CyGen

Cyber Safe Generation: Digital education by design

Co-designed digital educational package

A RESOURCE FOR YOUNG PEOPLE, TEACHERS AND PARENTS

2019

Project Overview

CyGen is a co-funded Erasmus+ Key Action 2 strategic Partnership. The project engaged directly with children (aged 8-13), teachers and parents in four European countries (United Kingdom, Belgium, Denmark and Greece) to:

1. Explore the digital opportunities and challenges as these are experienced by these groups;
2. Develop a novel participatory design methodology and methods in order to work collaboratively with children and young people;
3. Co-design a culturally, linguistically and age appropriate open-access multimedia education programme, a 'web app' with children in the four member states. Designed by children, for children, the web app recognises and builds on children and young people's knowledge and experience to support their safe, informed use of the Internet;
4. Produce online open-access guidance encompassing lesson plans and pedagogical resources to support teachers and educators in primary and secondary schools in diverse European education settings to support children's online safety

The CyGen project was created to understand the opportunities and challenges faced by children when they go online. The project worked with children, young people, teachers, parents and academics to map these opportunities and challenges and, with children, to design educational resources to support children's safety online. The project was unique in that children helped the project team to develop and evaluate an evidence-based digital educational programme to promote young peoples' online citizenship and safety across the four participating European countries (UK, Denmark, Belgium and Greece).

The outputs created for this project are:

- 🌍 IO1: Scoping and needs analysis
- 🌍 IO2: Participatory Design Model
- 🌍 IO3: Design workshops
- 🌍 IO4: Co-designed digital education programme
- 🌍 IO5: Evaluation

Further information regarding the evidence-based digital educational programme can be viewed via our website http://cygen.eu/resources/

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Executive summary

The digital education package (Webapp and wrap around text) developed during the CyGen project was co-designed with children, teachers and parents across the four partner countries: Belgium, Denmark, Greece and the UK. The Webapp enables pupils to engage in a virtual learning environment, offering them 'real-life' scenarios in which to enact and explore the possibilities of the digital environment. These real-life scenarios are 'played' by several characters. The characters and activities were developed initially by the pupils in the UK and modified by children in the partner countries in response to the needs articulated by them during the design cycle. Each of the character activities is focused on developing children's digital skills in order to support their safe, informed digital engagement. More particularly, the Webapp, has been designed to encourage both 'online' engagement and 'offline' discussion between children, teachers and parents. In so doing, it responds to a need articulated in the academic literature (Livingstone et al, 2011) and by children, teachers and parents in our project about the need for greater dialogue and shared understandings about the challenges children experience online.

The Webapp was developed cyclically with pupils, teachers and parents and included pupils from each country talking directly with the Belgian developers via Skype. This was supported by the development of a design template setting out the key features, activities and functions requested by children in each partner country ensuring the translation of the empirical data into a Webapp by and for children.

There are four versions of the Webapp which follow two broad designs, reflecting the children's design choices and preferences and in the languages of each partner country as determined by them. The pupils in Denmark were older and the Webapp reflects their needs as an older cohort of young people. Each Webapp also includes resources for teachers and parents to enable them to support children's participation and learning. These are embedded in each Webapp in a section entitled 'Information for grown-ups' and in the wrap-around text on the project website http://cygen.eu/.

The wrap-around text supports teachers and parents to adapt the Webapp to a classroom and/ or home setting. So, while the Webapp can be used as a stand-alone tool, it may also be used together with the wrap-around text in order to stimulate dialogue between children and children and teachers/parents about the challenges they experience online.

Introduction

The digital education package developed during the CyGen project was co-designed with children, teachers and parents across the four partner countries: UK, Belgium, Denmark and Greece. We discuss elsewhere in our reporting for Intellectual Outputs 2 (Participatory Design Model) and 3 (Design Workshops), how the empirical data for the project was collected, analysed and collated by each of the partners. This report offers an overview of the education package (Webapp and wrap around text) that was produced. It summarises how the partnership used the empirical data collated during the design cycle in order to develop the digital education package (Webapp and wrap around text) and offers reflections on the process from each country partner and the developers, the Belgium CyGen team.

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Webapp content: An overview
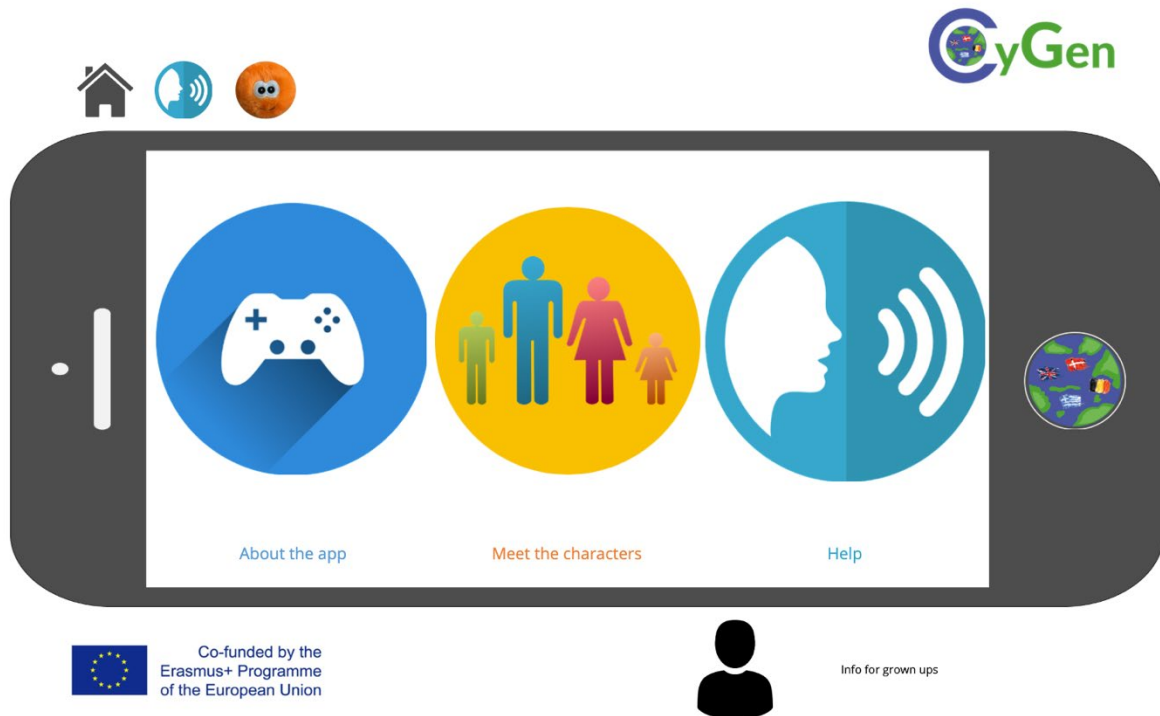
The digital education programme (Webapp) was co-produced with pupils from the four participating countries (United Kingdom [UK], Denmark, Belgium and Greece). The Webapp enables pupils to engage in a virtual learning environment, offering them 'real-life' scenarios developed by the participating children in which to enact and explore the possibilities of the digital environment. These real-life scenarios are 'played' by several characters as designed by the pupils in the UK (the country to deliver the first of the four design cycles). Each of the characters are connected with topics about safe internet use. The topics were generated during the Data and Design Workshop with pupils, through our co-design approach. In this way, the Webapp was developed cyclically with pupils, teachers and parents, who were involved in several stages of the design cycle.

The final Webapp includes resources for teachers to enable them to support children's participation and learning. These resources are embedded in the Webapp section 'Information for grown-ups', and in the wrap-around text.

The Webapp for the UK, Belgium and Greece shared a similar base design, with a series of characters initially designed by children in the UK. The use of characters – although the initial idea of the children themselves – also reflects our initial data from children,

parents and teachers at the Data Workshop phase of the project (Phase 1). They told us that it was important for children to be able to associate with resources used to help them learn; the characters and the situations in which they found themselves reflected real-life contexts.

The Danish version took a different approach. The Belgium developers team held a skype-meeting with the Danish pupils where they expressed their need for a Webapp that would meet their needs as 12- and 13-years-olds. In order to ensure that the project fully reflected our participatory and co-design approach, their requests and suggestions were respected, and an alternative design created. The design cycle in Denmark followed the same principles as those in the other countries, working with children, parents and teachers to capture their needs and ideas about how best to support children's digital literacy.

The wrap-around text provided alongside each Webapp supports teachers and parents to adapt it to a classroom and/ or home setting. While the Webapp can be used as a stand-alone tool, it may also be used together with the wrap-around as the basis for lessons in schools, and in order to stimulate dialogue between children, and children and teachers/ parents about the challenges and opportunities they experience online.

The Webapp's and the wrap-around texts are designed according to pedagogic principles. For example, Mayer's Multimedia Principles presented in the Cognitive Multimedia Theory suggest that words and graphics are more conducive to learning, rather than just text or graphics alone. This approach is based on the idea that learners learn better when they:

- engage in relevant cognitive processing such as attending to the relevant material in the lesson;
- mentally organise the material into a coherent cognitive representation and
- mentally integrating the material with their existing knowledge (Mayer 2005).

This view is a cornerstone of the Universal Design for Learning (UDL) framework, which emphasises multiple means of representation and expression to provide learners with a variety of ways of acquiring information, together with alternative ways of demonstrating what they know (Rose, 2002). Similarly, the Read, Reflect, Display, Do (R2D2) model from Bonk and Zhang (2007) suggests a series of stages that move from acquiring knowledge through a range of media, through reflection, to creating digital content, thus providing a framework for engaging, dynamic and responsive teaching and learning.

As learners engage with the CyGen Webapp's and wrap-around text activities they develop shared understandings. They then apply their knowledge to real situations in the accompanying digital literacy activities, resulting in new digital artefacts to share. The digital literacy activities in the wrap-around texts draw upon the rich choice of authoring technologies children can choose from in their production of multimodal texts. These include making interactive images with hotspots, animated presentations, screencasts, quizzes, and online bulletin boards.

In this way, the Webapp's and wrap-around texts generate a social environment for learners to pursue questions that they find interesting related to contexts with real world relevance. There follows an opportunity to use their new knowledge to collaborate on the production of shareable products. This is consistent with a constructionist view of technology use that acknowledges the importance of social participation (Papert, 1980; Kafai and Burke, 2013). These ideas also resonate with the work of Mercer et al. (2003) emphasising the value of talk combined with digital activities for promoting children's literacy development.

Burden and Kearney (2018: see Figure 1) draw upon the idea of situated social learning mediated by tool use described above in their Mobile Pedagogical Framework, which recognises the potential for mobiles to enable students to construct individualised and customised learning opportunities. This framework embeds three constructs of mobile learning, personalisation, authenticity and collaboration, in the time-space context of mobile learning.

MOBILE PEDAGOGICAL
FRAMEWORK
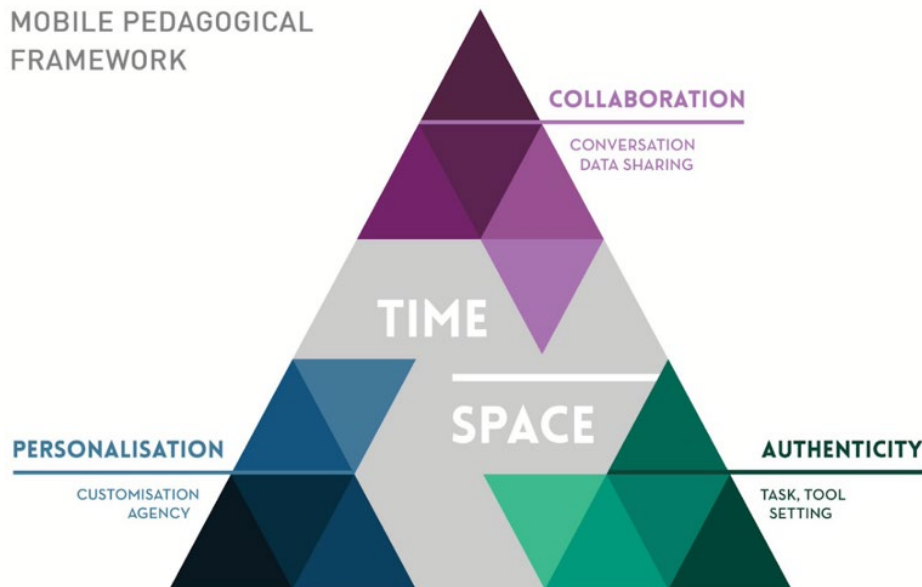
Mobile pedagogical framework adapted from Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. Research in Learning Technology 20

Figure 1: The mobile pedagogical framework (Burden and Kearney, 2018)

When applied to the CyGen Webapp's and wrap-around text resources, this framework helps to delineate a learning process whereby learners identify with each app character in a conversational way, engage with their authentic dilemmas in familiar settings, suggest solutions based on their own personal experiences, and then reflect and use their own voices to create shareable products that build upon the app's impetus. Together, the Webapp's and wrap-around texts provide contextualised experiential learning opportunities that move in and out of digital and physical spaces and combine real world collaboration with the creation of digital artefacts.

The development of the Webapp is based on previous experience from the Belgium CyGen team (our developers). Prior to the project's inception, they had developed an online multimedia tool, Skillville, for children to learn cross-curricular subjects. Skillville is a case-based learning (CBL) tool. Students apply their knowledge to real-world scenarios, promoting higher levels of cognition. In CBL classrooms, students typically work in groups on case studies, stories involving one or more characters and/or scenarios. The Webapp of UK, Greece and Belgium is based on the case-based learning principles. Benefits of using CBL in the Webapp include:

- 🌍 utilises collaborative learning;
- 🌍 facilitates the integration of learning;
- 🌍 develops pupils intrinsic and extrinsic motivation to learn;
- 🌍 encourage learner self-reflection and critical reflection;

integrates knowledge and practice and support the development of a variety of learning skills.

(Williams, 2005).

The content for each Webapp was delivered throughout several workshops with pupils, teachers and parents. These workshops were part of the design cycle (for further information see our reporting for IO2: Participatory Design Model). Each of the partner countries followed this structure and were supported by guidelines for each workshop. The following sections outline how each country-team used this model, adapting it to meet the needs of the children, teachers and parents within each country.

United Kingdom: Team reflections

Approach

During the UK Design Cycle, children were allocated to different specialist groups including the Young People's Panel, Design Team and Quality Team. The Design team were instrumental in working alongside the researchers to distil the key messages arising from the data collection following the Design Workshop (described in IO3) and sharing these with the Belgium research team as they developed the Webapp. Two Skype conversations were held between the Design Team, UK and Belgium research teams. The first of these took place following the Design Workshop and specific activities were included to enable everyone to get to know each other (e.g. sharing information about favoured hobbies and interests). This was an important part of the session, enabling the children to relax into a somewhat unfamiliar context. The children then used written scenario sheets as prompts to give a summary of the main issues that were identified by the whole group during the Design Workshop earlier in the day. It is important that these two activities were held so close together; the children were still able to recall the nuances of the discussions from the morning's session. The team in Belgium were able to ask the children questions – continuing our co-design approach – both about the information that they had shared, and about the proposed structure of the online tool.

The team in Belgium then outlined a first prototype based on the data received from the workshops. The prototype has been developed considering the earlier developments in Skillville and the case-based learning approach. The UK team also developed a character initiation document which mapped the children's ideas for characters, opportunities and challenges to the UKCCIS (UK Council for Child Internet Safety) framework (2018). This provides a framework of age-appropriate competencies to be developed by education providers.

During the second Skype meeting, the Belgium team demonstrated the outline model for the tool that had been developed following the earlier session with the design team, asking the children for their feedback. The children were offered three media through which to feedback:

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1) Verbal feedback offered during the discussion (captured by notes made by the Belgium team, and in notes made by one of the UK research team);
2) A structured feedback sheet, designed as a table with the column headings 'things I like' and 'things I don't like', and rows for them to record the feature of the tool that they were writing about;
3) Freehand notes written on blank pieces of paper and sticky notes.

The feedback was discussed with the developers in Belgium. Each of the suggestions from the pupils was assessed and the extent to which this could be tackled was examined. Where it was not possible to implement a suggestion, this was discussed with the children and the reasons why were given. This testing phase of the UK Design Cycle enabled the children to make further suggestions, and to develop resources to feed into this. The children completed Vox pops offering feedback on the app following the delivery of an observed session guided by the wraparound text. During these activities, the children felt that a character to offer an overall introduction to the Webapp was needed, and the UK mascot 'Bubbles' was chosen for this, with a video created by the children using the PuppetPals app. For the UK team, this reflects an important example of the increasing ownership that the children took of the Webapp's development, and the ways in which they critically considered the importance of the user experience throughout its design, drawing on their own interests and experiences of using internet-based technology in which the child user is central.

A review of an early design of the Webapp was completed by two academic advisors to the project who offered feedback on accessibility, ease of navigation, language and content.

Children's feedback and ideas
Figures 2-4 offer example notes written by the children during the second Skype meeting with the Belgium team. None of the children opted to feedback via medium (2). Feedback was offered verbally during the session, and through freehand notes and doodles on the sheets of paper that they had been given. On reflection, the research team felt that this enabled them to follow their own instincts regarding the important information to capture, illustrating the importance of a flexible, child-centred approach.
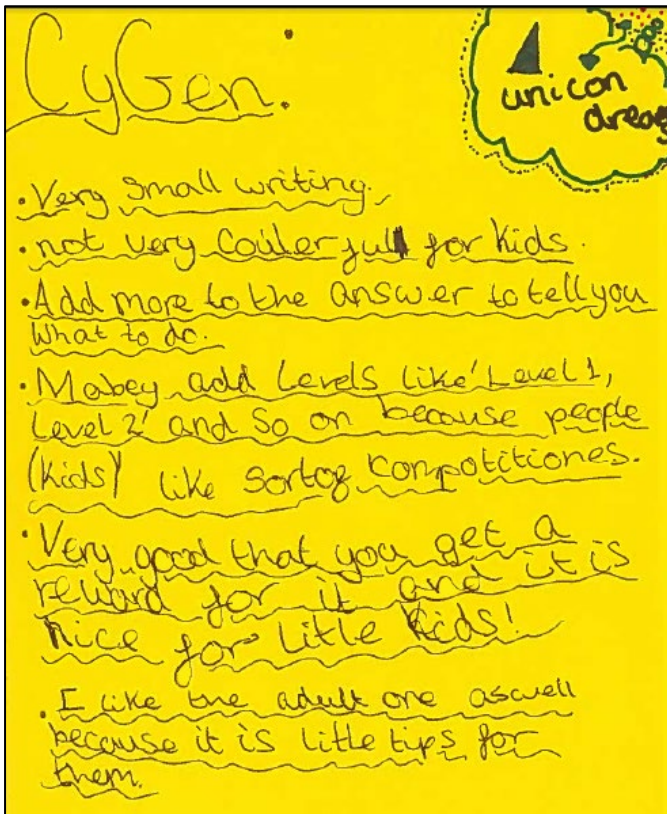
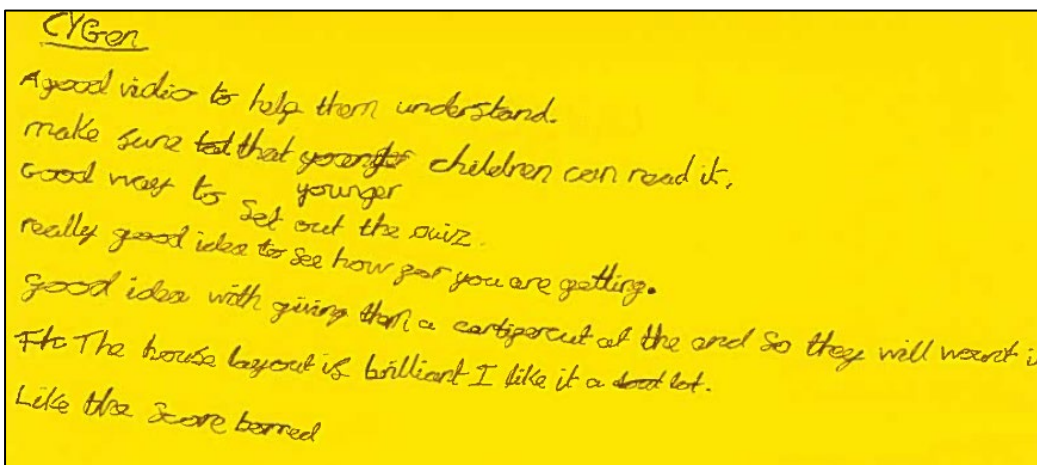*Figure 2: Example of child's notes from Skype with Belgium team (Design Workshop phase) (1)*

Figure 3: Example of child's notes from Skype with Belgium team (Design Workshop phase) (2)

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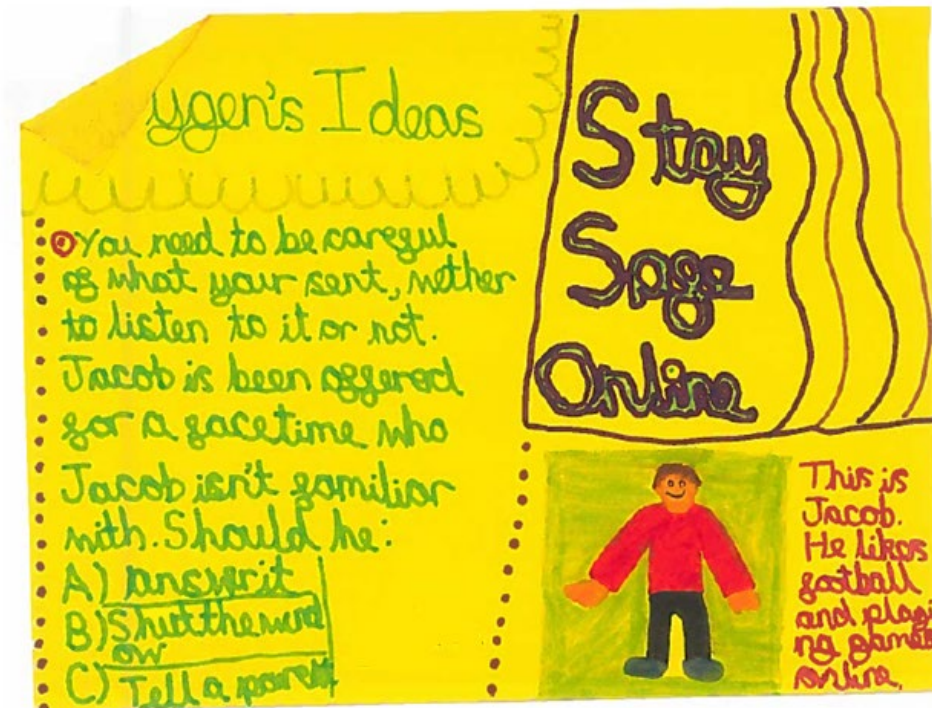Erasmus+ Programme
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Figure 4: Example of child's notes from Skype with Belgium team (Design Workshop phase) (3)

The children offered a range of feedback ideas, focussing on the aesthetics of the tool content, functionality, accessibility and language.

Aesthetics (how the tool looked)

The children noted that the tool could be more colourful to make it more appealing to children. In addition, the size of the font was considered to be too small, and the same was noted for the buttons available for navigating within the tool '[the] tick and cross could be bigger to spot'. They discussed the setting in which the tool would be based, with the Belgium team showing them examples of other tools that they had previously developed. They also noted that it was 'good that there's a variety of backgrounds'. The progress bar at the top of the page was also positively received: 'really good to see how far you are getting'. The children liked the idea of using characters drawn by a member of their school (see Figure 5). They also discussed the importance of using characters that both boys and girls would like, including unicorns and footballers.

Figure 5: Characters for the tool drawn by a UK child

Content (information included in the tool)

The Belgium team showed the children a short introductory video. The children commented that this was 'good' and 'short so that kids don't get bored'. They felt that this was a good way of sharing information. The children liked the short quizzes that were included in the demonstration, which they felt were clear, and commented that the notes provided alongside the answers could have more detailed information to help children to learn. Some of the wording was deemed 'tricky' for younger children, which highlights the importance of enabling, within the design, children to comment and reflect on the language that is included. In addition, they liked the feature of being able to receive an award, via a certificate, they felt that this would be 'nice for little kids', and that it was 'good to know what you're doing good and when you're at the end of a tool'. This is incorporated by the 'voices' of the characters. These characters are providing feedback to the pupils. The pages set aside for information for adults were also positively received, because they gave 'little tips for them'.

Additional functionality (additional elements for elements of the tool)

During the final data collection phase of the project, children shared some last suggestions for the Webapp. These will be considered in any future iterations and are noted here as useful points in the development of similar resources in future. The children suggested the possibility of having multiple levels throughout the tool, so that there was opportunity for progression when a section or level had been completed. Following a discussion about challenging words, the children also suggested that a list of difficult words and explanations be included in the tool: 'make a library for difficult words'. They also suggested that it was important to consider how things were phrased in the tool to make sure the words made sense to children using it in the future.

Accessibility and language

The Design Team wanted to know whether the tool could be made available in different languages, so that children in other countries could use it. The Belgium team confirmed that this would happen.

Character design in the UK

The starting point is our six characters, drawn by one of the UK year 5 children (aged 9 at the time). These characters, which were named by the children, were developed as the central characters in the Webapp. They guide users through six different activities designed to develop children's cognitive, technical and interpersonal skills in order to build their digital literacy and help them stay safe online. This approach is informed by:

a) The UKCCIS (UK Council for Child Internet Safety) framework (see attached) which provides a framework of age-appropriate competencies to be developed by education providers. These include:

- Self-image and identity
- Online relationships
- Online reputation
- Online bullying
- Managing online information
- Health, wellbeing and lifestyle
- Privacy and security
- Copyright and ownership

b) The data on skills that children, parents and teachers told us where important (see attached document 'UK design cycle analysis overview 31-01-2018b').

c) Guidance from Childnet – information on this website and twitter posts gives up-to-date guidance which maps which neatly on to the UKCCIS framework e.g. resources include:

- an online 'reputation checker'
- family agreements
- what you do if your child sees something upsetting
- SMART' advice' on the website and attached document in the CyGen analysis document 'UK design cycle analysis overview 31-01-2018b'.

d) NSPCC guidance (including the 'TEAM advice' for parents).

e) Internet Matters guidance: use of this advice ensures that we are offering up to-date advice relevant to the apps and platforms children are using currently, for example: https://www.internetmatters.org/advice/11-13/resources/

f) PHSE Association advice and the specific focus on building resilience – see scoping presentation and document. The PHSE recommends:

- Focussing on building competence, confidence and enabling children to thrive;
- Moving from information to illumination – the ability to remain in control of one's actions and emotions allows a person to think about what is going on, consider responses and then learn or recover from what follows.

In summary, all of the scenarios, activities, safety advice, linked platforms and online activities have been carefully designed to ensure that they are reflective of recommendations for this age group, as evidenced through the above range of resources.

These characters, their skills, interests and dispositions (character, temperament, outlook) are drawn from the things that children told us about what they like, what they do (on and offline), what concerns them and their strategies for staying safe. Table 1 offers an overview of each character, showing pertinent demographic information (age, gender, family members), the skills that their character profile has been aligned to (each has been developed with a particular UKCCIS Skill area in mind), key disposition and favourite online activity which is displayed through their profile. Additional information is offered where this is useful to understanding the character, and to show any links between other characters within the Webapp.

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	Age	Gender	Lives with:	UKCCIS Skills	Dispositions	Favourite Online Activity	Additional Information
George	9	Boy	Sister (Katherine, 14) Mother (Julie)	4. Managing online information	Critical thinker	Doing homework	• George loves doing his homework
Rilley	10	Girl	Sister (Jasmine, 18) Mother (Sue) Father (John)	2. Online relationships	Team player	E-mail	• Friends with Amir • Amir has invited Rilley to be in his first You Tube video
Lilly	10	Girl	Brother (Emile, 6) Mother (Beatrice) Father (Miles)	1. Self-image and Identity	Positive Curious	Hobbies	• Has a dog called Pip • Loves baking: Uses the Internet to watch cookery programmes and find new recipes. • Is friends with Amir and Violet
Violet	10	Girl	Mother (Karen)	6. Health, wellbeing and lifestyle 7. Privacy and security	• A team player • Confident (through judicious use of the internet)	Gaming	• Has a pet bat called Luna • Plays online with her friends, Amir and Lilly.

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Fifi	11	Girl	Dad (Steve), Step mum (Amanda)	5. Online bullying	• Egocentric • Intrinsically and extrinsically motivated	Social media	• Has a cat called Kim • Loves fashion and chatting to her friends on social media. She has a cat called Kim.
Amir	10	Boy	Mum (Aaila), Dad (Maalik), Sister (Dina)	3. Online reputation		Uploading videos on YouTube	• Amir is friends with Rilley • Amir has his own YouTube channel. He likes watching YouTubers such as DanTDM

Table 1: Overview of key character information

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For consistency and ease of navigation, each character section of the Webapp contains the same elements, supported by different content. These are:

- What is it (the challenge)?
- Opportunities and challenges
- What would you do?
- Things to do
- For parents and teachers

The activities centre on key skills, rather than problems, reflecting the ethos of the CyGen project: the online environment provides opportunities and challenges. Each character guides the user through an activity drawing on the interests shared with us by the children who participated in the UK Design Cycle.

The Webapp characters were further developed by the UK children through the use of Puppet Pals, an app which enables the user to create cartoon-based scenarios. The children used this application to develop short character introductions which were embedded at the outset of the Webapp and included voiceovers to bring the characters alive using child-friendly language that the children scripted themselves. It was not possible to animate the original drawings of the characters for this purpose, and therefore the children selected existing character templates from within PuppetPals which broadly reflected these. The creation of these character videos therefore enables users of the Webapp to hear from the UK children, through the characters, at the outset of each character story.

Wraparound text: development and content
The text accompanying the UK Webapp has been written for two audiences: teachers and parents. The Webapp is accompanied by resources on the www.CyGen.eu/resources webpage which includes quizzes and follow up activities intended to develop digital literacy skills. A set of additional notes explain the outline of the Webapp, and the functionality of the different sections and characters. These were developed on the basis of the character dispositions described in the previous section. Although the primary driver for the character development and activities were the children's ideas (as developed in the data and design workshop stages of the project), the team drew on focus group data derived from parent and teacher experiences. This ensured that the two documents (together forming the 'wraparound text' for the UK Webapp), reflected their needs to order to facilitate their interactions with children with reference to digital literacy including online safety.

Denmark: Team reflections

Approach

Our design process was based on design-based research and methods from Participatory design. The methodical approach focuses on the idea that the pupils' opinions and attitudes should be on a par with the designers – participatory design, and the idea of democracy as a value that leads to considerations for proper and legitimate user participation. The process emphasises the importance of making participants' 'tacit knowledge' come into play in the design process. We think about this as the value of being able to express and share 'aesthetic experiences' in the pragmatic sense of embodied experience enforced by emotion and reflection (Binder, 2011).

During the DK Design Cycle, children were invited into 3 different groups.

1: **The whole class** that worked with the participatory setups in the data and design workshop. They contributed with their reflections upon country specific themes, that frames a process where children and young people can share experiences about their behaviour on the Internet. The design workshop framed a process in which the students worked as co-designers of the learning content and tested specific work quests towards the country-specific dilemmas, gained from the data workshops (see Figure 6).

Figure 6: Data Workshop, Denmark

2. The Young People's Panel

3. The Design Team. The Design team participated in two meetings:
1. A design meeting that aimed to reflect on the developed materials and to develop new ideas to both form and content to the educational package.
2. A design meeting with the Belgium design team that aimed to communicate their ideas and desires, and to cooperate with the Belgian designer on developing a user-friendly and exciting solution for other students in Denmark.

The first meeting of the Danish Design Team was held just after the design workshop, and the project was therefore fresh in the children's memory. The design meeting took place at a small meeting room at the school, where there was access to pencils and tokens, post its and A3 paper (see Figure 7) Here the students joined in a design process where they were facilitated in different reflections on the learning potentials of the processes they had participated in at the various workshops. They were also invited into a design process where they were given the opportunity to come up with new ideas for both form and content of the teaching material.

The intentions of the work process were:

- 🌐 Reflections on good teaching materials
- 🌐 Are the dilemmas strong and the right ones?
- 🌐 How did you experience the processes in the workshops? Learning potentials?
- 🌐 Idea brainstorm and sorting out ideas based on the selected themes

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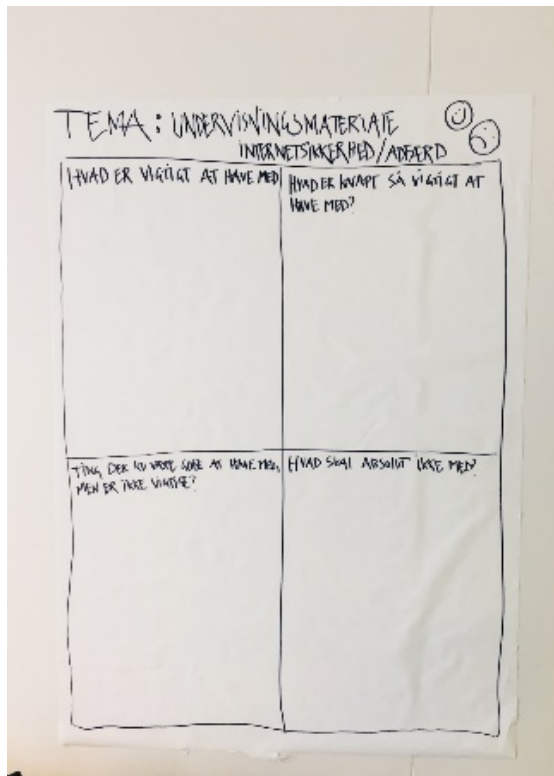Erasmus+ Programme
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Figure 7: Danish Design Team reporting template

One of the DK CyGen team's key findings in the workshops was that there are many learning potentials in the children's processes in the data and design workshop, where they reflected upon developing and testing the dilemma cards. We recognised new ways for silent knowledge to become articulated learning, and the possibility for deeper learning than simply quizzes and dilemma tests with right and wrong answers. When the Danish CyGen team met at the design meeting with the students, they were eager to share their preoccupation of how to facilitate students' learning and design processes in the design of the educational package. Their aims were how to make an educational package, and to support students to think and create and have a deeper learning.

When we met the children of the design team, we asked them about the learning potentials of the workshops and what they would prefer the educational package to contain. Here it was clear that as much as the Danish Design Team could see many possibilities in the reflections on their own experiences and dilemmas the students mostly wanted quizzes (see Figure 8).

FINDINGS

VIA TEAM	THE STUDENTS
The materials provide other learning processes – new ways for silent knowledge to become articulated	They wants quiz´s and games
We (adults and designers) see the posibilities in the refleksion on their own experiences and dillemmaes for children to become cypersafe	They have a lot of (unreflected) knowledge on the behaivior part (but don't want to share it with us – or each other)

They express that they are on top of it – but 4th grade isn´t |
| Learning by designing – deeper learning? - research potential! | They are eager to get more knowledge about safety on the internet.
They want cool design |

Figure 8: Danish Design Team

The Design Team also suggested that the digital educational package should be targeted at 4th grade, because they found that they lacked competencies in online security more than the 6th grade. At the meeting they worked with the dilemma cards to match the younger students, and together with the Danish CyGen team, they came up with a mock-up for the online tool. This was a first prototype to respond to at the next meeting with the BK design team.

Between the design meetings

Based on the data from the design workshop with the class and the design workshop with the Design Team, the Danish Design Team sent the BE team input to the first mock-up of our prototype for the BE design meeting. The children's Design Team wanted to have something to respond to and to give some feedback on the design, fonts and navigation. The first design elements for the homepage were four parts: a dilemma game, a quiz and the digital temperature of the Class (this should contain how to make the data workshop facilitator guide) and a teacher's guide/ wraparound text (see Figure 9).
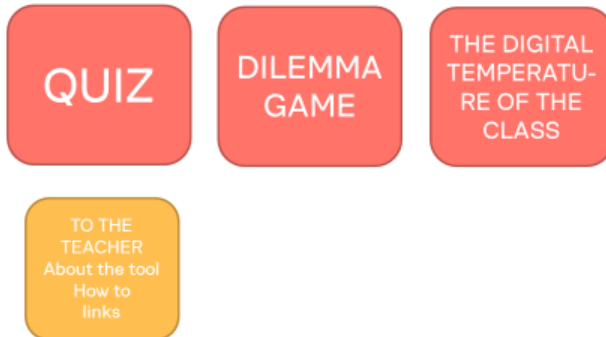
Figure 9: Danish Webapp front page

Attached were a PowerPoint with the sketch for the frontpage-navigation, introduction and a content for the dilemma-game. The PowerPoint also included a snip of the quiz, and a draft for an Epub file to test if it could work for the pupils to download the file from the CyGen Webapp directly to BookCreator on Chromebooks and iPads. We had added comments in the PowerPoint with descriptions for the navigation in the game in English.

Content

Dilemma Game

The Dilemma game was almost done and was based on three dilemmas created by the Danish student design team. Each dilemmas had different questions for children in 4th class to discuss in groups. There are no right or wrong answers. The Dilemma game is developed on the basis of the Danish children's own stories and experience of issues in relation to their own experiences in their digital leisure culture. A dilemma card is a situation description in the form of a case that contains several solution and action options that children and young people can experience in connection with their online life. The dilemma cards are the point of departure for the dilemma game in the teaching material.

Through questions and academic input, the digital learning tool facilitates the students through a process in which they together have to deal with a number of ethical and personal reflection and work issues. There are no right or wrong answers, but the dilemma game contributes to a space where children and young people can explore and innovate based on each other's experiences. There are also tasks where they have to find solutions and bid for ethical rules for behaviour and safety for children and young people on the Internet.

The dilemmas are based on real-life situations that students can reflect on, discuss and find solutions for. The dilemmas challenge students both intellectually and emotionally and set the scene for a qualified discussion on their own attitude and behaviour. They contribute to reflections on the influence of technology in communities, play and youth culture.

Quiz

The children also wanted quizzes in the online tool. Together with the Danish CyGen team they pointed out 3 themes from the work with the dilemmas, that could be themes for the quiz:

1. Profiles - Who are you online - and who are the others?
2. Communication on social media
3. Technical security and digital tracks

The BK design team meeting

The Skype meeting between the students and the BE design team went well. The meeting was in a small meeting room at the school, and the Skype solution worked. During the Skype meeting, the Belgium team demonstrated the beginning of the tool that had been developed and asked the children for their feedback. The students had some difficulties speaking in English, but even so the meeting went well. The students told the BE team how they wanted the online tool to look and what it should contain, and the BE team were able to ask the children questions, both about their wishes for the content in the online tool, and about the proposed structure of the online tool.

The children's Design Team explained that they wanted an inspiring and exclusive look for the online tool like Instagram and musica.ly type of design (see Figure 10). Less is more, and with one or two cool colours and a cool font. The design team also liked the design (graphic, font and designs) of the site:
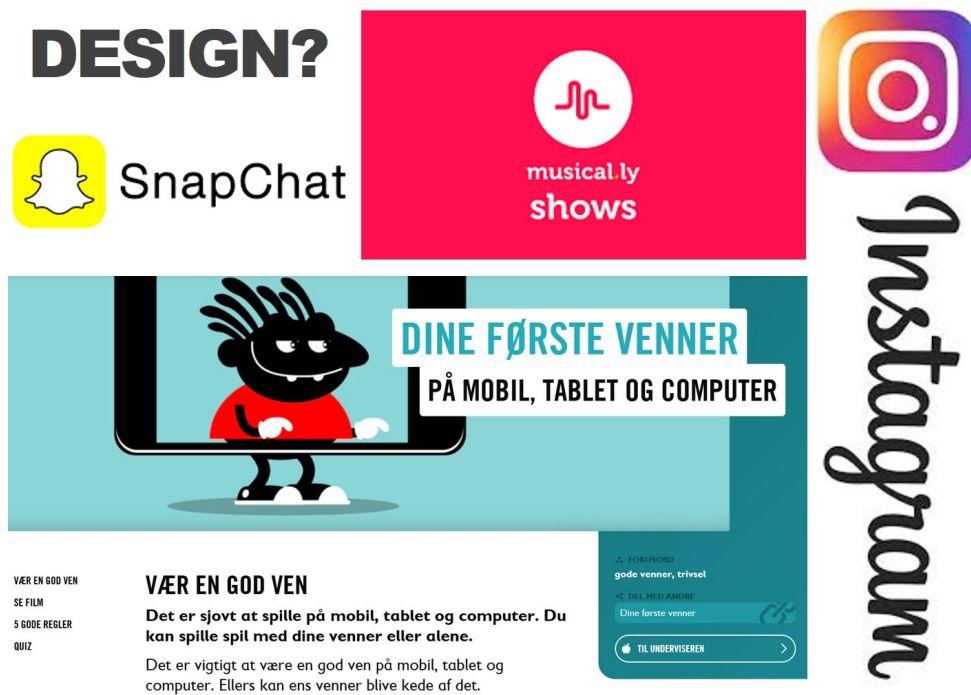https://redbarnet.dk/skole/sikkerchat/dine-foerste-venner-paa-nettet/#7q2v36ka

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Figure 10: Design graphic: Danish Webapp

The Danish CyGen team ensured that notes from the meeting where collected. After the meeting, the Danish CyGen team developed the content based on the children's perspectives for the prototype that the students could test with some 4th grade students.

Design of the final online tool to test

A quiz was developed which was one of the key elements of design promoted by the children. They felt that the quiz should not only contain wrong or right answers but also give the target group the possibility to think for themselves and give them insight about different solutions. The design for the quiz was based on the student's wishes on the themes 1. Profiles - Who are you online - and who are the others? 2. Communication on social media 3. Technical security and digital tracks (see Figure 11). For each quiz theme, an introductory video was developed for the purpose to give the target group insight and knowledge about the theme.
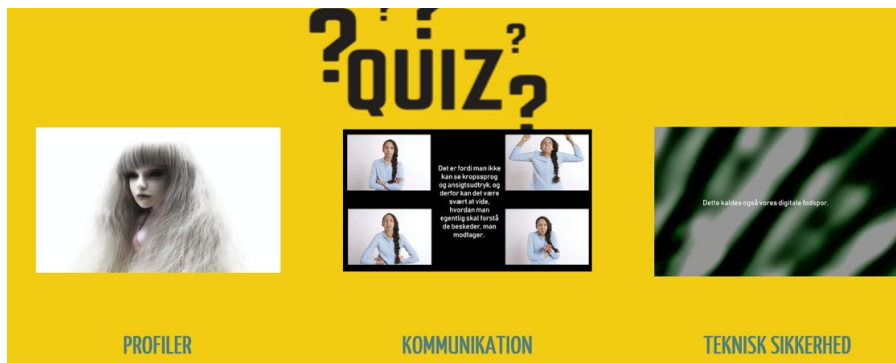
Figure 11: First draft themes with videos user interface online tool

The quiz themes are based on several questions with both right and wrong answers, including some with several correct answers (see Figure 12). For each answer, the student gets a brief description of why or why not the answer is correct, and good advice on how they can behave in the future if they experience similar online situations. Each theme contains three different questions and each quiz question contains three different possible answers.
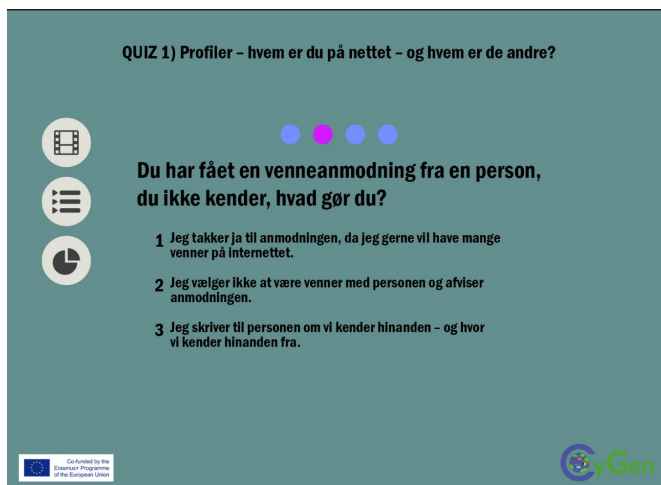

Figure 12: Example of quiz question design

The Danish CyGen team also participated with suggestions on how the online tool could get a simple design according to the students' wishes. The design also included the children's suggestions for setup, colours and font (see Figure 13).

Figure 13: Example of user interface design

The final elements of the quiz were merged into the final educational package, after the design meeting with the BE design team for the final test with the children from 6th and 4th grade. After this session the BK team were sent the revisions for the final online tool.

The test

In the design process, the students tested their online tool with their target group, the 4th grade (see Figure 14). The test of the tool was based on a first prototype version. The test went well, however, and the students received a number of answers from the test. They tested it with special focus on time issues, difficulty, topicality, flow, layout and navigation. They observed the 4th grade students testing the prototype and afterwards they interviewed the students about the tool.

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Figure 14: Testing the Webapp

The conclusions of the test were:

- The dilemmas must be simpler, with not too many different persons in the dilemmas.
- Don't call it a (dilemma) game but a school assignment – then it's okay.
- Great potentials in the story - the narrative design is good to base the assignments upon.
- Important with coolness and layout.

The children are experienced media consumers and media producers, and they therefore have strong ideas about the designs they interact with. After the test the Danish CyGen team communicated the test results with the BE design team for the final design of the tool.

Wraparound text: development and content

The text accompanying the DK online tool has been written for teachers. In making the DK online tool there has been an attempt to design a tool that is very user-friendly, and which does not need a long user manual. The design should be so simple that a teacher can use it with not much preparation for teaching and parents can use it for reflections with their child about their online safety.

The wraparound text is designed as an introduction to the background of the tool. That is based on the Danish children's own stories and experience of issues in relation to their own experiences and their experiences in their digital leisure culture. The wraparound text contains both a brief description of the project behind the package

and a description of the individual content elements in the package. The wraparound text also seeks to inspire teachers to take pupils' perspectives and experiences as a point of departure to allow their unarticulated knowledge to be expressed in co-operative processes, in which they can develop a common strong mindset and competencies to act in the future in a digital world.

The design and the wraparound text is based on a brief interview with the schoolteacher in the participating school. The teacher described an everyday life with short preparation time and a need for educational packages that in their design and content inspire and support the teacher in thinking and rethinking his or her teaching in relation to the subject.

Belgium: Team reflections

Approach

The design process for the Belgium team was based on the design-based research and methods from participatory design. The methical approach focuses on the pupils' opinions. Two workshops have been implemented to collect data for developing the Webapp. A detailed description of the design cycle is covered in IO2.

The developers of the Webapp were also involved in the workshops with pupils. This sped up the process in comparison with the other designs of UK, Denmark and Greece. There were no bilateral skype meetings with pupils needed. The pupils in Belgium had the opportunity to have a sneak preview of the first Webapp of the UK, meaning that the pupils had a better understanding of the possibilities of the Webapp.

The first version (UK version) was used as a template to develop the next versions of the Webapp. Together with the pupils, we organised a session to write stories (see Figure 15) that underpinned the characters. Pupils were also asked to write down skills that are important to stay safe online (see Figures 16). The stories and skills are connected to the data collected during the data and design workshops.

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Figure 15: *Story writing example by pupil*

Figure 16: *Important skills listed by pupil*

The characters of the Belgium Webapp are connected to the following themes/topics:

- 🌐 Privacy (settings in apps and games)
- 🌐 Bullying on social media
- 🌐 Hackers
- 🌐 Computer viruses

These themes were based on the data from the design workshop and the input from the Young People Panel (see Figure 17).
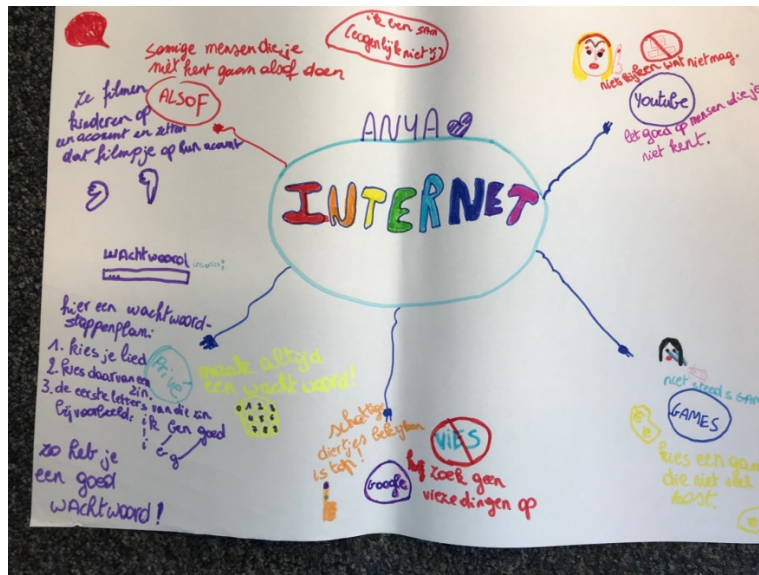
Figure 17: Mind map created by YPP member

All of the scenarios, activities, safety advice, linked platforms and online activities have been carefully designed to ensure that they are reflective of recommendations for this age group. These characters, their skills, interests and dispositions (character, temperament, outlook) are drawn from the things that pupils told us about what they like, what they do (on and offline), what concerns them and their strategies for staying safe.

Greece: Team reflections

In the framework of the design-based research of the CyGen project, two workshops have been implemented in the context of the Greek design cycle: the data workshop and the design workshop. The first of the two CyGen workshops, the data workshop, aimed at leading students towards understanding safe online behaviour through making creations that were meaningful to them. These creations, according to the project guides, were Lego and play-dough constructions as well as the usual drawings student create at this age (10 year- old children), all relating to opportunities and challenges the children faced online (see Figures 18 and 19). Children tend to be unaware of potential dangers when using the web and some of them overuse it ignoring potential dangers and risks. During the workshop, children focused on recreation through the internet (watching movies, listening to music) as well as on dangerous situations (gaming), discussed issues like viruses, scary situations (e.g. blue whale), and effects like sharing personal data. They came up with such constructions such as Lego viruses, robotic figures, mobile/tablet and computer screens/consoles, constructions showing messenger or other media communications and many more, in order to depict online opportunities and challenges.

Figure 18: Greek Data Workshop

Figure 19: Greek Design Workshop

The second CyGen workshop, the design workshop, focused on initiating discussion on general and specific online dilemmas already derived from the previous data workshop, that is children's constructions regarding online opportunities and problematic situations. Children identified challenges like 'talking to strangers' 'phishing messages', 'personal data' and their sharing, 'surfing unknown web pages' and 'playing dangerous games'. Next, they had to stick to one of the above problems and work on their own in order to construct the identified problem by using a different kind of material from the previous data workshop. Then students had to draw a poster in their groups in order to depict 'their group's problematic situation' and offer relevant advice to other children or people through their posters (see Figures 20, 21 and 22).
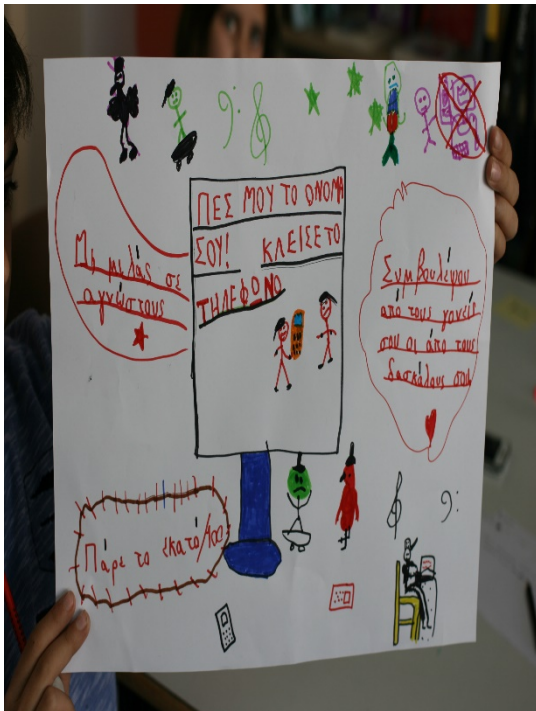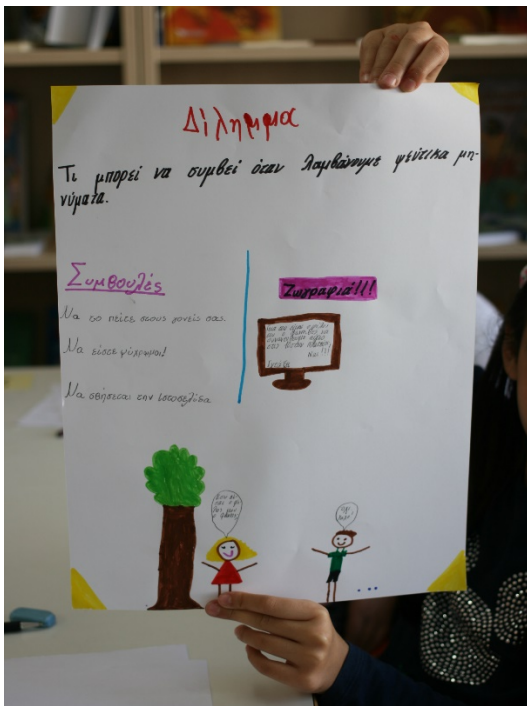
Figure 20: Poster by Greek child (1)

Figure 21: Poster by Greek child (2)
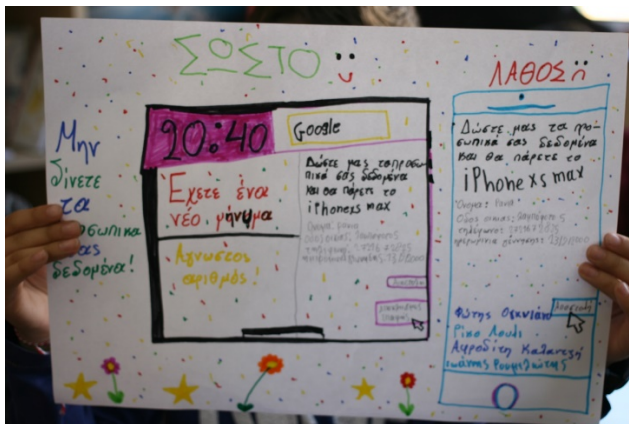
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Figure 22: Poster by Greek child (3)

Reflecting on this 'workshop' approach to the design of new learning contexts, there is evidence of design-based research elements of scoping, continuous cycles of design and redesign (iteration), the way 10-year-old children worked through a project-based model of learning in three levels, individual/pair/group within an authentic setting and with an upcoming outcome (poster production).

After the implementation of the two aforementioned workshops (data & design) which led to the production of the dilemmas of the Greek CyGen Webapp, the ICT teacher of our team communicated with the developers in Belgium so as to see what could be done in order for the Greek version of the CyGen Webapp to 'come into online existence!' Both parties agreed that the Greek team had to end up with the names of the Webapp characters and whether there would be a story to follow them. The Greek team felt better if they left the story behind each character for the different students who will use the Webapp during the sustainability period and maybe later. The Greek group thought that they would like to boost children's creativity by having them imagine the story of the CyGen characters' lives. As a result of this, they ended up with the following characters and their dilemmas (see Figure 23).

Figure 23: The Greek CyGen Webapp characters and their dilemmas

From left to right:

- 🌍 **Helen**
  Helen's dilemma: Online communication with strangers
- 🌍 **Fofo**
  Fofo's dilemma: Personal Data sharing online
- 🌍 **Joseph**
  Joseph's dilemma: Unknown Web pages
- 🌍 **Stephania**
  Stephania's dilemma: Inappropriate online games
- 🌍 **George**
  George's dilemma: Fake (phishing) Messages

Three activities are suggested for the dilemma of each of the characters of the Greek CyGen Webapp in the warm-up, presentation and practice – production model. Specifically, for Helen, the first activity asks children to reflect on apps they use to communicate online, the second activity, as in the rest of the characters, presents her dilemma and the solutions/advice offered, while in the third activity, kids have to enter the safe internet web page and explore and discuss online dangers.

In Fofo's case, students create an infographic for the first activity in which they have to distinguish between online opportunities and challenges, the second activity presents

her dilemma with the proposed actions, while the third activity asks students to play a quiz on the safe internet web page and discuss.

For Joseph, the first activity asks students to write on a padlet their views about how they would act if they received a rather strange message on Messenger/Viber, the second activity presents his dilemma with the suggested options, while the third activity asks students to play a quiz on the safe internet web page and compose their answers to that quiz on a Powtoon creation.

In Stephania's situation, the first activity asks students to fill in a mind map about online games they usually play, the second activity presents her dilemma with the options available, while the third activity gives them the opportunity to browse and play some safe online games on the safe internet web page.

For George, the first activity asks students to play a quiz about netiquette on the safe internet web page and create a ThingLink infographic with some of the answers they provided on the quiz. The second activity presents his dilemma with the provided options, while the third activity asks them to play a quiz about chat rooms on the safe internet web page and discuss whether they have received fake messages while playing online games (through the games' chat rooms). Then, students are given a mind map to complete in Mindomo in which they have to recognize potential fake messages.

It is our firm belief that in line with the above described app methodology, students' 21st century skills are practiced in the most optimal way as they have to explore online opportunities and challenges, go online to find solutions in an enjoyable way (quizzes), discuss the app's options on dilemmas about online safety, collaborate with classmates to create things (either constructions or digital outcomes) and explain the procedure as well as communicate to solve problematic situations. In this way, they fulfil some of the most important goals of contemporary education: learner autonomy intertwined with innovation (CyGen Webapp) and creativity (CyGen methodology).

Digital Education Programme development: Final developer reflections

The developers of the Webapp have a lot of experience in developing educational tools at local level. The developers in the Belgium team are learning technologists with a degree in Teaching and in Technology Enhanced Learning. They have a lot of experience in creating online tools, even in an international context. They recently developed tools for refugees to learn languages and learn about cultural habits in European countries to fully integrate in another country.

This project was new for them, they are used to working with teachers and it was the first time they developed a Webapp together with children. When children are invited to make a Webapp, they have no limitations on ideas. It was therefore important to show the possibilities of the Webapp and its limitations.

The first design cycle was the most challenging given that there was no established prototype and the methods of the design cycle were being applied within the project for the first time. The development of a PowerPoint template after the Design Workshop helped to create shared understandings and design goals in creating the online tool. This is a key learning point for our team, and useful for other future projects. As we have noted elsewhere in this report, the needs of the different age of children involved in the project in Denmark required the development of a Webapp with an alternative template and therefore the learning/ communication approaches that were developed during first design cycle in the UK were immeasurably helpful.

When we finished the first design cycle with the UK, we thought it would be easy to design the next phase with Denmark, Belgium and Greece. But it was a bit more complicated. Due to the age differences in Denmark, we had to develop another tool for the pupils in Denmark.

Another challenge working with international partners is language, time and place. The different native languages of the project partners can lead to challenges in understandings and occasionally misinterpretations. The cyclical design of the project, including regular management and team meetings with all partners, alongside Transnational Partner Meetings (TPM) between each design cycle, played a crucial part in our developing shared understandings throughout the collaboration. During our final

TPM meeting in Hasselt, the Belgium and Greek teams worked intensely together in person. Virtual communication between the remaining partners was always supportive and collegial, however with the nature and nuances of co-developed resources, face to face interactions with the Greek team expedited the development period of their Webapp.

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