



E2L

CPDs that work:

Developing CPDs to empower teachers in personalised learning with ICT

**This report was produced as part of the Empower2Learn project and has informed the CPD design guide in the Empower2learn toolkit:
<https://empower2learn.online/design-guide/>**

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1 Introduction

Empower2learn is an international project (2019-2022) that focuses on personalised learning with ICT. The use of digital devices and technologies is rapidly transforming the way young people of today communicate, engage and learn. New technology offers new possibilities in all areas of society, and education is no exception. Nevertheless, educational systems across Europe still struggle in providing students, in particular in K-12 schools, with proper digital technologies that can support, individualize and enhance their learning. Both scholars and educational strategists believe that digital technologies in education, have a high potential to empower learners through personalised learning. The overall objective of the project Empower2learn is to:

EXPLORE, DEVELOP, PERFORM, EVALUATE AND DISSEMINATE METHODS FOR PERSONALISED LEARNING WITH DIGITAL TECHNOLOGIES THAT CAN BOOST THE COMPETENCES OF TEACHERS AND EDUCATORS AND EMPOWER ALL PUPILS IN THEIR LEARNING.

The partners involved are CLC Arnhem & iXperium/Centre of Expertise Teaching and Learning with ICT (Netherlands), Education Department of the Municipality of Norrköping (Sweden), CLC London (United Kingdom) and PXL Hogeschool (Belgium).

This report is part of IO3 and is a guide aimed at developers of Continuous Professional Development activities (CPDs) focused on personalised learning with ICT.



Co-funded by the Erasmus+ Programme of the European Union



2 Designing and developing the CPDs

2.1 Introduction

The use of ICT in education demands a lot from teachers because it often requires an innovation in pedagogical-didactic approach used, while at the same time it requires them to get to know new, unknown ICT tools and applications.

The goal of this work package was to generate design principles and a design template for CPD-activities in the area of personalised learning with ICT and for CPD methods based upon personalised learning with ICT by redesigning and trying out CPD-activities in the different partner countries and gathering information about the appreciation of the redesigned CPD-activities.

Each partner (re)designed and tried out two CPD-activities. These CPD activities either had personalised learning with ICT as their topic, or focused on personalised learning with ICT as a method for the learning activities of the CPD.

The CPDs were (re)designed using the ADDIE Instructional Design method. In order to be able to describe and compare the very diverse set of CPD-activities, a common framework based on research into effective CPD was used.

3 Instructional design according to the ADDIE method

The CPDs are designed according to the ADDIE¹ Instructional Design method. The partners had an active role in all the different phases of the design, development, implementation and analyses afterwards. During interim online meetings, time was spent on evaluations and adjustments were made based on each other's input.

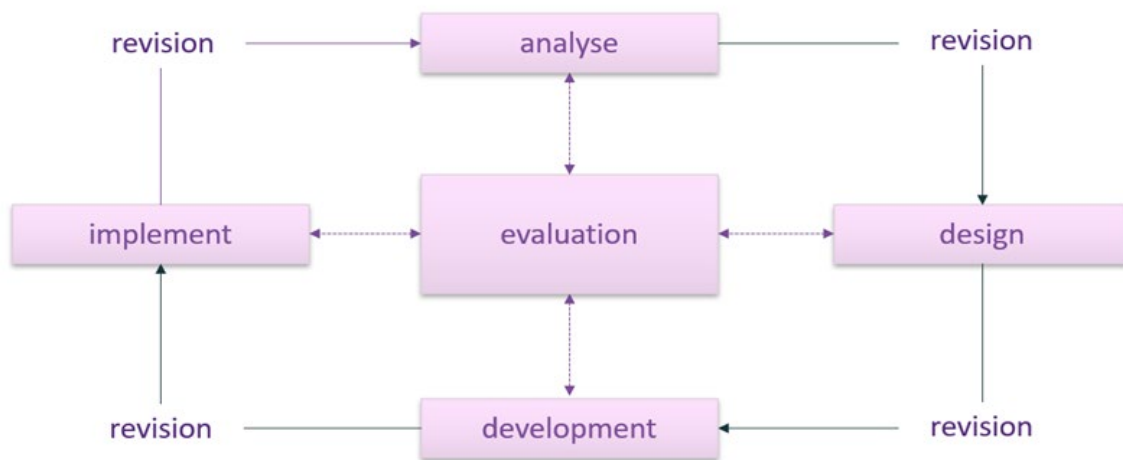


Figure 1. ADDIE Model (based upon original <https://apps.dtic.mil/sti/pdfs/ADA019486.pdf>)

3.1 Using a common framework while designing the CPDs

The partners of the Empower2learn project identified the need to have a common language and shared principles while discussing the development of the different CPDs that were being developed. To achieve this, the project adapted work done by Horvers, A., Uerz, D., Hopster-den Otter, D., ter Beek, M. (2020)². In their research they identified so-called “building blocks” for effective teacher professional development in higher education aimed at educational innovation using ICT. The framework they developed was a good fit for the needs and requirements of the Empower2learn project because:

- It describes a set of principles that are proven to be effective based on scientific literature.

¹ ADDIE = Analysis, Design, Development, Implementation, Evaluation

² Horvers, A., Uerz, D., Hopster-den Otter, D., ter Beek, M. (2020) Building blocks for effective teacher professional development in higher education aimed at educational innovation using IT. Literary study. Utrecht: Acceleration Plan for Educational Innovation with IT.

- It focuses on teacher professionalisation aimed at educational innovation with ICT, which includes personalised learning with ict.
- It gives a clear definition of all the principles as building blocks.
- The framework was drawn up for the European context (and available in English).

The model describes building blocks in three domains: professional development, facilitation and lecturer characteristics. Building blocks that focus on the professional development itself are either about the form or the content of the activity. Facilitation forms the foundation and focuses on the context and necessary conditions. The lecturer characteristics are designed as an infinity loop because of the importance of linking up (with) these characteristics in the design process, at the same time, these characteristics can (further) develop during the professionalisation.

The full model is available for download online and a summary of the building blocks used can be found in ANNEX 1.

3.2 Using the building blocks during the analyses and design of the CPDs

Following the ADDIE model for the design of the CPDs the E2L partners started with an analysis of the trainee characteristics, facilitation and the form and content of the professional development. The purpose of the analysis is to gain insight into the building blocks that are important for the design of the CPD. This can differ per CPD. In order to support the E2L partners in getting this focus, four assignments have been developed around using the building blocks for the base of the design. The set of assignments is accompanied with a (online) form with the building blocks on which the implications for the design can be noted.

During the Empower2Learn project the assignments were used in an online setting with all participants in a remote Microsoft Teams setting, collaborating in a shared Google Jamboard environment and a facilitator introducing the different assignments. The assignments are summarised below with a screenshot of the Jamboard used for each assignment. Every team (re)designing a CPD used its own page in the Google Jamboard notebook.

Assignment 1: Wait, but why?

Instruction: *The first step for the team to design or redesign a CPD is to make sure you are all on the same page. You have to make sure you're all working on the same goals. Write down what you want to achieve with the CPD and why this is important. And if there is some spare-time, pick one or more symbols that really represent the CPD you envision. If the symbol is missing, you are free to go look for the perfect match.*

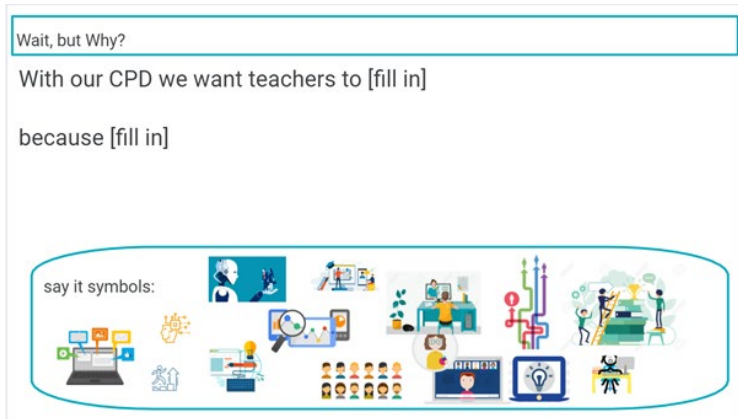


Figure 2. Jamboard assignment 1: Wait, but why

Assignment 2: What do we know about the target group?

Instruction: *Because Empower2learn is about personalised learning we first focus on the characteristics of the participants because this is one of the key elements in this innovation (and one of the main challenges a teacher faces). Decide for each characteristic if it's a strong point, a weak point or an uncertainty. Exchange with the other partners on which of the characteristics you want tips on how to incorporate it in the CPD.*

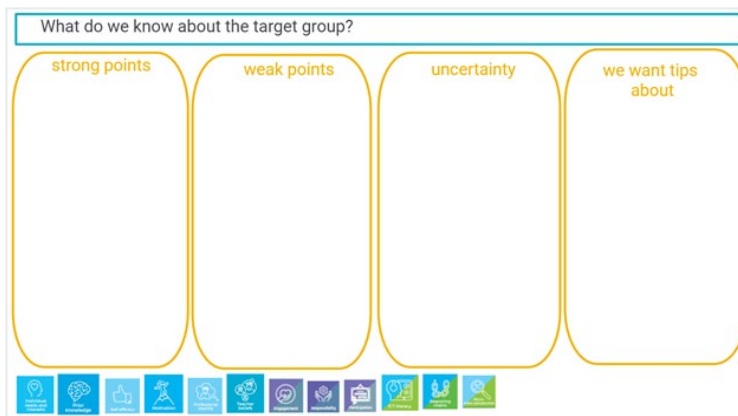


Figure 3. Jamboard assignment 2: What do we know about the target group?

Assignment 3: Building blocks: in all shapes and sizes

Instruction: *Next step is to assess the building blocks that refer to professional development with the purpose of critically examining each building block to see if it fits the goal of the CPD and the participants characteristics. Building blocks that fit well can be made larger, building blocks that don't fit well or are not relevant can be made small(er).*

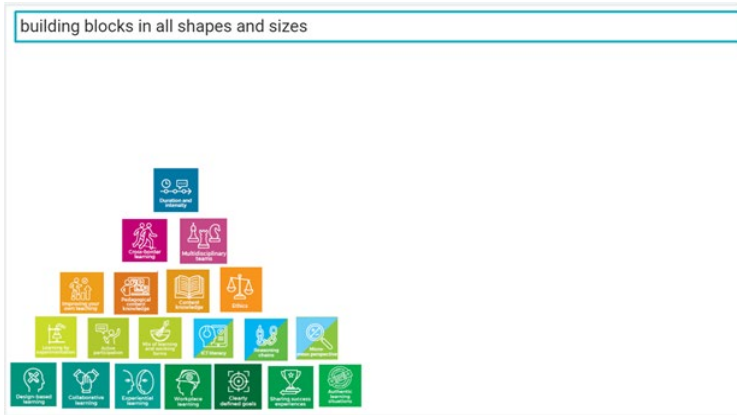


Figure 3. Jamboard assignment 3: Building blocks in all shapes and sizes

Assignment 4: Facilitation: SWOT

Instruction: For the last building blocks-assignment we'll focus on the facilitation. Assess for your situation which of the building blocks referring to the facilitation of the trainees are strengths, weaknesses, opportunities and threats.

- *Strengths: characteristics of the business or project that give it an advantage over others*
- *Weaknesses: characteristics that place the business or project at a disadvantage relative to others*
- *Opportunities: elements in the environment that the business or project could exploit to its advantage*
- *Threats: elements in the environment that could cause trouble for the business or project*

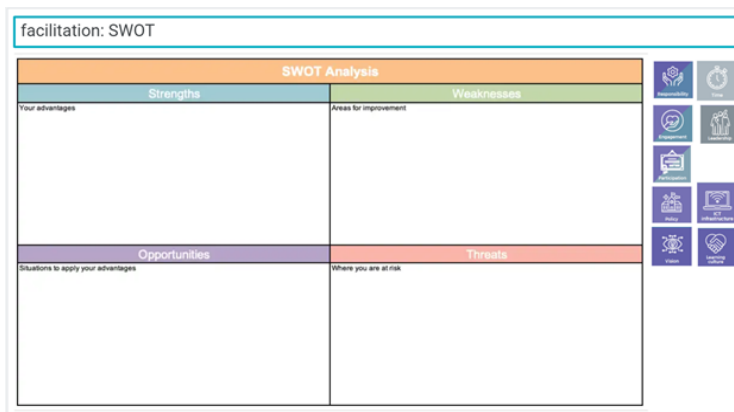


Figure 4. Jamboard assignment 4: SWOT

4 Showcases of the CPDs

As a result of the designing phase every E2L-partner had a rough outline of two CPDs. During the developing phase the partners collaborated with colleagues, experts and sometimes teachers from the target group to develop materials for the CPDs. During the implementation phase the partners performed the CPDs. Six of the CPDs were on topic of personalised learning with ict and two of the CPDs were personalised learning with ict method based. Most of the CPDs were online because this was the only option for delivering a CPD because of COVID-19.

In this chapter we give a short summary of the eight delivered CPDs. For in-depth interviews about the design process go to: [Design guide – Empower2Learn](#)

4.1 CLC London - Primary school computing conference

Primary school computing conference	
description	The CPD was part of a conference supporting primary school leaders of computing and digital strategy. The aim was for teachers to refine their current and future practice to improve outcomes for students through personalisation and blended learning The objectives were to establish, describe and provide examples for the key features of effective use of personalisation to support blended teaching and learning. The session showcased the work of the Empower2Learn project and drew on the experiences of the teachers enabling them to share good practice.
on topic / method based	Personalised learning with ICT as a topic
organisation	Date is set by organisation, open registration for participants
target group	Primary school computing and digital strategy subject leaders
online/offline/ blended	Offline in person conference

time

1 session (6 hours)
Full slide deck (PDF)

Sample slides:

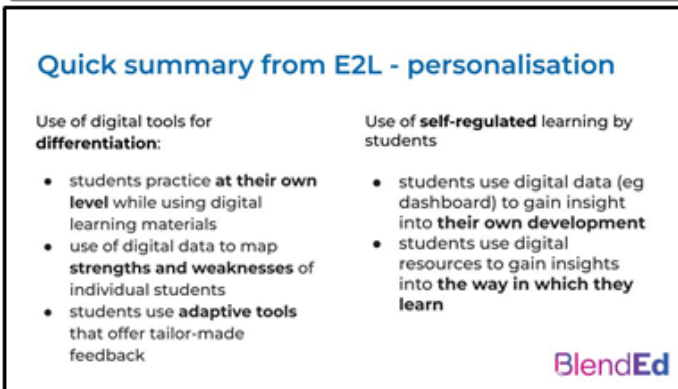


What does 'personalised' mean?

From two sessions with teachers recently

Word clouds include terms like: differentiated, learner voice, make sense of their world, relevant to their lives, challenge, empowered learners, shaped on their interest, engageable, engaging, formative assessment, adapt to class interests, using home learning, child led, differentiating, own level, learning pathways, following children's interests, different knowledge, self motivated.

BlendEd



Quick summary from E2L - personalisation

<p>Use of digital tools for differentiation:</p> <ul style="list-style-type: none"> students practice at their own level while using digital learning materials use of digital data to map strengths and weaknesses of individual students students use adaptive tools that offer tailor-made feedback 	<p>Use of self-regulated learning by students</p> <ul style="list-style-type: none"> students use digital data (eg dashboard) to gain insight into their own development students use digital resources to gain insights into the way in which they learn
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BlendEd

4.2 CLC London - micro-learning courses

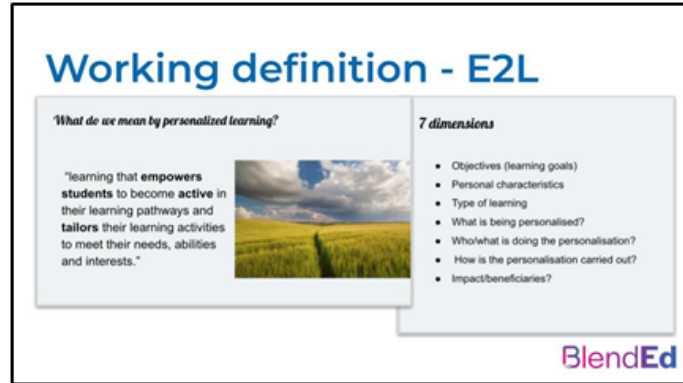
micro-learning courses	
description	<p>micro learning live and on demand courses about</p> <ul style="list-style-type: none"> ● MFL Forum: How digital technology can support personalised learning in modern foreign languages (MFL) ● Maths Forum: How digital technology can support personalised learning in maths ● Assessment and feedback CPD: How digital technology can support personalisation, assessment and feedback
on topic / method based	method based
organization	<p>Live sessions took place on</p> <ul style="list-style-type: none"> ● MFL 19/10/21 ● Maths 3/11/21 ● Assessment and feedback 16/11/21
participants	Primary school teachers - general class teachers and teachers with responsibility for languages and maths
online/offline/ blended	Live online course with teacher interaction and publicly accessible as an on demand online course

time

1 session (1 hour) each

- ([link to MFL recording](#), [MFL slide deck PDF](#))
- ([link to maths forum video](#), [link to maths forum PDF](#))
- ([link to assessment and feedback slide deck PDF](#))

Sample slides:



Working definition - E2L

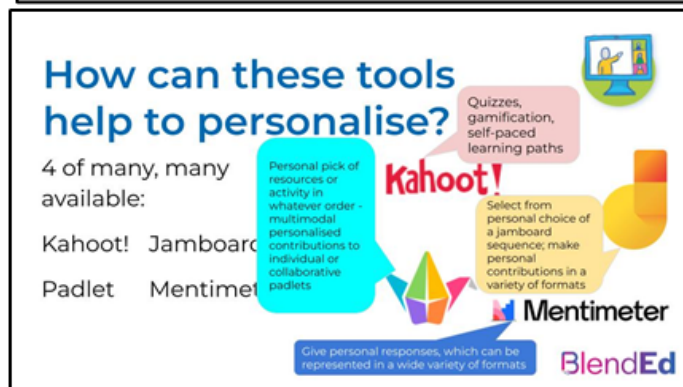
What do we mean by personalized learning?

"learning that **empowers students** to become **active** in their learning pathways and **tailors** their learning activities to meet their needs, abilities and interests."

7 dimensions

- Objectives (learning goals)
- Personal characteristics
- Type of learning
- What is being personalised?
- Who/what is doing the personalisation?
- How is the personalisation carried out?
- Impact/beneficiaries?

BlendEd



How can these tools help to personalise?

4 of many, many available:

Kahoot! Jamboard
Padlet Mentimeter

Quizzes, gamification, self-paced learning paths

Personal pick of resources or activity in whatever order - multimodal personalised contributions to individual or collaborative padlets

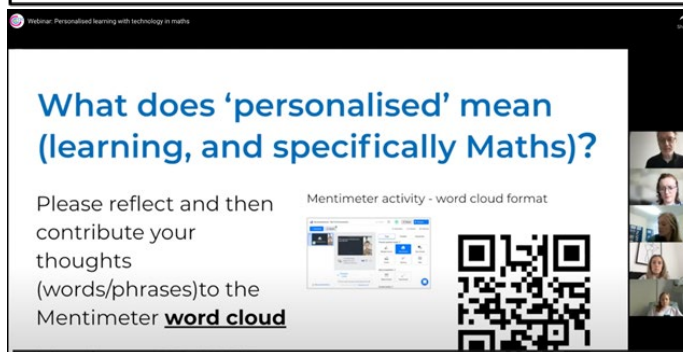
Kahoot!

Select from personal choice of a jamboard sequence; make personal contributions in a variety of formats

Give personal responses, which can be represented in a wide variety of formats

Mentimeter

BlendEd



What does 'personalised' mean (learning, and specifically Maths)?

Please reflect and then contribute your thoughts (words/phrases) to the Mentimeter **word cloud**

Mentimeter activity - word cloud format

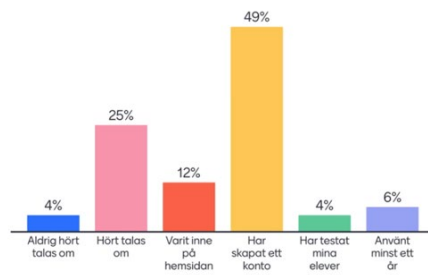
QR code

QR code

4.3 Norrköping - detecting reading difficulties with Legi Lexi

detecting reading difficulties with Legi Lexi	
description	The CPD will support teachers in understanding and applying the built in analytics tools in Legi Lexi in order to assess, analyze and improve the learning of their students and improve their own teaching in this area. The course consists of 2 parts where part will give an introduction of the tool and its theoretical underpinnings. Part 2 will focus on the analysis of the assessments and encourage discussion between participants. Part 1 can be omitted by teachers who have already been introduced to Legi Lexi or use it in their school.
on topic / method based	Personalised learning with ICT as a topic
organisation	date is set by organisation, open registration for participants
target groups	Teachers
online/offline/ blended	Online
time	3 session (1,5 hours each)

Hur väl känner du till LegiLexi?



LEGILEXIS TESTVERKTYG

- Genomförs på dator, iPad (eller papper)
- Eleverna jobbar självständigt med hörlurar som guidar genom testningen
- Tar ca 40-60 min att genomföra alla delar
- Går att pausa, dela upp i flera tillfällen och stänga av enskilda deltest
- Inloggning sker med en klasskod och PIN-kod för ökad säkerhet



OBS - funkar bäst med Google Chrome och Safari

Muntlig instruktion: "Välj den bild som passar bäst ihop med ordet: Krona"




LegiLexi

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LegiLexi – ett framåtsyftande bedömningsverktyg

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4.4 Norrköping - Learn the analytics of Binogi

Learn the analytics of Binogi	
description	The CPD will support teachers in understanding and applying the built in analytics tools in Binogi.se in order to assess, analyze and improve the learning of their students and improve their own teaching. By connecting the content to participants' own classroom context and the encouragement of collegial exchange and design learning teachers will be empowered to feel confident in applying what they have learned in their own teaching practices when using Binogi as an educational tool.
on topic / method based	Personalised learning with ICT as a topic
organisation	date is set by organisation, open registration for participants
target groups	teachers
online/offline/ blended	blended
time	3 session (1,5 hours each)

Statistik

Aug 1, 2021- Okt 10, 2021

Användning per skola - sedan skolstart

27 elever

23 lärare

Aug 1, 2021- Nov 21, 2021

Användning per skola - sedan skolstart

70 elever

26 lärare

Uppgift att jobba med

Uppgift

- Dela ut en uppgift - utgå från era arbetsområde!
- Sammanställ i arbetslaget de elever som hade problem med att genomföra uppgiften

Analys


- Vad beror det på att vissa elever hade problem med uppgiften?
- Hur kan ni stötta och nå dessa elever?
- Hur kan ni långsiktigt utveckla metoder för att använda Binogi för att era elever ska nå högre måluppfyllelse?

Dela ut en uppgift



4.5 PXL – Working with Vivista

Working with Vivista	
description	This CPD gives teachers, teacher trainers and decision makers an introduction on how they can create 360 degrees videos with the Vivista software, but also how this can be used to support personalised learning. In the follow up session the target group will also get the chance to work with cameras and the Vivista software themselves, so they really get to know the possibilities and limits.
on topic / method based	Personalised learning with ICT as a topic
organisation	date is set by organisation, open registration for participants
target groups	teachers
online/offline/	online

blended	
time	2 session (First one online: 2 hours - second one in real life: 8 hours)
pictures	 <p>Stapsgewijs zelf aan de slag gaan</p> <ol style="list-style-type: none"> Kiezen van een 360°-camera Voorbereiding van opname 360°-video opnemen 360°-video bewerken en stitchen 360°-video verrijken 360°-video's bekijken

4.6 PXL - Working with Vivista (redesign)

Working with Vivista (redesign)	
description	This CPD gives teachers, teacher trainers and decision makers an introduction on how they can create 360 degrees videos with the Vivista software, but also how this can be used to support personalised learning. In contrast to the first CPD, this one has been redesigned based on the feedback and building blocks that offered a new design strategy. In this CPD there were 2 half days of training in real life, with 3 online follow-up sessions. This allowed us to really get into interaction with the target group and discuss their input, but also to have a follow-up and support them over a longer period of time.
on topic / method based	Personalised learning with ICT as a topic
organisation	date is set by organisation, open registration for participants
target groups	teachers
online/offline/ blended	blended
time	5 session (first two sessions in real life: each 3 hour and 30 minutes - following three sessions online: each 3 hours)



pictures




4.7 HAN – iXpert on a distance

iXpert on a distance	
description	<p>iXpert on a distance is a short-term process which consists of three parts.</p> <ul style="list-style-type: none"> ● the intake interview, ● a prepared lesson in which the teacher uses an ICT tool ● the evaluation/follow-up <p>During the intake interview the teacher, together with an ICT coach, discusses the learning objectives of a lesson and how an ICT tool can help with this. When a choice has been made in the tool, the teacher uses the tool in the classroom, where the ICT coach is available online (via a Teams-link) for instructions and questions from the students and the teachers. Afterwards there is an evaluation of the lesson and the tool and the teachers is coached in using the ICT-tool without the help of the coach.</p> <p>A form is used for the intake interview and the evaluation/follow-up. The questions in the form are based on the building blocks for effective professionalisation in educational innovation with ICT.</p>
on topic / method based	method based
organization	anytime, at the initiative of the participant. Teachers can contact the ICT coach who is affiliated with their own school board. After the intake interview, the ICT coach ensures that the required ICT material is available at the school so that the teacher can use it in the prepared lesson.
participants	teachers primary education
online/offline/ blended	blended
time	3 session (2 hours in total)

4.8 HAN – introduction on learning analytics

introduction on learning analytics	
description	<p>Introduction on learning analytics for teachers and teacher trainers. This CPD focuses on the following learning goals:</p> <ul style="list-style-type: none"> • The teacher/teacher trainer can make choices about Learning Analytics in an ethically responsible and well-founded way • The teacher/teacher trainer can use Learning Analytics for personalised learning • The teacher/teacher trainer can give students insight into their own learning process by using Learning Analytics • By using Learning Analytics, the teacher/teacher trainer can reflect on his/her own educational practice and adjust and improve it where possible. All materials are shared via an online website.  

	<p>Example of a filled jamboard:</p> 
<p>on topic / method based</p>	<p>method based (although it also is on topic).</p>
<p>organisation</p>	<p>Dates are set by the organisers in consultation with participants. A format where participants had roughly 2 weeks of time between dates was considered to be optimal (not too high workload, not too far in between sessions). The CPD is structured as 4 face-2-face meetings (although an online form would be possible) consisting of a mix of methods where the trainer explains topics like “What is learning analytics?”, “What is the GDPR (AVG)?” combined with discussions between participants supported by using Jamboards to collect input.</p>
<p>target groups</p>	<p>teachers and teacher trainers</p>
<p>online/offline/ blended</p>	<p>offline</p>
<p>time</p>	<p>4 session (2 hours each)</p>



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5 Evaluation of the CPDs

















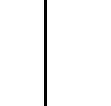


In preparation of the evaluation a form was created to learn more about the way the CPDs helped to improve knowledge, understanding and level of interest of personalised learning with ICT and increase confidence in delivering personalised learning.

The participants of the CPDs were all asked to fill out an evaluation form after attending. Unfortunately only a small number of the participants complied with the request to fill in this form. The low response may be due to the fact that many CPDs are given online due to COVID-19 quarantine measures. In an online setting, the trainer does not have the opportunity to hand out the evaluation on paper during the training and ensure that everyone fills in the form. Instead we collected feedback from the CPD developers about the redesigned CPD and the building blocks that were most useful during the (re)design process.

The objectives for the CPDs: **Following the CPD activities teachers will have improved knowledge and understanding of personalised learning with ICT and an increase in their confidence in delivering personalised learning with ICT.**

What helped achieving the objective?	
primary school computing conference	<ul style="list-style-type: none"> able to draw on ready-made micro-learning subject-focused sessions and on existing conference format/CPD model able to present online materials within a face to face program using the toolkit website to structure the slides drawing on previous presentations and the beta toolkit members of the team were able to reflect on performance and successful parts of the micro-learnings <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;">        </div>

<p>micro-learning (subject-focused forums)</p>	<ul style="list-style-type: none"> → existing programme of subject-focused forums with partner schools → existing online delivery model for CPD being refined in practice → authentic learning situations provided by participants and inclusion of sharing successful experiences and examples. Having an existing relationship with some of the schools attending meant we were able to ask teachers to send examples in advance of the CPD session → mix of learning and working forms and opportunity for active participation → setting in context of pedagogical content knowledge → Opportunity to record interactive CPD sessions with teachers and then make this into an on demand 'micro learning' course on the https://blendedlearning.org.uk/ website meant that the CPD had wider reach. The contributions and sharing made by teachers in the live event became important content for teachers accessing the course on demand at a later date. → Designing for synchronous and asynchronous worked well <div style="display: flex; justify-content: space-around; align-items: center;">        </div>
<p>detecting reading difficulties with Legi Lexi</p>	<ul style="list-style-type: none"> → need based and strategically important on a local authority level and among school leaders → there already existed an established and vast network of teacher to address → a good dialogue with Legi Lexi to tailor the introduction to the needs of the teachers → bringing data from one of the schools as an example → It provided with information on different levels which made it interesting for teachers already using Legi Lexi → The fact that it was 3 sessions spread over time <div style="display: flex; justify-content: space-around; align-items: center;">      </div>

<p>learn the analytics of Binogi.se</p>	<ul style="list-style-type: none"> → Binogi provided the actual training and could give the entire picture of the tool as well as an overview of research foundation → The schools principal participated in the 3 CPDs → Three of the teachers that participated also were assigned to support the other teachers in the school → There was enough time in between each meeting so the teachers could explore Binogi in their own teaching <div style="display: flex; justify-content: space-around; margin-top: 10px;">     </div>
<p>Working with Vivista</p>	<ul style="list-style-type: none"> → Because it is a tool that we develop ourselves, we know its possibilities and limitations very well. → Through earlier information sessions about the tool, we already had a certain amount of content that we could reuse with the necessary adjustments. → The second session was in real life, which made it possible to go deeply and concretely into individual questions. <div style="display: flex; justify-content: space-around; margin-top: 10px;">     </div>
<p>Working with Vivista (redesign)</p>	<ul style="list-style-type: none"> → Building on experiences and feedback from first CPD. → By arranging the organization of the CPD in good time (everything was finalized one month before the start), the expectations were very clear to all concerned. This also made it possible to schedule participants freely or to replace them if necessary. → By organizing the first two training sessions in real life, there was a lower threshold for participants to ask questions and interact with each other and the instructors. → We were able to build on existing material with only minor adjustments. → Because we provided both the pedagogical and technical input and the participants mastered the actual subject content, this was an efficient mix to run the course with interaction. → The three follow-up moments provided insight into the learning process. <div style="display: flex; justify-content: space-around; margin-top: 10px;">          </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;">   </div>

iXpert on a distance

-> Because of COVID-19 iXperium, Arnhem was searching for a way to stay in contact with teachers and professionalize them. There was a clear urgency for the ICT coach to develop a different form of professionalizing teachers which created a higher engagement.
-> Since this CPD is built up as a 1-on-1 training, it was easy to adapt to prior knowledge, individual needs, and interests. A teacher with prior knowledge about video calls helped set up a video call with the ICT coach. Teachers were motivated because it was easy to adapt to earlier mentioned building blocks.
-> During the professionalisation activity itself, the teacher was active in working with different ICT tools. The teachers felt there was room for experimenting with ICT because there was always an ICT coach at a distance that could help out when needed. What also helped was a supporting environment, a learning culture helps the teacher to reach out and subscribe to iXpert on a distance. A good functioning IT structure (good WiFi for video calls) helped the teacher to get easy in contact with the ICT coach.



6 Conclusion and considerations

Eight CPDs have been developed and implemented for the Empower2learn project. These CPD activities integrate personalised learning through ICT as content or as a method. Thanks to these CPDs, participating teachers have worked on their knowledge and understanding of personalised learning with ICT and an increase in their confidence in delivering personalised learning with ICT. Therefore it's expected that these teachers have taken an important step in reinforcing their learning.

Looking back on the activities carried out, a number of considerations can be formulated for those involved in the development of CPDs regarding educational innovation with ICT.

- ⇒ The building blocks are not a simple checklist that every CPD must comply with, but a practical tool that helps to focus on integrating relevant aspects considering the goal of the CPD, trainee characteristics and the facilitation.
- ⇒ The building blocks help the collaboration and communication between CPD designers or between CPD designers and the target group because they can use the building blocks to make sure everybody uses the same terminology.
- ⇒ Using the building blocks as a starting point in the designing process help to design a CPD in a professional and critical way. Working with the building blocks increases designers' awareness that a good fit of the various building blocks contributes to the effectiveness of the CPD which results in CPDs that fits the goal of the CPD, trainee characteristics and facilitation instead of CPDs that fit the preferences of the CPD designer.
- ⇒ Taking into account the characteristics of the target group is important, but also a challenge and will be a trade-off between possible wide reusability of the CPD and tight fit.
- ⇒ Evaluation of the CPD and what was learned / the intended goals should always be an integral part of the CPD, eliminating forms (and low response rates) after the CPD has been concluded.

ANNEX 1 Building blocks for effective professional development

The publication *‘Building blocks for effective professional development for lecturers in higher education aimed at educational innovation with ICT – literature study’* presents a framework of several building blocks which are proven to be effective in the professional development of lecturers.

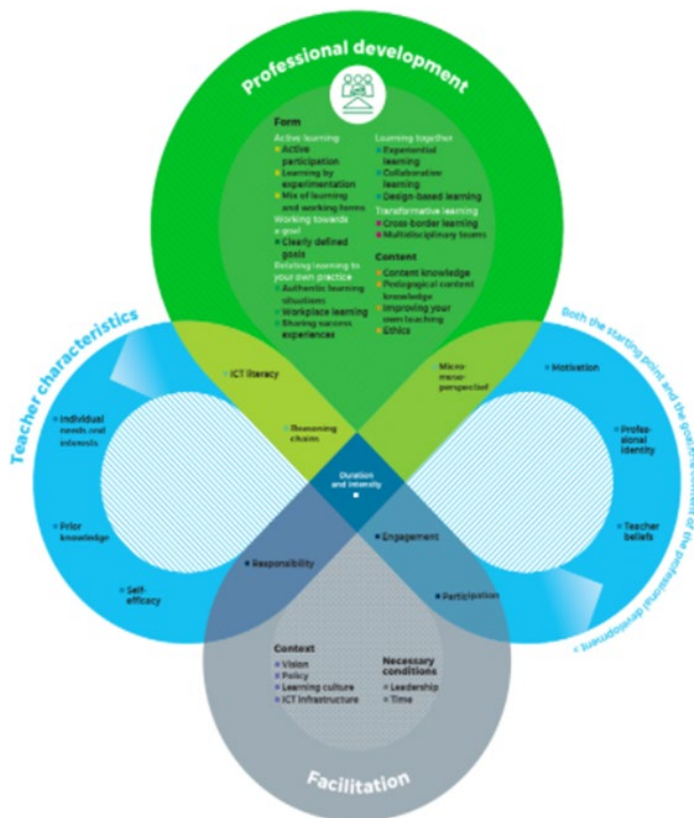

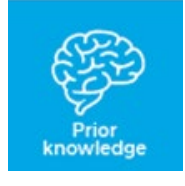
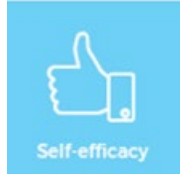

























Figure 1. Model including building blocks for the effective professional development of lecturers


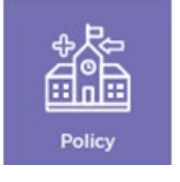




The model distinguishes building blocks in three domains: professional development, facilitation and lecturer characteristics and several crossroads between these domains. Building blocks that focus on the professional development itself are either about the form of the content of the activity. Facilitation forms the foundation and focuses on the context and necessary conditions. The lecturer characteristics are designed as an infinity loop because of its importance to link up with these characteristics and in the designing process, at the same time, these characteristics can (further) develop during the professionalisation.

trainee characteristics					
 <p>Individual needs and interests</p>	 <p>Prior knowledge</p>	 <p>Self-efficacy</p>	 <p>Motivation</p>	 <p>Professional identity</p>	 <p>Teacher beliefs</p>
<p>The form and the content of professionalisation match the personal, individual needs and interests of teachers regarding of what and how they want to learn.</p>	<p>The knowledge base and competencies that teachers already have at the beginning of the professional development process with regard to educational innovation with ICT.</p>	<p>Self-efficacy is the lecturers' belief in their own abilities, in this case in relation to educational innovation with ICT.</p>	<p>The willingness to learn and to innovate education with ICT.</p>	<p>The core beliefs of a teacher about what good teaching means.</p>	<p>The beliefs about what constitutes good teaching, how students learn and the role and added value of ICT.</p>
trainee characteristics			& facilitation		
 <p>Engagement</p>	 <p>Responsibility</p>	 <p>Participation</p>			
<p>If teachers experience the added value of professional development for education, this will increase the chance that they will actually implement the educational innovation with ICT in their own teaching practice.</p>	<p>The extent in which teachers are attentive to and feel responsibility for developing their own teaching practice.</p>	<p>Teachers who actively participate in professional development on the basis of their own motivation are teachers who share their own experiences in their own practice.</p>			
trainee characteristics			& professional development: content		

 <p>ICT literacy</p>	 <p>Reasoning chains</p>	 <p>Micro-meso perspective</p>			
<p>The ability to make well informed and reasoned decisions about the stake of existing technologies that improve learning and teaching</p>	<p>Teachers should be able to substantiate in terms of educational value why they use certain technologies in specific target groups (what works where, with whom and why?).</p>	<p>The professional development activity should generate insights into the different levels that play a role in educational innovation with ICT.</p>			
<p>professional development: form (active learning)</p>					
 <p>Active participation</p>	 <p>Learning by experimentation</p>	 <p>Mix of learning and working forms</p>			
<p>Any learning activity in which teachers actively participate or in which they are actively involved in the content and form of their own professional development process.</p>	<p>The space for teachers to acquire new ICT skills and try out digital tools.</p>	<p>Effective professional development requires a mix of learning and working forms.</p>			
<p>professional development: form (working towards a goal)</p>					
 <p>Clearly defined goals</p>					

<p>The goal is clearly formulated and preferably aimed primarily at student learning.</p>					
<p>professional development: form (focus on the teachers' own practice)</p>					
					
<p>Authentic learning situations in the theoretical knowledge learned to teaching practice, and are therefore meaningful.</p>	<p>Workplace learning ensures that teachers can directly apply what they have learned through the professional development process in their own teaching practice.</p>	<p>Sharing success experiences from teaching practice is inspiring and lowers the threshold for teachers.</p>			
<p>professional development: form (learning together)</p>					
					
<p>Groups of teachers (and other stakeholders) working together on specific objectives.</p>	<p>Design-bases learning focuses on problem solving by using activating work forms to produce a product. It encourages teachers to think outside the box.</p>	<p>Reflecting on the own experimenting experiences is an important part to be investigate what works well in the teaching practice.</p>			
<p>professional development: form (transformative learning)</p>					

 <p>Cross-border learning</p>	 <p>Multidisciplinary teams</p>				
<p>In cross-border learning people with different frames of references and perspectives are involved in the professional development process, revealing differences in mental models.</p>	<p>Transformative learning can be achieved by forming multidisciplinary teams in which teachers and others form different disciplines work together to strengthen each other.</p>				
<p>professional development: content</p>					
 <p>Content knowledge</p>	 <p>Pedagogical content knowledge</p>	 <p>Improving your own teaching</p>	 <p>Ethics</p>		
<p>Knowledge and skills in a specific field, such as facts, concepts, theories and principles.</p>	<p>The specific pedagogical knowledge required for the content knowledge being taught by the teacher.</p>	<p>The professional development has to be about the teaching environment in which the teacher works.</p>	<p>A reflection on the (possible) impact of the use of ICT for educational innovation on the values that education seeks to imbue.</p>		
<p>professional development</p>		<p>& trainee characteristics</p>		<p>& facilitation</p>	
 <p>Duration and intensity</p>					
<p>Effective professional development is long term and ongoing.</p>					

facilitation: context (institutional level)					
 Vision	 Policy	 Learning culture	 ICT infrastructure		
A clear vision of the relevance and added value of ICT and its contribution to educational innovation.	Translating a vision into policies with clear objectives for the use of educational innovation with ICT.	The professional atmosphere, beliefs, perceptions, responsibilities, relationships and objectives focused on the ongoing development of teachers.	A good ICT infrastructure is a prerequisite for the integration of ICT in the education process.		
facilitation: context (national level)					
 Leadership	 Time				
Managers have a pivotal role in initiating and maintaining professional development activities relating to educational innovation with ICT.	The executive board and senior management should make sufficient time available for the professional development of teachers.				