/KeyCoNet/web/app.php*
- KeyCoNet's Spanish node also has a dedicated website with various resources for teachers interested in implementing competence-based teaching and learning methods: *http://www.keyconetspain.org/wordpress*

4. CONCLUSIONS AND ACTION POINTS: WHAT DOES THIS MEAN FOR PRACTICE?

Project-based learning has great potential to be an effective method for developing key competences across primary and secondary school phases.

Some next step questions and action points could be:

- Looking at the examples above, what types of project-based learning already take place in your school? How do these relate to key competences in the curriculum?
- Talk to curriculum leaders to see where project-based learning of key competences could be introduced or expanded in your school.
- Find out if there are any opportunities for professional development in project-based teaching and learning – is there any training available or can you learn informally from colleagues who have more experience?
- Visit the KeyCoNet website – http://keyconet.eun.org – to learn more about the key competence approach in schools across Europe.

If you are already involved in project-based learning or are keen to get involved, this set of teaching principles for key competences could help to keep you on track.

Teaching principles for key competences

- Task-based: Learners should develop key competences through active, authentic, collaborative tasks.
- Interdisciplinary: Key competences should be 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: Key competences should 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.

(Cook and Weaving, p.32)

5. REFERENCES

KeyCoNet literature reviews

Arjomand, G., Erstad, O., Gilje, O., Gordon, J., Kallunki, V., Kearney, C., Rey, O., Siewiorek, A., Vivitsou, M. and von Reis Saari, J. (2013). KeyCoNet 2013 Literature Review: Key Competence Development in School Education in Europe [online]. Available: *http://keyconet.eun.org/literature-review* [26 June, 2014].

Pepper, D. (2013). KeyCoNet 2013 Literature Review: Assessment of Key Competences [online]. Available: *http://keyconet.eun.org/literature-review* [26 June, 2014].

Items cited in the KeyCoNet literature reviews

Some of the following sources are used as cited by the original literature review authors (above); they have not all been consulted by the authors of this report.

Boaler (2002). 'Learning from teaching: Exploring the relationship between reform, curriculum and equity', Journal for Research in Mathematics Education, 33, 4, 239–58.

Fisher, L., Evans, M. and Esch, E. (2004). 'Computer-mediated communication: promoting learner autonomy and intercultural understanding at secondary level', Language Learning Journal 30, 1, 50–58.

Gordon, J., Halasz, G., Krawczyk, M., Leney, T., Michel, A., Pepper, D., Putkiewicz, E. and Wiśniewski, J. (2009). Key Competences in Europe: Opening Doors for Lifelong Learners across the School Curriculum and Teacher Education [online]. Available: *http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1517804* [26 June, 2014].

Lombardo, V. and Damiano, R. (2012). 'Storytelling on mobile devices for cultural heritage', New Review of Hypermedia and Multimedia, 18 1-2, 11-35.

Websites of case study schools/projects referenced in KeyCoNet literature review

Applied Learning Academy, USA
http://appliedlearningacademy.fwisd.org/pages/AppliedLearningAcademy

Junior Achievement Young Enterprise, Europe
http://ja-ye.eu/pls/apex31mb/f?p=17000:1000:996066678747892

Les Savanturiers, France
http://les-savanturiers.cri-paris.org

Marina Laroverket School, Danderyd, Sweden
http://www.marinalaroverket.se

River City project, Harvard University, USA
http://rivercity.activeworlds.com

Sherman Oaks Elementary, USA
http://shermanoaks.campbellusd.org

Additional sources consulted

Assessment and Teaching of 21st Century Skills (ATC21S) (2014). What are 21st Century Skills? [online].
Available: *http://atc21s.org/index.php/about/what-are-21st-century-skills* [26 June, 2014].

BIE (2014a). What is Project-based Learning? [online].
Available: *http://bie.org/about/what_pbl* [26 June, 2014].

BIE (2014b). Project Search [online].
Available: *http://bie.org/project_search* [26 June, 2014].

Cook, R. and Weaving, H. (2013). Key Competence Development in School Education in Europe: KeyCoNet's Review of the Literature: a Summary. Brussels: European Schoolnet.

European Commission. Audiovisual and Culture Executive Agency and Eurydice (2012). Developing Key Competences at School in Europe: Challenges and Opportunities for Policy [online]. Available: *http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/145EN.pdf* [30 June, 2014].

European Commission (2006). Recommendation 2006/962/EC of the European Parliament and the Council of 18 December 2006 on Key Competences for Lifelong Learning, OJ L 394, 30.12.2006 [online]. Available: *http://europa.eu/legislation_summaries/education_training_youth/lifelong_learning/c11090_en.htm* [30 June, 2014].

Kaldi, S., Filippatou, D. and Govaris, C. (2011). 'Project-based learning in primary schools: effects on pupils' learning and attitudes', Education 3–13, 31, 1, 35–47.

Partnership for 21st Century Skills (2014). Framework for 21st Century Learning [online]. Available: *http://www.p21.org/about-us/p21-framework* [17 July, 2014].

Patton, A. (2012). The Teachers' Guide to Project-based Learning [online]. Available *http://www.innovationunit.org/sites/default/files/Teacher's%20Guide%20to%20Project-based%20Learning.pdf* [06 August, 2014].

Ravitz, J., Hixson, N., English, M. and Mergendoller, J. (2012). 'Using project-based learning to teach 21st century skills: findings from a statewide initiative.' Paper presented at Annual Meetings of the American Educational Research Association. Vancouver, BC, 16 April.

KEYCONET PARTNERS

www.bmukk.gv.at

http://www.ond.vlaanderen.be/wegwijs/AKOV

http://www.education.gouv.fr/

http://www.juntadeandalucia.es/

http://www.ncca.ie/

http://www.eitsa.ee/en/

http://ife.ens-lyon.fr/ife

http://www.eiesp.org

www.uned.es

http://www.ie.uminho.pt/

http://www.ie.ul.pt

http://www.uv.uio.no/pfi/english/

http://www.cicero.fi

http://www.ja-ye.eu

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

education.gov.mt

KEYCONET ASSOCIATE MEMBERS

KEYCONET ASSOCIATE MEMBERS

KEYCONET ASSOCIATE MEMBERS

KEYCONET ASSOCIATE MEMBERS

KEYCONET ASSOCIATE MEMBERS

KEYCONET
Key Competence Network on School Education

ABOUT EUROPEAN SCHOOLNET

European Schoolnet is the coordinator of the KeyCoNet project.

European Schoolnet is a network of 31 Ministries of Education from across the European member states, leading educational innovation at European level. As a major international think tank, European Schoolnet operates key European services in education on behalf of the European Commission, member Ministries of Education and industry partners.

European Schoolnet's activities are divided among three areas of work:

- Policy, research and innovation: information sharing and evidence building.
- Schools services: enhancing cooperation between schools across Europe.
- Advocacy: how ICT and digital media contribute to transforming teaching and learning processes.

Join us on

http://europeanschoolnet.org
Key Competence Network on School Education – KeyCoNet
#21skillscourse #KeyCoNet
http://www.europeanschoolnetacademy.eu/web/keyconet

The KeyCoNet project has been funded with support from the Lifelong Learning Programme of the European Commission. Responsibility for this publication lies solely with the author, and the Commission is not responsible for any use which may be made of the information contained therein.

http://keyconet.eun.org

KEYCONET
Key Competence Network on School Education

European Schoolnet