

CPDLab

Continuing Professional
Development *Lab*

D2.1 Report on existing training support materials

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EXECUTIVE SUMMARY

This report provides the results of the survey that was conducted at the start of the CPDLab project to identify relevant materials that could be leveraged by CPDLab. The aim was to identify and avoid duplicating any courses or materials that may already exist and to leverage currently available resources that could benefit the project.

The survey started with the project partners, including interviews with leading experts in each field. The results were then circulated to a wider group of MoE associate partners and institutions participating in linked European Schoolnet initiatives to identify further relevant resources.

Overall the survey results confirmed the Consortium's initial appraisal prior to the project proposal submission, that there are only a small number of resources that the CPDLab course development activities could build on. The reasons for this varied by course type.

At one level, there is ostensibly a lot of training materials and resources for Interactive Whiteboards (IWB). However, these tend to be linked to specific vendors and focus more on the technical aspects. Amongst the partners, there have been some significant, national initiatives within both Italy (led by ANSAS) and Portugal (led by DGE). These are detailed in section 1.1. The training materials are naturally in the language of the country; as the CPDLab courses develop, the respective partners will identify relevant elements to include, address the issues of translation and confirm Creative Commons licences. Following European-wide research¹, the European Schoolnet IWB Working Group (consisting of 15 MoE) is currently reviewing proposals for a generic, pedagogical-led IWB course. Discussions have been held so that his work can be leveraged by the CPDLab project.

In eSafety, while there is an abundance of materials and information available at national and trans-national level through the InSafe programme² and its linked national centres, there is limited training. As a result, relevant resources and activities are being identified to leverage within the CPDLab project. Current training tends to be around single issues eg: cyber-bullying. For example, in Finland, IBM sponsors a 'Challenge of Cyber-bullying' lecture for secondary schools. At a national level, DGE in Portugal has backed a 'Safety on the Internet' training course initiative for schools (see section 2.2 for details). In both Finland and Norway, when it came to e-safety the survey respondents stated that this was a subject frequently addressed in a different context. There is, however, not a whole module specifically on e-safety issues as a special topic. E-safety is more or less integrated in all modules to some extent.

In the third CPDLab course area, Future Classroom Scenarios, discussions have been held with the Project Manager of iTEC project³ to link into the Future Learning Stories and activities that are being developed and piloted across Europe in >1,000 classrooms. BMUKK (Austrian Ministry of Education) has highlighted examples of future classroom initiatives within their 'COOL' network initiative. Within Italy, ANSAS highlighted their national project comprising: "Classi 2.0"; National project "Scuole 2.0"; National portal "Aesse"..

The report that follows summarises the survey results within each of the three course areas.

1. EXISTING TRAINING SUPPORT MATERIALS: INTERACTIVE WHITEBOARD

1.1 CPDLab partners and associates – IWB existing materials

The table below summarises the survey information. Each project partner was asked to identify the top 3 courses within their country. Associate partners and institutions were then approached to add further information.

Key highlights:

- The survey highlighted the work of the European Schoolnet's Interactive Whiteboard Working Group (<http://moe.eun.org/web/iwbworkinggroup/iwb>). Currently 15 Ministries of Education are members. The working group is also supported by six IWB vendors. The IWB working group has commissioned a number of different research studies (ref. table below), and highlighted the need for a generic pedagogical IWB course. The work in this area is expanded on in section 1.2 below.
- Portugal: the Ministry of Education, DGE (formerly DGIDC), has spear-headed a national led IWB training programme. The training started with the teacher trainers, who then cascaded the training to teachers throughout the country. The training followed a blended learning format comprising 25 hours face to face training, followed by 25 hours of trainer-supported autonomous work by the teachers themselves. These training materials are in Portuguese covered by a Creative Commons license.
- Italy: similar to Portugal, ANSAS (formerly INDIRE) has spearheaded a national led IWB training programme. The IWB Italian Expansion Project targeted primary, lower and upper secondary teachers. This is a 3 year programme running from 2009 to 2012, with 45,000 teachers trained to date.
- To date the investment in IWBs in schools in Finland and Norway is more varied and as a consequence the training initiatives are more localised. Examples were given of courses in Finland (ref. 1.11 in the table below) and Norway (ref.1.12 to 1.16), which typically were led by University teacher training institutions.
- Teachers contacted through associate partner, MoNE (Ministry of Education, Turkey) reviewed the project partner survey information and highlighted their particular interest in resources from the IWB Working Group, DGIDC and ANSAS, and in the current iTILT project.

1.2 Next steps

The CPDLab project is now involved in the discussions with the IWB working group on their specification for a generic pedagogical-led IWB training course and will leverage this work within the CPDLab project. In addition, CPDLab partners DGE and ANSAS will look to identify useful resources from their national initiatives during the CPDLab course development and will submit these to the review process being led by the Finish project partners, FNBE and UOULU.

CPDLab survey - identifying relevant materials that could be leveraged in the areas of: i) Interactive Whiteboards (IWB); ii) eSafety; iii) Future Classroom Scenarios

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Below summarises the existing course information from the survey and conversations held by CPDLab partners with their contacts. The survey looked to identify the top 3 courses in the areas of: 1) IWBs; 2) e-Safety; 3) Future Scenarios. The results were then circulated to associate partners and institutions to gather further information and the table updated. Supporting information forms part of an information appendix.

Key: ** represents Training course (T) or Reference material (R).

ref	area	ref'd by:	T or R**	Training course or Reference material	type	phase	comment	date	author	publisher	licence type	languages
1.1	IWB	IWB working group	R	Summary guidelines: Making the most of your interactive whiteboard Making the most of your interactive whiteboard, Diana Bannister (September 2010), as part of the EuSCRIBE project.	report	all	Practical guidelines for schools and teachers, under 7 key themes: 1. Leadership and organisation; 2. Purchase, installation and maintenance; 3. Access; 4. Classroom management; 5. Training and CPD; 6. Learning and teaching; 7. Resources	Sep-10	Diana Bannister and Learning Technologies team, University of Wolverhampton for the EUN's IWB Working Group	EUN	Creative commons 3.0	English
1.2	IWB	IWB working group	R	Full report: Guidelines for Effective School/Classroom Use of IWBs	report	all	full report of the above. European Schoolnet's Interactive Whiteboard Working Group (http://moe.eun.org/web/iwbworkinggroup/iwb) Currently 15 Ministries of Education are members. The working group is also supported by a number of IWB vendors.	Jun-10	Diana Bannister and Learning Technologies team, University of Wolverhampton for the EUN's IWB Working Group	EUN	Creative commons 3.0	English
1.3	IWB	IWB working group	T	Generic teacher training course. Requirements currently being discussed with IWB working group.	training proposal - up to 5 days	secondary	Proposal developed by CTIE submitted to the IWB working group to develop a generic teacher training course. Proposed modules: 1. Setting the context with case studies and acquiring basic skills. 2. Creating resources for teaching with IWBs 3. (after period of 6m) Presentation of resources - show and tell. Skills workshop. Discussion January 2012, proposal update by Diana Bannister, University of Wolverhampton for discussion March 2012, IWB working group based around: communications, and collaboration, student multi-media projects, problem solving, resource and lesson planning, feedback and student response assessment, leadership	Aug 11, updated Jan 12, current updating for March 12	Stephanie Burton, HEP (School of Education) CTIE (Switzerland) Diana Bannister MBE, University of Wolverhampton	proposal	n/a	n/a

1.4	IWB	IWB working group	T	Using the Interactive Whiteboard to support literacy	training course - 20 hours	primary	training course appropriate to all makes and models of IWBs. Supplemented by an online training and resources area specific to particular brands of IWB and their accompanying software. 5 training modules: 1. Introduction to IWB in primary classroom; 2. Creating a literacy resource with your IWB; 3. Using NCTE online resources with your IWB; 4. Downloading and adapting literacy and numeracy resource 5. Classroom management and using other technology with your IWB	2011	National Centre for Technology in Education (NCTE), Ireland	NCTE	copyright NCTE	English
1.5 1.6 1.7	IWB	ANSAS (INDIRE)	T	Top 3 courses, from the Italian IWB expansion project 1. Exploiting the IWB potential http://repository.indire.it/repository/working/export/3281 http://forum.indire.it/repository/cms/working/export/4652 2. From Chalkboard to Whiteboard http://repository.indire.it/repository/working/export/3328 IWB in the classroom http://repository.indire.it/repository/working/export/3259 3. The IWB in the classroom's physical space http://repository.indire.it/repository/working/export/3486/content.html eTwinning on the IWB http://repository.indire.it/repository/working/export/3286	Blended learning: 16h face to face / 30 h online (full program)	All	IWB Italian Expansion project addressed to primary, lower and upper secondary teachers . A three years professional development program is delivered by ANSAS from 2009 to 2012. The material was published in 2009 and is being updated in 2011. 45.000 teachers trained through programme todate	2009 to 2012	various	ANSAS (INDIRE)	mixed	Italian
1.8 1.9 1.10	IWB	DGE (DGIDC)	T	Top 3 courses from: 1. IWB in the teaching and learning of... (languages, sciences, mathematics, social studies...et alli) RCA training centre Batalha; 2. Teacher training in pedagogical and professional competencies: IWB; DGIDC, Portuguese MOE 3. IWB in the classroom dynamics; ACEAV, Aveiro	25+25 hours: 25 hrs in classroom; 25 more hrs at home or/and with students for applying the resources and make an evaluation of them	all	Under the PTE initiative (http://www.pte.gov.pt/pte/EN/index.htm) there was a measure for the equipment of schools with these tools (IWB with projectors). At the same time there was a concern to give teachers some training to help them use these new tools; first the training of trainers and after that the training of teachers throughout the country.	d/k	It's all published at http://r21.ccems.pt under a CC licence	DGIDC	Creative commons 3.0	Portuguese

1.11	IWB	FNBE	T	Use of IWB: improve the use of IWB and pedagogical skills with it	1-2 hours, then learning by doing	student teacher and all teachers	Educator Martti Mery shares all material in schools' own Intranet	d/k	Viikki Teachers Training School, University of Helsinki	Viikki Teachers Training School	school shared resource	Finish
1.12	IWB	NCIE	T	When it comes to IWB these courses range from three hours to two weeks modules. The shorter modules are primarily focused on getting the teacher acquainted with the technology whereas the two weeks course is also based on self-study and teamwork assignments. These modules are a part of courses called IT-1 and IT-2. Due to the limited time frame the modules are mostly tool based and do not provide different ways of designing pedagogical content or various ways of teaching and learning with IWT.	one to two semesters long		reference NCIE report providing full detail of contacts and further reference materials	d/k	The University Colleges in Oslo and Akershus - HiOA offers one and two semester long courses/modules in ICT in education for teachers. These are modules that are both organized for pre-service teachers as well as for in-service teachers.	HiOA	university	Norwegian, plus?
1.13	IWB	NCIE	T	"Interactive whiteboards in teaching"	6 one day, over per of a year	teachers and teacher students	The only Interactive whiteboard course that we know of is obtainable at the Vestfold University College. However this course will not be available for very much longer as the intention is to integrate the use of IWT into other courses.	d/k	Vestfold University College -	university	university	Norwegian, plus?
1.14	IWB	NCIE	T	Oslo municipality provides course in interactive whiteboard use for the teachers in the schools of Oslo.	6 hours - mix f/f, self-study, doing	all	The course is based on Danish modules and the course content is in Danish and Norwegian (see further: http://hval.dk/web/bruger/eraun/iwb/) See also brochure in Danish: interaktive_whiteboards_maj2011_web.pdf. The course content is not openly available but the structure/themes of the courses can be seen on the website.	d/k	see further: http://hval.dk/web/bruger/eraun/iwb/	Danish	not openly available	Danish and Norwegian
1.15	IWB	NCIE	T	IWB courses at three levels: Level 1, 2 and 3, where level 1 is the basic tool knowledge, while the courses at higher levels are more pedagogically based	The courses are three hours, six hours (full day), or a two-day course.	all	Interactive Norway is the biggest supplier for IWT in Norwegian schools. Many participants prefer the short courses, whereas Interactive Norway prefers the longer courses because then they can use more time on the pedagogical aspects	d/k	Interactive Norway	Interactive Norway	not openly available	Norwegian, plus?

1.16	IWB	NCIE	T	IWB and tablet computers in schools	short course	all	Many of the participating teachers confirmed that they need much better training in the use of IWB and other ICTs before they feel comfortable enough to use it actively in their teaching practise	d/k	Norway	Aschehoug publishing house.	not openly available	Norwegian, plus?
1.17	IWB	iTILT	T	iTILT (interactive technologies in language teaching)	project in progress	secondary	current project exploring ways to integrate IWB into communicative language teaching. Project will deliver in 2013, research-based resources in several languages, including tips for language teachers, training materials and examples activities for learners of different levels and ages.	in progress	www.itilt.eu		Creative commons 3.0	English, plus
1.18	IWB	NAEP	T	according to MoE database there are about 90 institutions that offer courses on IWB in the Czech Republic. There is no special IWB training on national level in the Czech Republic available. IWB vendors provide training on installation of IWB. Individual schools, universities, educational organizations or IWB vendors provide training on IWB. Most of the courses are both for primary and secondary school teachers and focused on the basic pedagogical use of IWB in classroom.	various	all	Examples: Technical University of Ostrava or University of Ostrava - http://kurzy.vsb.cz/obsah_tabule.htm Primary schools: http://www.lupacovka.cz/ Secondary schools: http://gynome.nmnm.cz/board/ Organizations: http://www.venkovskyprostor.cz/cz/1/interaktivni-tabule/vzdelavaci-program.html IWB vendors: http://edu.vsb.cz/interaktivni_tabule_Smart_Board/SupportingFiles/ViewerWM7.html	various	various	various	various	Cz

2. EXISTING TRAINING SUPPORT MATERIALS: eSAFETY

2.1 CPDLab partners and associates – eSafety existing materials

The table below summarises the survey information. Each partner was asked to identify their top 3 courses within their country. Associate partners and institutions were then approached to add further information.

Key highlights:

- Discussions with experts linked to InSafe (a European network of Awareness Centres promoting safe, responsible use of the internet and mobile devices to young people) highlighted the diverse range of information that is available today through a range of different website at European and National level. Very few training courses were identified and where they were, these tended to be related to specific topics such as Internet Safety (ref. 2.2 in table below)
- Portugal: the Ministry of Education, DGE (DGIDC) has led on the development of a ‘Safety on the Internet’ course. Imparting skills specific to safety on the internet to schools. The course consists of 15 hours face to face training, with a further 15 hours self-supported study (ref. 2.5 in the table below). It is not available under a Creative Commons licence.
- Finland: the Ministry of Education, FNBE, highlighted a training course developed by IBM on ‘The challenge of cyber-bullying’. Targeted at upper secondary schools, this course takes the form of a 1-2 hour lecture (ref. 2.6 in the table below)
- Norway: the Ministry of Education in Norway, NCIE, highlighted the training course offered by the University Colleges in Oslo and Akershus (HiOA), who offer a 6 hour discussion for teacher trainers touching on social media, e-security, privacy, copyright, netiquette, how to evaluate different on-line resource. NCIE also provided useful links to a wide range of on-line resources.
- The wider survey identified useful resources available in the UK, from the SWGfL’s e-Safety policy (ref. 2.9) to the Open University’s teacher CPD programme Vital, which offers a blended learning programme for lower and upper secondary on e-Safety (ref, 2.12 and 2.13)
- Teachers contacted through associate partner, MoNE (Ministry of Education, Turkey) reviewed the project partner survey information and highlighted their particular interest in InSafe’s training courses (ref. 2.2), the NSPCC course (ref 2.6), DGIDC’s courses (2.10) and the IBM course delivered in Finland (ref. 2.11)

2.2 Next steps

The CPDLab project is working with the InSafe team to identify resources and activities that can be leveraged within the CPDLab project. In addition, CPDLab partners NCIE and DGE will look to identify resources from their national initiatives, during the CPDLab course development and the review process being led by the Finish project partners, FNBE and UOULU.

CPDLab survey - identifying relevant materials that could be leveraged in the areas of: i) Interactive Whiteboards (IWB); ii) eSafety; iii) Future Classroom Scenarios

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Below summarises the existing course information from the survey and conversations held by the CPDLab partners. The survey looked to identify the top 3 courses in the areas of: 1) IWBs; 2) e-Safety; 3) Future Scenarios.

The results were then circulated to associate partners and institutions to gather further information and the table updated. Supporting information forms part of an information appendix.

Key: ** represents Training course (T) or Reference material (R).

ref	area	ref'd by:	T or R**	Training course or Reference material	type	phase	comment	date	author	publisher	licence type	languages
2.1	e-safety	InSafe	R	Internet Literacy Handbook	report	all	published fact sheets, updated periodically. Fact sheets range from: 1. Getting connected; 2. Setting up websites; 3. Searching for information; 4. Portals;21. Blogs; 22. Social networks; 223. Web 2.0; 24. E-democracy	2008, updates	Janice Richardson, Insafe/EUN	Council of Europe	Creative commons	various
2.2	e-safety	InSafe	T	Internet Myths, Internet Safety, Cyber-bullying, Report on Learning Lab on esafety, Themes for teacher CPD	training material	all	various presentations, report and proposal for a 5 day course for teachers on e-safety from Karl Hopwood (Insafe expert)	various	Karl Hopwood, InSafe expert	KH	Creative commons	English
2.3	e-safety	InSafe	R	Developing the eSafety Label – the journey so far, European Schoolnet (February 2012), www.esafetylabel.eu	reference	all	new initiative to be launched in February 2012 on on-line safety support and accreditation for European schools	2012	EUN	EUN	Creative commons	various
2.4	e-safety	InSafe	R	various activities and resources for schools	various	all	ref http://insafe.eun.org eg: Play Decide e-Safety issue discussion games for teachers/students ref. www.paneuyouth.eu	various	EUN	EUN	Creative commons	various
2.5	e-safety	DGE (DGIDC)	T	Safety on the Internet, DGIDC Module 1 – Project Safe Internet – Computer safety Module 2 – Knowing the Web: risks and challenges Module 3 – Navigating the Web safely: rights and duties Module 4: Guidelines for parents and teachers	25-30 hours: 15 hours face-to-face and 15 hours autonomous work: b-learning, Moodle platform	all	ref DGIDC. Imparting skills specific to safety on the Internet	April 2008 – June 2008	ref DGIDC	ref DGIDC	It is not available under a CC licence. It is open to trainers and trainees of the course	Portuguese
2.6	e-safety	FNBE	T	The challenge of cyber bullying 1. What children do in Internet nowadays? 2. What is cyber bullying? 3. Support to media education	1-2 hours: face to face and conversational lecture	upper secondary	ref FNBE	d/k	IBM	IBM	ref IBM	Finnish

2.7	e-safety	NCIE	T	ref NCIE The professors at HiOA offer a six hours short introduction where they discuss social media, e-security, privacy issues, copyright issues, netiquette and how to evaluate different online resources.	6 hour short introduction	all?	When it comes to e-safety our respondents stated that this was a subject frequently addressed in different context. There is however not a whole module specifically on e-safety issues as a special topic. E-safety is more or less integrated in all modules to some extent.	d/k	The University Colleges in Oslo and Akershus - HiOA	HiOA	ref HiOA	Norwegian
2.8	e-safety	NCIE	R	reference NCIE report providing further details on training and reference materials	resources	all	Examples of useful resources: <ul style="list-style-type: none"> • On online bullying: www.dubestemmer.no and http://www.bruekue.com/ • Privacy issues: www.personvernskolen.no • Charlies nettips http://www.medietilsynet.no/no/trygg-bruk/Barn/Charlis-nettips/ • Netiquette: http://www.nettvett.no/ • e-safety: http://www.medietilsynet.no/no/Trygg-bruk/Larere/ (in-s@fe) • Site with collection of different links to various websites regarding for example e-safety and privacy issues. http://moava.org/index.php?pageID=14&categoryID=477 • An example of a anti-mobbing programme frequently used in Norwegian schools http://saf.uis.no/publikasjoner/zero-materiell/ • School based programs to reduce bullying and victimization http://campbellcollaboration.org/lib/download/718/ • Effectiveness of programs to reduce school bullying http://www.bra.se/extra/measurepoint/?module_instance=4&name=Effectiveness_of_programmes_to_reduce_school_bullying_webb.pdf 	d/k	various	various	various	Norwegian
2.9	e-safety	SWGfL	R	SWGfL eSafety Policy template	policy document	all	Copyright of the SWGfL School E-Safety Policy Templates is held by SWGfL. Schools and other educational institutions are permitted free use of the templates. Any person or organisation wishing to use the document for other purposes should seek consent from SWGfL and <u>acknowledge its use</u>	2005	Southwest Grid for Learning (SWGfL), UK	SWGfL	Copyright of the SWGfL School E-Safety Policy	English
2.10	e-safety	NSPCC	T	Safeguarding Children who use the internet	training course - one day	general	for anyone working with children and young people. One day course covering: <ul style="list-style-type: none"> - current safeguarding issues - indicators of abuse - developing resilience of children and young people - e-safety/acceptable use policy - practical safeguarding strategies - how to respond and report safeguarding concerns 	d/k	NSPCC	NSPCC	NSPCC	English

2.11	e-safety	BCS	T	Cyber-bullying workshop	training course - one day	general	One day course covering: - schools' perspective of issues in cyber bullying - government guidelines and local authority programme - experience with online environment for anti-bullying - education and cyber-bullying	d/k	British Computer Society and the University of Salford, Manchester	BCS	BCS	English
2.12	e-safety	Vital - OU	T	E-safety Key Stage 3	blended learning course - 9 to 12 hours over 9 weeks	lower secondary (KS3)	Course outcomes, at end of course teachers should be able to understand: - most common risks for KS3 students when engaged with ICT and technology - impact of e-safety on the use of technology to support learning - select appropriate resources for teaching of aspects of e-safety - identify how e-safety fits into the ICT programme of study - understand the importance of e-safety at the whole-school level - tackle e-safety issues within school setting	Sep-11	Vital - the Open University's Continuing Professional Development programme for all teachers	OU	Creative commons 3.0 - permission to be sought	English
2.13	e-safety	Vital - OU	T	E-safety Key Stage 4	blended learning course - 9 to 12 hours over 9 weeks	upper secondary (KS4)	similar to above, linked to older students at KS4	Sep-11	Vital - the Open University's Continuing Professional Development programme for all teachers	OU	Creative commons 3.0 - permission to be sought	English
2.14	e-safety	Plymouth Uni	T	A couple of years ago we ran a specialist module within a programme called the Integrated Masters Programme (IMP).	teacher CPD	teacher training	Unfortunately we do not run any specific e-safety courses - our courses are more generic than that and e-safety is integrated into a number of our degree programmes. The thrust of our module was a holistic look at information security of which e-safety was one element of it. However, the take up was not good so that was dropped. There is a focus on digital literacy as a broader aspect in the faculty of education - they have a degree programme called Primary Digital Literacy.	n/a	n/a	n/a	n/a	English
2.15	e-safety	FNBE	R	Some good materials on eSafety specially in German language http://ceop.police.uk/ http://www.childnet-int.org/ --> Specially Know IT all – materials good quality http://saferinternet.at/ --> Very good material in German language http://www.klicksafe.de/ --> Alao good material in German language				n/a	various, ref'd by EK, FNBE	d/k	d/k	d/k

2.16	e-safety	KH	T	UCLAN in the UK run an esafety course http://www.uclan.ac.uk/information/courses/print/cert_child_safety_internet.php	teacher CPD	undergraduate	Course Title: Child Safety on the Internet. 14 weeks online distance learning. Undergraduate Level. This Certificate provides an introduction to current and emerging internet and mobile technologies and services, and their use by children and young people in communication, information sharing and social networking. It outlines the risks associated with ICT use, and appropriate educational, technical and regulatory risk reduction strategies. It also considers media literacy and human rights. It aims to develop knowledge about effective ways in which to encourage safe and responsible use of ICTs by children and young people, and to develop the skills to effectively communicate with them about these issues. The emphasis of the Certificate is activity-based and reflexive, and there is a strong focus on learning to use the technologies and services covered. Example sessions include: Current and emerging technologies and services, Social networking, Risks: Content, Risks: Contact and Educational resources.	Jul-05	UCLAN	UCLAN	d/k	English
2.17	e-safety	KH	T/R				Countries like Austria where training is being delivered in schools on a regular basis and with quite good take up - they also have extensive materials for teachers etc. Similarly in France they have an online CPD platform which is just focussing on esafety issues.					

3. EXISTING TRAINING SUPPORT MATERIALS: FUTURE CLASSROOM SCENARIOS

3.1 CPDLab partners and associates – Future Classroom Scenarios

The table below summarises the survey information. Each partner was asked to identify their top 3 courses within their country. Associate partners and institutions were then approached to add further information.

Key highlights:

- Discussions with the iTEC project team (<http://itec.eun.org>) took place during the survey to identify the Learning Stories and activities that are being developed as part of this four-year pan-European project (ref. 3.1 in the table below). The next section 3.2, expands on how these resources will be used within the CPDLab project.
- The iTEC project includes 27 Ministries of Education, associate partners and over 1,000 teachers taking part. Three of the CPDLab project partners (ANSAS, DGE, NCIE) are also partners in iTEC. FNBE is an iTEC Associate Partner.
- Italy: the Ministry of Education, ANSAS, is leading a national project in this area “Classi 2.0”, “Scuole 2.0” (ref 3.2 in the table below). This initiative is looking to disseminate European best practice, cascading through selected schools.
- Norway: the Ministry of Education in Norway (NCIE) flagged the importance of UNESCO’s future competences framework for teachers (which is being incorporated in the iTEC project scenarios) and also highlighted various web-based resources that might prove useful links.
- Austria: the Ministry of Education in Austria (BMUKK) flagged their work in the area, providing the links to their classroom of the future initiative and the development of their “COOL” network of schools.

3.2 Next steps

The CPDLab project will continue to liaise closely with the iTEC project, with work disseminating through its project partners. The iTEC Learning Stories and activities will feed into the CPDLab course development and the review process being led by the Finish project partners, FNBE and UOULU.

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Below summarises the existing course information from the survey and conversations held by the CPDLab partners. The survey looked to identify the top 3 courses in the areas of: 1) IWBs; 2) e-Safety; 3) Future Scenarios. The results were then circulated to associate partners and institutions to gather further information and the table updated. Supporting information forms part of an information appendix.

Key: ** represents Training course (T) or Reference material (R).

ref	area	ref'd by:	T or R**	Training course or Reference material	type	phase	comment	date	author	publisher	licence type	languages
3.1	Future Scenarios	EUN	T/R	iTEC project (Innovative Technologies for an Engaging Classroom), http://itec.eun.org iTEC is a four-year, pan-European project focused on the design of the future classroom. With funding of €9.45M from the European Commission's 7th Framework Programme, the involvement of 15 Ministries of Education and school pilots in up to 1,000 classrooms in 12 countries	current project	all	The third CPDLab course "teaching and learning activities for the future classroom" will be based on the learning scenarios developed within the iTEC project. This will create a direct link between the two projects and thus provide dissemination opportunities among the 27 iTEC partners, numerous Associate Partners, over 1.000 teachers taking part in the iTEC project validation, and other stakeholders. Project resulting in various learning stories and activities being piloted in the different cycles of the development phase.	current	development phase	EUN	CC	various
3.2	Future Scenarios	ANSAS (INDIRE)	R	1. Istituto secondario e Scuola dell'obbligo, Turku (FI) – high school http://www.indire.it/aesse/content/index.php?action=read_school&id_m=9074&id_cnt=9104 2. Secondaria De Titaan, Hoorn; Centro sc. De Spil, Arnhem (NL) – high school http://www.indire.it/aesse/content/index.php?action=read_school&id_m=12222&id_cnt=12232 3. Scuola primaria e dell'infanzia Fabbriche di Vallico (IT) – primary school http://www.indire.it/aesse/content/index.php?action=read_school&id_m=7329&id_cnt=7390	Self-study They are not real courses but dissemination material related to European best practices:	all	National project "Classi 2.0"; National project "Scuole 2.0"; National portal "Aesse" The main objective is to provide examples of schools where setting is intended to be pedagogically relevant thanks to ICT but also to architecture. How the setting can create a community; how technology can help learning, motivation and participation; how students and families can participate in the innovation of educational settings	The material was published in 2010-2011	ref ANSAS	ANSAS (INDIRE)	ref ANSAS	Italian

3.3	Future Scenarios	NCIE	R	reference NCIE report providing further details on training and reference materials	resources	all	UNESCO has been facilitating effective ICT pedagogy integration project to create a student-centred use of ICT. Some of the models they are using might be of interest for the course development (as of structure and method). The project envisions three possible collaborations. These are: → Scenario A: Teachers from different subjects collaborating with a group of students within the same school to implement a “project” (inter-disciplinary) → Scenario B: Two or more schools from the same country collaborating with each other to implement one or more projects (inter-school) → Scenario C: Schools from different countries collaborating on a project of common-interest (inter-cultural) See further: http://www.unesco.org/education/ict/ict-in-education-projects/training-of-teachers/facilitating-ict-pedagogy/	d/k	UNESCO	UNESCO	CC	English
3.4	Future Scenarios	NCIE	T	Høgskolen i Volda Digital competence and learning http://hivolda.studiehandbok.no/content/view/full/21921 course credits: 60 / 2 semester / 1 year kjell.antvort@hivolda.no Advanced course in pedagogical use of ICT https://memex.hio.no/wiki/fordypning/fordypning_i_pedagogisk_bruk ICT in a pedagogical context Course credits 15+15 Online studies in two parts: a) introduction b) pedagogical use of ICT Wenche Langeland Pedagogisk consultant wenche.langeland@nla.no	blended learning	all	Examples of other useful resources: • A beginners introduction course on different ICT tools available for teachers (a module within the ICT in education programme at HiOA) http://www.lui.hio.no/IT/grunnutdanning/gr/1-7/begynneropplaering/ • University of Leeds, staff and departmental development unit – using wikis in learning and teaching http://www.sddu.leeds.ac.uk/online_resources/wikis/ • An article by: Lund, Andreas; Rasmussen, Ingvill & Smørdal, Ole (2009). Joint designs for working in wikis: a case of practicing across settings and modes of work In Harry Daniels (ed.), Activity theory in practice: promoting learning across boundaries and agencies. Routledge. ISBN 978-0-415-47725-3. chapter 11. p. 206 – 229 might be useful here.	d/k	various	various	d/k	various
3.5	Future Scenarios	BMUKK	R	In Austria we have a very positive example, ABZ St. Josef, Salzburg, http://www.abz-stjosef.at/ for establishing the future classroom. The next future classroom will be established at EDUGROUP in Linz www.edugroup.at , Upper Austria in 2012.	reference	all	Web implementation and dissemination of the future classroom is one of the major interests here in Austria.	n/a	n/a	n/a	n/a	n/a

APPENDICES

Appendix 1: IWB working group proposal - generic IWB training course proposal , CTIE, January 2012

Appendix 2: IWB working group discussion - generic training course outline, IWB working group members, iTEC, CPDLab, Diana Bannister, January 2012

Appendix 3: eSafety course proposal outline, Karl Hopwood, InSafe, December 2011

Appendix 4: Structure eSafety outline, Barry Taylor, InSafe, December 2011

Appendix 5: iTEC proposal for Future Learning Scenarios training course, December 2011

Appendix 6: iTEC Learning Stories, Cycle 2 example, February 2012

Appendix 1: IWB working group proposal - generic IWB training course proposal , CTIE, January 2012

Module Timing	GOALS and CONTENT	Materials to be produced for this module	Material to be developed by vendors for specific software packages or board features.
MODULE 1	<p>Goals:</p> <p>By observing and discussing video examples of real classroom usage of IWB, participants:</p> <ul style="list-style-type: none"> • reflect on the possible innovative impact of IWB on teaching and learning • Find motivation to learn the necessary skills to integrate the tools • Define how they plan to use the tools in their teaching and which skills they need to acquire to reach their goals (personal development plan) <p>By transferring basic blackboard gestures to the IWB, participants:</p> <ul style="list-style-type: none"> • learn how to do the things they already do in the classroom on the IWB <p>are ready to use the tools and feel in control during the first few weeks of implementation</p>		
<p>Module 1 - A</p> <p>[Format: groups of teachers from the same school with heterogeneous skills]</p>	<p>Setting the context with case studies</p> <p>In groups of 4, teachers watch real examples (5-10 min video clips) of classroom usage of IWB. The clips, which are filmed in classrooms throughout Europe, should demonstrate effective and/or innovative usage of IWB in the classroom.</p> <p>In small groups, teachers analyse the videos and share their findings (jigsaw puzzle methodology). Possible questions:</p>	<p>Production of 5-10 minutes video clips of classroom examples with attached scenarios</p> <p>The videos show real teachers interacting with IWB and as such, can serve as learning scenarios to promote innovative ways of using</p>	

<p>Time: 150 minutes</p>	<ul style="list-style-type: none"> • Which added value does the interactive solution bring to teaching and learning? • Which differences could you observe between the way you teach and the way the teacher in the video clip is teaching with the board (teacher's gestures, students' activities and reactions etc.). • Do the interactive tools enhance teaching ? In which ways ? • Is student learning enhanced by the usage of interactive tools ? In which ways ? • With your group partners, clearly identify advantages and potential constraints of migrating towards an interactive solution in the classroom • Relate the classroom situations you observed in the clips to current models of teaching (ITEC p.10). • In the examples shown, do the tools enable the teachers to better address different learning styles and interests ? • Is there any meditational role of the IWB on the teacher-pupil interactions? • Is the IWB the teacher's tool or a shared workspace for students and teachers? <p>Transfer (teachers journal their thoughts at the end of each module) :</p> <ul style="list-style-type: none"> ➤ 3 elements I found thought-provoking for my own teaching ➤ What I have seen and would like to learn, the specific gestures and resources I would like to produce. 	<p>the tools (ITEC p.9). See criteria list in Appendix.</p> <p>To identify suitable classroom situations, a checklist is provided (see Appendix 2).</p> <p>See Primitice website as an example of good practice, and Cambridge University practice examples of IWB to orchestrate classroom dialogue</p> <p>http://www.educnet.education.fr/primaire/primitice</p> <p>(the site is being upgraded during the summer).</p> <p>Cambridge University Press:</p> <p>http://iwbcollaboration.educ.cam.ac.uk/analysingepisodes/</p> <p>http://thinkingtogether.educ.cam.ac.uk/</p>	
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<p>Module 1 - B</p> <p>[Format: groups of teachers from the same school with similar skills]</p> <p>Time: 240 minutes</p>	<p>Acquiring basic skills</p> <p>In the weeks prior to the course, teachers are invited to jot down the kind of activities and gestures that they perform with the blackboard, overhead projector, etc. This can be done by:</p> <ul style="list-style-type: none"> • taking pictures of their blackboard at the end of the lessons • collecting the digital material used during the lessons (such as presentations). <p>Participants should select 2-3 lesson preparations they wish to transfer to the interactive solution.</p> <p>A.</p> <p>Teachers establish a list of basic board skills they need to acquire to feel comfortable</p> <p>Teachers share their wish list of IWB skills they would like to master by the end of the course.</p> <p>B.</p> <p>Overview presentation of what an interactive solution is and how it works.</p> <p>Presentation of the tools available to perform the different tasks + presentation of all reference material available (online help, screencasts, etc.)</p> <p>C. Workshop</p> <p>Participants work alone or in pairs to transfer their teaching material and thus practice basic board skills: they are given tutorials and videos resource to support them. Teacher trainer serves as facilitator.</p> <p>By the end of the workshop, all attendees should master the following basic skills:</p>	<p>Canvas for production of screencasts.</p> <p>Exercises enable participants to check if they master the skills.</p> <p>The framework is provided to the vendors so they can include relevant screen captures and links.</p> <p>There should be at least two levels of difficulty provided for each exercise so that teachers with better ICT skills can work on more complex activities.</p>	<p>All handouts, video tutorials (screencasts) and short exercises should be made available for the different software packages so that teachers can work independently.</p> <p>Such examples are being developed for the open source IWB solution Unboard Sankore.</p>
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	<ul style="list-style-type: none"> • Opening a new flipchart and saving it in an appropriate folder • Typing text in the new flipchart, introducing images • Writing in the flipchart, changing the size and colour of the pen, erasing content • Basic page layout • Transferring content from PowerPoint or Word (methods vary depending on software; some allow import, other copy paste). • Opening a web page and navigating through it with the interactive tools, highlighting content, copying content into the flipchart. 		
<p>MODULE 2</p> <p>This module takes place approximately 2 months after module 1</p>	<p>Creating resources for teaching with IWBs</p> <p>By the time they start module 2, teachers have been using the interactive solutions for at least 2 months.</p> <p>Goals :</p> <p>Module 2 gives participants the opportunity to reflect on how they have been using their interactive solution, and to assess what they have learnt so far. Participants get the opportunity to brush up their skills and start producing innovative resources for their teaching.</p> <p>Teachers are shown where they can find resources for their IWB (databases, online repositories, etc.) and how they can adapt resources with the IWB software's authoring tools.</p> <p>They are made aware of copyright issues and explore how to develop and share open source resources.</p>		

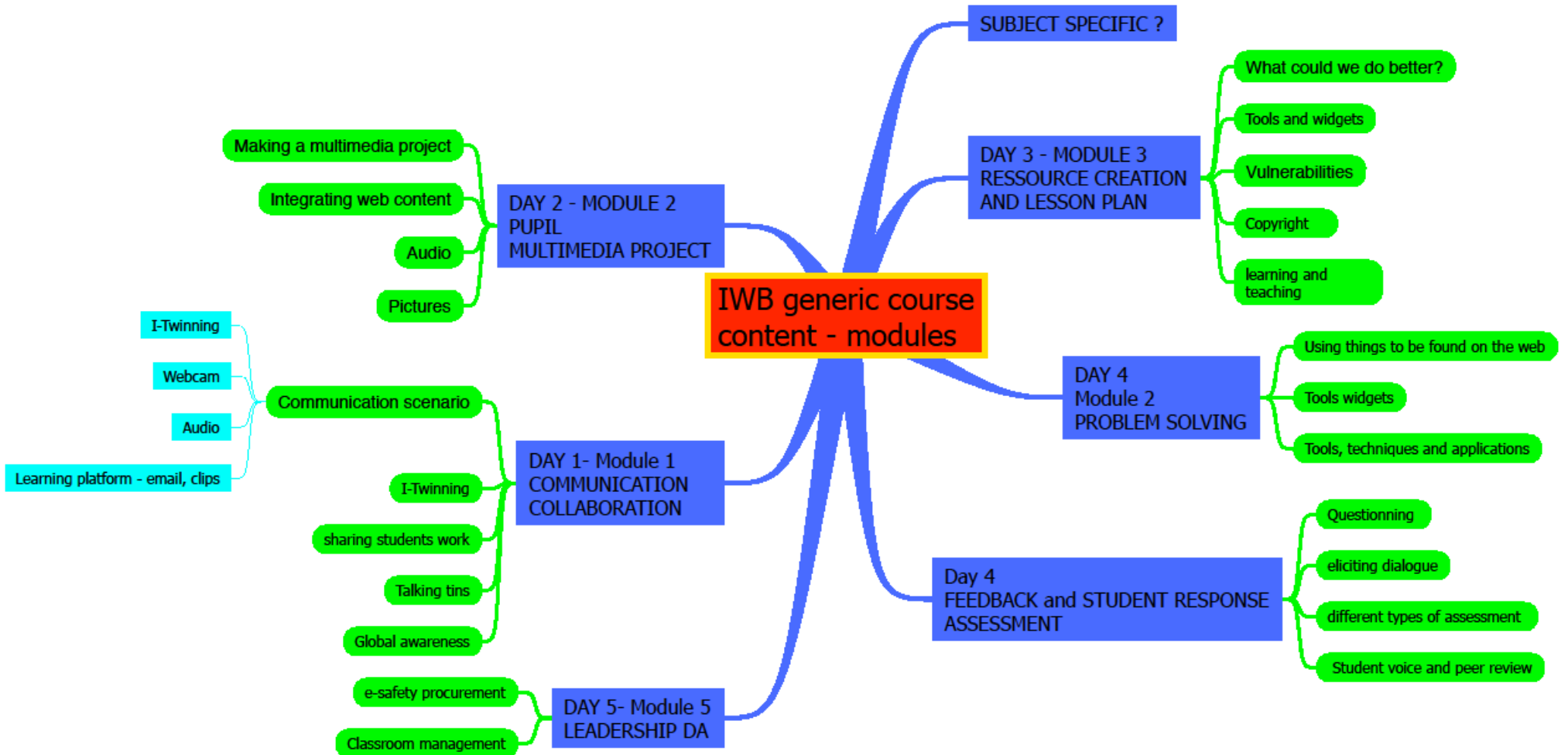
<p>Module 2 - A</p> <p>[Format: Group of teachers with mixed ICT skills]</p> <p>Time: 240 minutes</p>	<p>Preparation work for module 2:</p> <p>Based on their experience, participants briefly outline 2 learning scenarios they wish to develop (alone or in pairs). These should be lessons to be taught in the coming weeks.</p> <p>The outlines should be fairly specific (canvas) to help teacher select appropriate learning objects in the repositories.</p> <p>Phase 1</p> <p>In groups, overview of the skills the teachers have developed and how the added interactivity has impacted their teaching and their students' learning (see Appendix 1 for list of technical interactive features that may /may not enable more interactivity with the pupils).</p> <p>Workshops to make sure all the relevant technical features are mastered by all participants.</p> <p>Phase 2</p> <p>The teacher trainer gives an overview of existing resources in repositories and how they can be adapted to suit the needs. Particular attention is paid to the underlying pedagogical principles on which the flipcharts are built (some of the criteria used in the case studies are used to evaluate the resources).</p> <ul style="list-style-type: none"> • In small groups, teachers download relevant flipcharts and resources and analyse how they are put together. • They present the chosen resources to their colleagues. • Teacher trainer gives input on copyright issues related to digital resources. They show participants where they can find open source images, sounds and video (creative commons, etc.). 		<p>Each vendor gives an overview of the material available in the different subject areas and languages. Trainers analyse what can be transferred to other software packages (cff format).</p> <p>The most valuable resources should be transferred when possible in the common file format for all to use.</p>
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<p>Module 2 - B</p> <p>[Format: groups of teachers teaching similar subjects]</p> <p>Time: 150 minutes</p>	<p>Phase 1</p> <p>ITEC learning activities with IWB</p> <p>Teacher trainers presents 2-3 ITEC learning scenarios that make a relevant use of IWB (see those not covered by introductory case studies):</p> <ul style="list-style-type: none"> • How students can present their findings of outdoor projects on a IWB - visualizer • How students can be encouraged to produce multimedia projects that are stand alones for their peers. • How IWB can help a class get into contact with a network of experts • I-Twinning with an IWB • Using response systems for feedback <p>Teacher trainer presents</p> <p>Phase 2</p> <p>Participants work on their resources et learning scenarios. The teacher trainer serves as a facilitator.</p> <p>At the end of the module, all created material is shared.</p>		
<p>MODULE 3</p> <p>This module takes place approximately 6 months after module 1 at the</p>	<p>Goals:</p> <p>Participants reflect on their 6 months to 1 year experience with the interactive solutions.</p> <p>Impact on teaching, student learning, etc.?</p> <p>Which difficulties do they encounter?</p> <p>Participants share their resources (cfl format) and learn how to publish them in</p>		

<p>end of school year 1 or at the beginning of school year 2</p>	<p>national and international repositories. Participants are encouraged to work as facilitators for one another (learning community).</p> <p>Transfer</p> <p>Case studies about the role and activities of students in interactive classrooms.</p> <p>The following questions should be addressed:</p> <ul style="list-style-type: none"> • How much time should be spent working on the IWB? • What should students be doing at the board? 		
<p>Module 3 - A</p> <p>[Format: groups of teachers from the same school with heterogeneous skills]</p> <p>Time: 150 minutes</p>	<p>Presentation of resources – show and tell</p> <p>Transfer phase (individual phase).</p> <p>If I go back to the checklist we used for the case studies in module 1, how are my teaching and my students' learning developing with interactive whiteboards?</p> <p>Teachers present the resources they have produced, get feedback from the trainer as to how the resources could be improved and resolve pending copyright issues.</p> <p>The teacher trainer gives input about ergonomic issues (font colours, quantity of text presented on flipcharts, etc.)</p> <p>How to use font, colours and images in the most effective way in the classroom ?</p> <p>Workshop to improve flipcharts presented.</p>		

<p>Module 3 - B</p> <p>[Format: groups of teachers with similar ICT skills]</p> <p>Time: 150 minutes</p>	<p>Skills workshops</p> <p>2 workshops are offered:</p> <ul style="list-style-type: none"> • Review of all basic skills • Interactive authoring tools: Animating flipcharts for student response: how to create learning objects that students can work on alone (including visual or aural feedback in learning objects). <p>At the end of the module, participants are shown how to publish all created materials in repositories.</p>		<p>Each vendor provides handouts and tutorials for the two workshops.</p>
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Appendix 2: IWB working group discussion - generic training course outline, IWB working group members, iTEC, CPDLab, Diana Bannister, January 2012



Appendix 3: eSafety course proposal outline, Karl Hopwood, InSafe, December 2011

5 day e-safety course for teachers

For a number of years now, InSafe has been involved in providing CPD for teachers and professionals across the EU and beyond. Following the recent online learning lab that InSafe has provided for the eTwinning network and feedback from other CPD sessions for teachers, the themes detailed below would seem to address the most important issues around esafety for teachers.

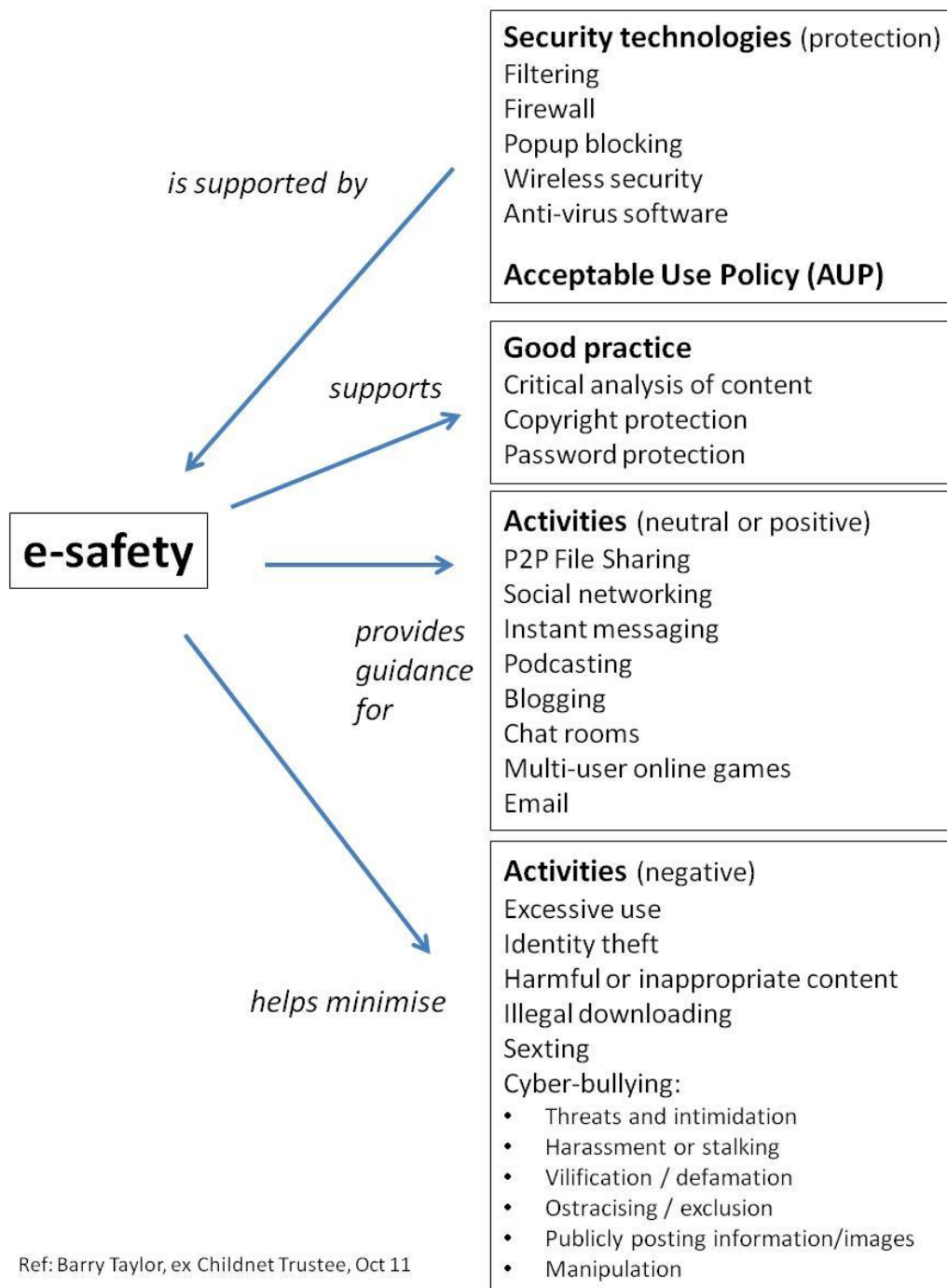
- Definition of e-safety – who is responsible – why we have to address this in schools.
- Risks and benefits – what are the challenges and what are children and young people actually doing online.
- What the research tells us.
- Cognitive development – what we can expect from children and young people at different ages and stages...
- An educational approach to esafety – including resources, schemes of work etc.
- How staff can protect their personal and professional online identity.
- Using new media to support learning.
- Why digital literacy skills and competencies are so important.
- How to create and apply a whole school policy for esafety (including acceptable use policies).
- De-bunking the myths around online safety...
- What lies ahead – the mobile future and what it means for us.
- Online sexual behaviour and the consequences.

Methods

Ideally the best approach to this would be a mixture of whole group input and discussion along with smaller group sessions which would allow teachers to share their own expertise, knowledge and understanding with each other. An online collaborative environment that could be used to support the group would also be useful.

Appendix 4: Structure eSafety outline, Barry Taylor, InSafe, December 2011

The diagram below was prepared to help build structure around the e-safety topic. It's about: i) understanding the appropriate levels of expertise required within a school (not everyone needs to be an expert, but all need trained to base level), and then; ii) what need to do to make it happen. Ref diagram overleaf to help think through structure of e-Safety:



Ref: Barry Taylor, ex Childnet Trustee, Oct 11

Appendix 5: iTEC proposal for Future Learning Scenarios training course, December 2011

COURSE OUTLINE – FUTURE SCENARIOS

iTEC - 5 day training Programme.

Who is this course for?

The iTEC training programme is aimed at trainee or practicing teachers or learning facilitators, including support staff such as learning assistance or technical support. The appropriate course candidates should have an interest in understanding learning and teaching can be enhanced by the effective use of technology. The course is suited to those practitioners who have a basic level of understanding and experience in technology supported learning e.g. the simple use of online resources, data projectors, digital media capture devices, but can also be tailored to those teachers with more expertise and who are willing to extend their repertoire and competence.

Introduction

iTEC is a pan European initiative involving the collaboration of teachers, researchers and pedagogical and technical experts from European education authorities and technology suppliers. The initiative involves these partners in a structured process to identify, develop and describe “Learning Activities” that can be adopted by teachers to introduce advanced learning and teaching approaches and technologies to their school, classroom or learning environment. The course seeks to provide teachers with competencies necessary to make effective use of the technologies currently available to them, and prepare them for technologies which are likely to be available in the future.

The iTEC 5 day training programme will equip the teacher for the practical classroom delivery of iTEC learning activities, making use of learning technologies already available to them, and providing them with access to additional iTEC technology, and the skills to use it effectively. The iTEC learning activities are designed to be easy to adopt and apply whilst challenging learners and teachers to try new approaches to learning and assessment, and to develop the appropriate skills and competencies for the future classroom.

Programme objectives

Participates in the iTEC 5 day training programme will:

- Gain insight into of how their current skills, competencies, access to resources and teaching strategies compare to those promoted by iTEC.
- Be able to identify and select iTEC scenarios and learning activities which extend their current pedagogical capability
- Make effective use of the iTEC learning technology tools to support the extension of their pedagogical capability

- Deliver and support, teaching and learning using a selection of iTEC learning activities, which will lead to their own professional development, and give them the ability to improve the learning experience of their students.
- Be able to extend and design iTEC learning scenarios and evaluate their effectiveness using the iTEC evaluation framework.

Course structure

The course is made up of 10 Modules, each of which has recommended study duration of 3 hours.

Module Number	Title	Content
1	Self evaluating your iTEC pedagogical capability	Understanding what iTEC scenario's and learning activities are, and how to identify those which may be of most value
2	Selecting iTEC scenarios to extend pedagogical capability	
3	iTEC and learning environments	Using the suite of iTEC technologies to identify and access the resources needed to deliver iTEC activities
4	Composing environments and resources	
5	iTEC activity training (pre-selected activity 1)	Developing the skills and competencies required to deliver a set of specific iTEC activities.
6	iTEC activity training (pre-selected activity 2)	
7	iTEC activity training (self selected activity 1)	
8	iTEC activity training (self selected activity 2)	
9	iTEC learning activity performance evaluation	Working with the iTEC evaluation framework to assess the effectiveness of learning activity implementation and taking the next step to develop extended or new scenarios and activities.
10	Extending and designing scenarios and learning activities	

Appendix 6: iTEC Learning Stories, Cycle 2 example, February 2012

iTEC CYCLE 2 PILOT - LEARNING STORIES

These Learning Stories exemplify the two Packages of Learning Activities described above. Choose one of the Learning Stories for your pilot. Remember, they are merely inspirational material, not a recipe. For example, either of the Learning stories may be performed in form of either package 1 'Learning in Teams' or package 2 'Learning Individually'.

In case it is not possible for you to perform any of these Learning Stories, please be prepared to reflect on and explain your reasons.

1. MATHEMATICS IN A MULTICULTURAL SETTING

I am a teacher in Spain, and the first language of many of my students is not Spanish. These additional-language students form teams (see activity 1), and begin their math course by starting a wiki, in which they enter explanations of math concepts they are familiar with in their native language. They link these language versions to those entries that discuss the same concepts in another language that were created by other classes and students, and add a list of new concepts that are expected to be handled during the course.

The students continue by gathering guides, videos, exercises and other resources online that relate to the topics they need to learn about (see activity 3). They find these online resources in their native language, and link them together in a single repository by using Diigo (or other social bookmarking services). I support the data gathering by preparing the students, giving them starting pointers, as well as following the Diigo group and their regular audio updates (see activity 4). They post the links to the wiki as well.

The students prepare short presentations, which include a Q&A session. They present their results to other students in Spanish and receive feedback. I am supporting the communication and sort out misunderstandings (see activity 5).

Then, the additional-language students use the iTEC collaboration environment (see activity 2) to find other math students (either native speakers or speakers of a different foreign language) and invite them to a virtual team. Together, they reflect on their understanding of the concepts by grouping their information visually (see activity 6), and try to use math as the common language in making sure they all understand everything correctly.

The additional-language students find a classroom from their native country, and ask students there to look at their math questions and give feedback (see activity 2 and 5). They create math questions to test their understanding. When possible, the questions are based on concrete situations, such as information from their own classroom, numerical facts from their home countries, etc. Finally, the results of each team are shared with others in the class. (see activity 7).

2. EMBEDDING EXAM PREPARATION IN LEARNING ACTIVITIES

After each lecture, it is my students' homework to create resources based on the topics discussed in class. I instruct the students on the types of resources that are most appropriate for each topic. These may include:

- exam questions (using an online questionnaire tool)
- crossword puzzles

- audio podcasts
- videos
- mind maps (Mindmeister, Bubbl.us, etc.)
- collaborative wiki notes (Wikispaces, Etherpad, etc.)
- and more

These resources are stored in online services that are most suitable, and linked to from our course home page. The resources are available to students from several classrooms in various cities. All students try and test resources made by others, give feedback in form of suggestions, and vote for the best resources (see activity 5). Resources are then further edited, either by the original author, or in collaboration with others.

I follow my students by tracking their audio updates (see activity 4). Most of the time, I let the students help each other, but instruct them on how to critically browse for and evaluate online information, and how to gather data online (see activity 3). During the course, we use post-it notes and list all topics of the course and all of our resources to see both relate to each other. This helps the students identify missing areas of the subject matter (see activity 6).

Students use the iTEC collaboration environment to let others know about their new project works and works in progress. There the students also negotiate about ad-hoc collaborative sessions with other students from around the country and internationally. These collaborative activities can address the curricula of many courses (history, foreign language, geography) simultaneously (see activity 2 and 7).

3. STUDENTS CREATING SCIENCE RESOURCES

I want my students to become more interested in science topics, and decide to ask them to create exhibits that they show to younger students of other schools.

I start with a formative test to evaluate how much they know about the course's topics. Then, I create small heterogeneous teams that mix different expertise (see activity 1). Each team works on one science concept and produces an exhibit that illustrates it.

To support the students, I give them pointers to various resources, including people and related events (see activity 2 and 3). They browse and learn together and teach one another. They try different ways to teach the concepts, give each other feedback, and choose those that seem to work best based on a map that visualizes out the findings of their trials concretely (see activity 5 and 6). Based on these experiences, they construct their "virtual science museum exhibit" (see activity 7). A poster, one physical and one virtual simulation, a video recording of a lecture, a rap song, and a puppet play are among the most exciting exhibits by the students in my class. Each group also creates a few sample problems to accompany their exhibit.

I monitor team progress and ensure that their productions are accurate and complete (see activity 4). In some cases, I suggest improvements. When the exhibits are ready, each team finds students of a lower grade that would be interested in learning the concepts, and work with them and their exhibit to teach them (see activity 2).

After the course I can use the exhibits and sample problems created by the students to prepare year-end subject reviews, and later use the resources to spice up my courses.