Project Title:

INFRASTRUCTURE AND INTEGRATED TOOLS FOR PERSONALIZED LEARNING OF READING SKILL

Project Acronym:

Grant Agreement number:

731724 — iRead H2020-ICT-2016-2017/H2020-ICT-2016-1

Subject:

D3.1 User Requirements Analysis and Pilot Specification

Dissemination Level:

INTERNAL

Lead Beneficiary:

UGOT

Project Coordinator:

UCL

Contributors:

All Partners

Revision	Preparation date	Period covered	Project start date	Project duration
V1	June 2017	Month 1-6	01/01/2017	48 Months

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement No 731724

Table of content

Table of figures

1 EXECUTIVE SUMMARY

The aim of the iRead Project is to enhance the technology previously developed during another EU FP7 Project, iLearnRW, elevating it to a flexible, scalable and cost-effective cloud-based infrastructure offering personalised learning services.
The iLearnRW Project (Integrated Intelligent Learning Environment for Reading and Writing) aimed to facilitate the learning process for children with dyslexia and/or dysorthographia. The iLearnRW project developed two integrated tablet apps, Words Matter Game and Words Matter Reader. Words Matter Game introduces key phonics skills through nine different multisensory activities. The Words Matter Reader uses knowledge about dyslexia-friendly reading and makes it possible to highlight different phonics features in any text. This feature is made possible by the phonics engine which also powers the Words Matter Game.
While iLearnRW focused on dyslexia for Greek and English readers, iRead broadens the scope to include also beginning readers in Germany, Greece, the UK and Spain, as well as EFL readers in Greece, Spain, Sweden and Romania. As a result, the user requirements gathered in the iLearnRW Project need to be extended with requirements for all the other target groups.
This deliverable describes the results of an analysis of the curricula of the countries involved in the project, as well as user stories based on the interviews performed in all countries. These user stories describe the teachers' requirements for the iRead system on a high level will form the basis for further investigation of the details for the different components of the iRead system.

2 User Requirements - Data Gathering

The iLearnRW project gathered requirements for dyslexic readers through interviews in the UK in its first year. These requirements were checked for the Greek context through the pilot evaluations in the final year of the project.

Unlike iLearnRW which focused on children in the UK and Greece with dyslexia, iRead additionally considers reading skills in first and second language learning by primary school children across Europe. Specifically, iRead targets students who:

- make typical progress in learning to read;
- struggle with reading due to dyslexia;
- learn English as a foreign language. The choice of English as a foreign language (EFL) is motivated by its prevalence across Europe, with 95% of students of upper secondary school studying English [5].

Thus, in iRead we gathered additional user requirements for beginning readers and EFL readers through curriculum analyses and interviews with teachers in all countries involved in the pilots. In order to determine the relevant curricula and recruit teachers having experience with the relevant student groups in each of the countries, we needed to define the relevant age groups or grades for the iRead system. In the countries involved in the project, the reading process takes place over a period of 3-4 years. However, the first year is devoted to developing children's phonological awareness and initial letter knowledge. For this reason, and given children's general maturation, we focused on children's grades 2-4 for beginning readers and ages 9-12 for dyslexic readers. For EFL, we focused on the ages or grades that most clearly match the A2/B1 level of the Common European Framework of Reference for Languages [4], which was grade 5 or around 11 years of age.

Reader groups	Curricula and Teachers from groups/ages
Beginning readers	Grade 2 (at least one year formal schooling)
Dyslexic readers	Grade 4 / from 10 years
EFL readers	Grade 5 / from 11 years

Table 1 Reader groups targeted in iRead with specification of curricula and teachers

2.1 Curriculum Analysis

As Dillenbourg [3] points out, one of the constraints for teachers to use any educational technology in the classroom is that they have to follow the curriculum. Without adhering to the curricula in the different participating countries we are unlikely to be able to successfully exploit the iRead system. A curriculum analysis was thus performed in order to define similarities and differences between the countries in the official documents that schools need to apply for literacy and language learning. Since the iRead system will not be able to accommodate all learning goals defined in the curricula for all countries, as these will be bounded by the language areas defined within the project, a selection needs to be made. Language areas are thus selected based on two criteria:

(a) those that are most relevant to reading in general as a language skill and linguistic process, and

(b) those that are found to be more difficult to develop and are, therefore, often emphasized in teaching.

The analysis of the curricula will mainly provide input for the first selection criterion, while input for the second criterion will be given through the teacher interviews. Each of the partners involved in the pilot studies gathered the relevant curricula for this analysis and

summarized the parts related to reading. They used the definitions of the different readers groups as given above to determine which curricula were relevant.

2.2 Interviews

Since not all countries had the same opportunities to recruit teachers for the interviews, no fixed number of interviewees for each country was set. Instead, we defined several axes to help make a selection of interviewees, meaning that it would be preferable if the interviewees represented different places on those axes in each country. Thus the research took a critical sampling approach that sought to maximize differences in order to address the possible divergent requirements that yet apply to different technology adopters [8].

- Technological advancement
- Pedagogical models
- Socio-economic background

The final set of interviews is presented in Table 2. In some cases, group interviews rather than individual interviews were performed. We therefore indicate both the number of interviews and the number of teachers. We note that in the case of dyslexia, given the user requirements carried out in iLearnRW, we did not proceed with additional interviews.

Country	EFL interviews (#teachers)	Beginning Readers interview (#teachers)	Dyslexic Readers interview
UK		6 (8)	1
Sweden	7 (11)		
Spain	6 (7)	5	
Germany		5	
Greece	7	4	
Romania	9 (10)		
Total	29 (35)	20 (22)	1

Table 2 Interviews performed in all countries

In total we thus performed 50 interviews involving 58 teachers in the six participating countries. Each interview lasted around one hour.

Interviews were semi-structured, meaning that there was an interview guide for interviewers to keep in mind (see Appendix), but the interviewees were engaged in a natural conversation where unexpected lines of thought could be followed up as well [10].

In order to make the iRead scenario more concrete to the teachers during the interviews, we used two scenarios, one for beginning and dyslexic readers and one for EFL readers (see Appendix).

Interviews were performed face-to-face or through telephone and were recorded after the teachers giving their informed consent. All informed consent forms have been kept for our records. All interviews were then listened to and extensively summarized (and in several cases transcribed) by each partner, after which an overarching analysis was performed by the lead of this task, UGOT, based on the summaries.

3 Curriculum Analyses

Based on the curricula gathered from the different countries, we determined several areas that were quite similar. However, in some countries, particular parts of the curriculum received special attention. In such cases we have added those particular parts with reference to which country has specified them in the curriculum.

3.1 Beginning and Dyslexic readers

As there is no separate curriculum for dyslexic readers, and this learner group is taught material found in early years' curriculum, we have combined the learning goals from the curricula for beginning readers in their mother tongue with the curriculum for slightly older readers with dyslexia in their mother tongue.

3.1.1 Meta level goals

1.	Students should develop a positive attitude towards reading.
2.	Students should also be able to reflect on their own reading progress **(Germany)**.

3.1.2 Reading Aloud

1.	Students should be able to read aloud with reasonable fluency

3.1.3 Phonology

1.	Students should be able to identify sound- letter correspondence.
2.	Students should be able to identify phonemes, e.g. vowel-consonant digraphs, and apply this knowledge when encountering new words.
3.	Students should be able to sound out the taught graphemes when reading and recognize alternative sounds for graphemes.
4.	Students should be able to read words with more than one syllable.
5.	Students should be able to note unusual correspondences between spelling and sound.
6.	Students should be able to distinguish between homophones and near-homophones.

3.1.4 Morphology and morphosyntax

1.	Students should be able to identify and understand word structure, e.g. prefixes (un-) and suffixes (-s, -es, -ing, -ness, -ful).
2.	Students should be able to use word parts to identify new words.
3.	Students should be able to understand the morphological structure of words.
4.	Students should be able to understand how to add further suffixes.

3.1.5 Vocabulary

1.	Students should be able to read frequently encountered words quickly and accurately (This is related to phonology as it is an outcome)
2.	Students should be able to read accurately at word, sentence and text level. (This is related to phonology as it is an outcome)

3.1.6 Text comprehension and syntax

1.	Students should be able to recognize parts of speech, e.g. verbs and nouns. **(Germany)**
2.	Students should be able to recognize sentence types, e.g. questions and

	statements. **(Germany)**
3.	Students should be able to read words with contractions and understand that the apostrophe represents omitted letters **(UK)**
4.	Students should be able to understand what they read.
5.	Students should be able to infer meaning not explicitly expressed in the text.
6.	Students should be able to use strategies such as re-reading, predicting, and contextualizing for understanding texts.

3.1.7 Text types

1.	Students should be able to read various text types, e.g. rhymes, poems, fairy tales, non-fiction, plays, songs, textbooks
2.	Students should be able to read texts pertaining to their own lives and on familiar topics.

3.2 EFL readers

3.2.1 Phonology

1.	Students should be able to identify and understand sound-letter/sound-grapheme correspondence. For **Romanian** EFL readers, there is specific focus on vowels and consonants in English that do not exist in Romanian.
2.	Students should be able to note unusual correspondences between spelling and sound.
3.	Students should be able to distinguish between homophones and near-homophones.

3.2.2 Morphology and morphosyntax

1.	Students should be able to identify and understand word structure, e.g. prefixes and suffixes.
2.	Students should be able to recognize patterns and associated meaning.
3.	Students should be able to understand how to add further suffixes.

3.2.3 Vocabulary

1.	Students should be able to read frequently encountered words quickly and accurately (This is related to phonology as it is an outcome)
2.	Students should be able to read accurately at word, sentence and text level (This is related to phonology as it is an outcome)
3.	Understand the use of words and fixed expressions in specific situations. (**Sweden**)

3.2.4 Text comprehension and syntax

1.	Students should be able to obtain and process information from a variety of texts.
2.	Students should be able to identify the main ideas and key words in a text.
3.	Students should be able to use the context to identify new words.
4.	Students should be able to predict meaning from the context.
5.	Students should be able to use tools, e.g. dictionaries and online resources, to understand texts.
6.	Students should be able to adapt reading strategies to different types of texts.

7.	Students should be able to transfer strategies learnt from first language reading to EFL texts.

3.2.5 Text types

7.	Students should be able to read texts they may need in daily situations, e.g. timetables, basic instructions.
8.	Students should be able to read dialogues, songs, poems, game rules.
9.	Students should be able to read texts pertaining to their own lives and on familiar topics, e.g. personal experiences.

3.3 Implications

The curricula for L1 do not mention orthography (correctly recognizing letters), as this skill is a prerequisite for all other learning goals and should preferably be addressed during the first year of formal schooling. However, for dyslexic children, this is an additional learning goal that the iRead system should support. Furthermore, as Snowling and Hulme [11] point out "It is not necessary to wait until a child has a reading problem or a 'diagnosis'; early intervention to promote the foundations of reading (via explicit training in phoneme awareness and letter knowledge) is beneficial". Therefore, the iRead system for beginning and dyslexic readers should pay particular attention to phoneme awareness.

While the Beginning readers curricula in all countries tend to have and approach that goes from segments to whole (focusing on phonology and morphology), the EFL curricula tend to focus more on whole-language learning, e.g. working with text comprehension using dictionaries and L1 reading strategies, and the use of standard words and expressions in certain situations. While text types are often similar for beginning readers and EFL readers, there are some differences to take into consideration. Beginning readers in their native language have a much larger vocabulary than EFL readers. On the other hand, EFL readers are more practiced in reading. The EFL readers should also engage in reading texts about things they may need in daily situations (like menus, time tables etc). Considering this, the texts can be similar, but not necessarily the same.

An implication for iRead is that while the games can provide support for the approach of segment to whole learning of reading skills, the reader must specifically be usable for the EFL context, providing ways for students to work with text comprehension by using reading strategies and vocabulary lists.

4 Technical considerations

4.1 Tablet Technology

In order for the iRead system to function some hardware is necessary. While in some countries iPads have generally been adopted in schools, other countries have adopted Android technology, or do not have any technology that can be used for iRead. An overview of the technological situation in the schools that were interviewed is given in Table 3 .

Country	# Different schools interviewed	# Schools using iPads	# Schools using Android tablets	# Schools without tablets
UK	3	3[1]		
Sweden	7	7		
Spain	6		5	1
Germany	5	3		2
Greece	10	1[2]	3 (unspecified tablets)	6
Romania	9			9
Total	40	14	8	18

Table 3 Type and use of tablets in all countries

The issue of which tablet technology should be targeted with the iRead system is thus difficult. Many schools in Sweden and the UK already own iPads, which would require the system to be compatible with iPad in order to allow for successful exploitation. Schools in Spain usually have Android tablets, while schools in Greece, Romania and Germany often do not have any tablets yet. Furthermore, while some schools may have iPads or other tablets, they may be of older generations.

The project does not have the resources to develop for both platforms and all generations. Furthermore, iPads are generally more expensive than Android tablets, as well as development for iPads. Android tablets and even mobile phones also play an important role in the home market. In light of these considerations the project will focus on developing the complete system for Android to be used during the evaluations. However, further specification of how exploitation will be possible on iPads needs to be performed.

4.2 Access to Network

Although the intention of iRead is to offer cloud-based technology, the reality is that not all schools in Europe have reliable wifi connections. Many schools in Sweden, Germany and the UK have a rather reliable wifi connection, but there are also schools, especially in Romania and Greece that do not have a stable network connection. Furthermore, the networks may become unstable if many children at the same time are using them. Therefore, the iRead system needs to be able to handle short wifi drop outs, and should preferably even have some parts that are usable when offline, and that only will be updated with learner information and new content when there is a wifi connection.

[1] One of the schools has access to iPads but they are from the first generation.

[2] The interviews were all held at the same private school that uses iPads. However, the situation for most public schools is that there are no tablets available.

5 Constraints and User Stories

The iRead system should be useful and usable for both teachers and students in the school context, which is rather complex. Full, detailed requirements for such a system cannot be developed easily as these requirements will inevitably change over time, for example because of e.g. other software and technologies the system should interact with and changing user populations. We therefore start with simple, knowable approximations to the final requirements, and then continue to increment the detail of these requirements throughout the life of the development. This incremental requirements refinement is thus intertwined with design, coding and testing at virtually all stages of production activity. In this way, the requirements work product is as accurate and useful as the final software itself" [9].

Here we will describe user stories [1] that capture how teachers envision to use the iRead system in their classroom. These user stories are revealed through the interviews with teachers (both during iRead and the iLearnRW project for dyslexic readers). Note that these user stories are written from the perspective of the teachers. In a way they serve as proxies for the students, who are also important users of the iRead system. However, given the fact that teachers act as gatekeepers, we will here treat them as the main users. During the design of the games and the reader we will gather additional user stories from the children and refine the user stories for the teachers.

The user stories presented here focus primarily on how the iRead system can support teachers' responsibility to provide student learning related to reading. However, according to Dillenbourg [3] "[…] classroom life is populated by activities or events that are not part of the scenario […]. There is indeed a continuum of activities from those intrinsic to the scenario to activities extrinsic to learning". The range of activities that teachers are responsible for can be summarized according to Danielson's framework for teaching [2]. This model has four domains of teaching responsibility, and each of these domains has several components (see Table 4).

Primary Domain	Component
1. Planning and Preparation	**A.** Demonstrating Knowledge of Content and Pedagogy **B.** Demonstrating Knowledge of Students **C.** Setting Instructional Outcomes **D.** Demonstrating Knowledge of Resources **E.** Designing Coherent Instruction **F.** Designing Student Assessments
2. The Classroom Environment	**A.** Creating an Environment of Respect and Rapport **B.** Establishing a Culture for Learning **C.** Managing Classroom Procedures **D.** Managing Student Behavior **E.** Organizing Physical Space
3. Instruction	**A.** Communicating with Students **B.** Using Questioning and Discussion Techniques **C.** Engaging Students in Learning **D.** Using Assessment in Instruction **E.** Demonstrating Flexibility and Responsiveness
4. Professional Responsibilities	**A.** Reflecting on Teaching **B.** Maintaining Accurate Records **C.** Communicating with Families **D.** Participating in a Professional Community **E.** Growing and Developing Professionally **F.** Showing Professionalism

Table 4 Domains and components of Danielson's framework for teaching

According to Dillenbourg [3] the inclusion of extrinsic activities that teachers have to perform, comes with several extrinsic constraints that need to be dealt with as well. Below, we will give

each of those constraints and consider what overarching consequences they may have for the design of the iRead system:

1. Time constraints: Time is a scarce resource in teaching. For instance, teachers often blame constructivist methods for being too time-consuming. In addition, a class is often segmented into slices of 50 min: time management is a permanent concern of teachers. We thus have to consider how the activities in iRead can fit the tight schedule in the classroom, allowing for shorter activities.
2. Curriculum relevance: Teachers are not free to teach whatever they like. In order to address this constraint, we have looked at the commonalities in the curricula in the different countries as described in Chapter 3. Furthermore, we are aware that some countries work with reading schemes for the first classes of elementary school (usually until the end of year 2). These reading schemes offer colour coded bands and children are assessed to determine from which scheme they should read books. We need to determine how the iRead system can incorporate or accommodate for such reading schemes.
3. Discipline constraints: School directors and parents expect the teachers to be in control of their students and have a reasonable level of discipline: some animation is expected in classrooms, but no chaos or violence. While most teachers are happy to use games in the classroom, some teachers who are less used to games are concerned that they will cause children to become unfocused. This concern needs to be addressed during the Continuous Professional Development for iRead.
4. Assessment constraints: Beyond the usefulness of assessment, schools are driven by the need to provide grades. A good pedagogical scenario may be abandoned if this is not the case. For instance, teachers often criticize collaborative projects because it is difficult to give individual grades. For iRead we thus have to make sure that information about the individual children's progress is available to the teachers.
5. Energy constraints: The total effort a teacher may invest (preparation work, time to provide feedback, etc.) is limited. To start using the iRead system each child needs to have an individual profile. Teachers have said to be willing to create individualized learner profiles but this should be quick and easy. If possible, teachers would like to involve the children themselves in the creation of the profiles.
6. Space constraints: Is there enough space in the classroom to set up activities and is the layout compatible with expected social interactions or to the work format (e.g. teams)? We do not foresee that the iRead system will require any changes in the allocation of space in the classroom. However, we need to be aware of the necessity to provide ways for children not to disturb each other when working with audio in the system.

Below we will present the user stories for teachers which were identified through the interviews with the teachers. These user stories are an alternative way of presenting the requirements. To structure the presentation of the user stories we use Danielson's framework on the top-level. For each of the lower-level constraints we indicate whether it has a high (HP) or a low priority (LP) based on our assessment of how each user story may impact on teacher's ability and willingness to use the iRead system.

- As a teacher, I want the iRead system to help me **plan and prepare my classes** to fulfil my duties as a teacher.
    - As a teacher, I want functionality to easily get an overview of children's activities and progress. (HP)
    - As a teacher, I want functionality that helps me to plan other off-line activities outside the iRead system based on what the children have done. (LP)
    - As a teacher, I want easy logging in to the system taking into account that children are likely to forget their passwords. (HP)

  - As a teacher, I do not want to lose time because children don't know what to do in the games. I therefore want functionality to show the games to the students before they start working with them on their own in order to model the task. (HP)
  - As a teacher, I want to be able to influence what vocabulary the children are working with. (LP)
- As a teacher, I want the iRead system to help me **manage the classroom environment** to fulfil my duties as a teacher.
- As a teacher, I want the iRead system to help me **provide effective instruction** to fulfil my duties as a teacher.
  - As a teacher, I want the iRead system to show me how the activities performed by the children relate to assessment. (HP)
  - As a teacher, I want the iRead system to provide individual children with appropriate tasks so they become more motivated to read. (HP)
  - As a teacher, I want the activities in the iRead system to be designed so that the students intuitively understand how to engage in them. (HP)
  - As a teacher, I want the iRead system to provide children with appropriate rewards to they become more motivated to read. (HP)
  - As a teacher, I want the iRead system to provide children with appropriate information about their progress so that they can manage their own learning and train meta-cognitive skills. (HP)
  - As a teacher, I want the iRead system to help my students to expand their vocabulary so that they get better at text comprehension. (HP)
  - As a teacher, I want the iRead system to provide functionality for children to practice text comprehension. (HP)
  - As a teacher, I want the iRead system to train children in decoding and pronunciation of words so that they struggle less with that when reading. (HP)
  - As a teacher working with dyslectic children, I want the iRead system to be responsive to difficulties that are typical of dyslexia. (HP)
  - As an EFL teacher, I want the iRead system to provide examples of correct intonation so that the children become familiar with English prosody. (HP)
- As a teacher, I want the iRead system to enable me to perform my **professional responsibilities** to fulfil my duties as a teacher (Professional responsibilities are: Reflecting on Teaching, Maintaining Accurate Records, Communicating with Families, Participating in a Professional Community, Growing and Developing Professionally, Showing Professionalism).
  - As a teacher, I want functionality to show children's results to the parents, but under my control. (LP)
  - As a teacher, I would like the system to advise parents on the kinds of texts to read with their children, or games to play at home. (HP)

6 Professional Development and Pilot Specifications

In this chapter, we will first describe what we have learned from the interviews about how to provide professional development to the teachers who will be involved in the pilot studies. Thereafter, we will provide information about the specific context and setting for the pilot studies that will be performed in a classroom context. These descriptions are on a high level, providing an overview of the current status of the plans for the pilot. More detailed descriptions will be given during a later phase of the project once concrete plans have been made with all of the schools.

6.1 Professional Development and Support

In order for teachers to apply the iRead system to its full potential they have to integrate their Pedagogical Content Knowledge (PCK), which is a deep knowledge of subject matter with profound understanding of what is good for learning, with a good understanding of how ICT provides us with new ways to access and process knowledge. This combination is described as Technological Pedagogical Content Knowledge (TPACK)[7]. Teachers thus need to make creative links between what is being learned (content), how it is taught (pedagogy), and the appropriate tools (technology).

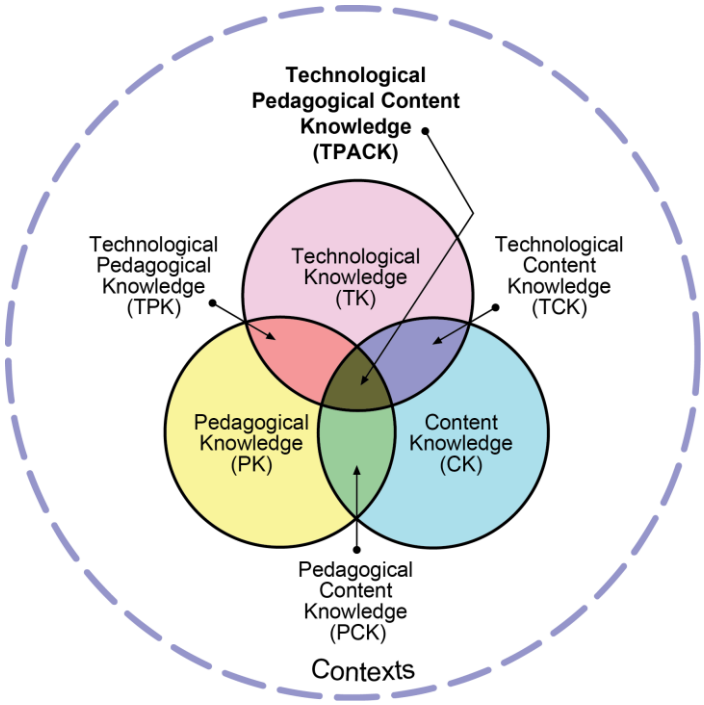

Figure 1 The TPACK model. Reproduced by permission of the publisher, © 2012 by tpack.org

Since we assume that the participating teachers have enough pedagogical and content knowledge, our professional development will focus mainly on Technological Pedagogical Content Knowledge, but with aspects of Technological Knowledge Technological Content Knowledge, and Technological Pedagogical Knowledge.

Technological Knowledge (TK) means that the teachers understand information technology broadly enough to apply it productively at work and in everyday life. Technological Content Knowledge (TCK) means that teachers need to understand how the iRead system can be used to teach reading to beginning readers, dyslexic readers, and EFL readers. Technological

Pedagogical Knowledge (TPK) means that the teachers need to understand how using the iRead system may change their teaching. Technological Pedagogical Content Knowledge (TPACK) means that teachers need to know how to use iRead in their classes in an effective way. Not all of this knowledge can be conveyed through direct professional development by the iRead team members, because the specific contexts of the individual teachers play an important role.

Continuous Professional Development and Support

The interviews indicate that the teachers who will participate in the pilot wish to have CPD in order to start implementing the iRead system in their teaching. They wish to have detailed instructions for how to use the system (both with respect to technology and pedagogical approach), how to set up individual profiles. Continuous technical and pedagogical support is also requested.

The interviews with the teachers have indicated that the preferred modes for CPD are face-to-face, online instruction or a combination of both. We do plan to provide face-to-face training, but the possibilities to provide online training as well as a discussion forum may be limited due to budget restrictions. However, we discuss both modes below in order to document our thoughts around them.

Face-to-face training

Face-to-face training during the pilot will include workshops to train teachers in the use of technology as well as the pedagogical approach, with follow-up in class modelling and support by the researcher to help them with implementation. Especially for the schools in those countries that currently do not have a technological density, there will be a need to focus not only on the pedagogical use of iRead, but also on the use of technology in itself. In some countries, especially Greece, there is a need to focus on the pedagogical use of games, which can be seen as a possible disturbance.

Online training and discussion forum

Online training may include video recorded instructional seminars, instructional videos, walk-throughs and tutorials about how to use the system during the classes. We also anticipate that in implementing the iRead system in classes, the teachers will benefit from having an online forum in which they can continuously exchange their user experience and support one another. The online forum also needs to have a tutor or researcher participating, in order to answer questions or solve problems that the users experience. For such a forum to be useful, it will have to be easily accessible to the users and preferably already part of their communication behaviour, in order not to require too much of their time and effort. A Facebook group would meet the case, as it is a social media platform which most users are familiar with. However, the choice of platform for an online discussion and support forum will have to be considered carefully, both when it comes to functionality and ownership of content.

Local Help-desk

In addition to the initial CPD (and possibly continuous exchange in an online forum), a local help-desk, which the users may contact for support and feedback in their own language, would be useful. As a suggestion, one of the responsible researchers in each pilot country could be assigned as a contact. The task for this local contact would be to solve problems as far as s/he can, and to mediate contact with the developers for specific technical support.

6.2 Pilot-1: Dyslexia-English

Partners involved: (UOI, UCL)

In the UK there are two levels of intervention for dyslexia, wave 2 and wave 3. Wave 2 are usually designed for a set amount of time and are delivered either in a group, or one-to-one. Wave 3 are for children with the most severe dyslexia, are much personalised and delivered one-to-one. The current evidence does not suggest higher gains resulting from one-to-one sessions, suggesting that group intervention is a more financially viable approach [6]. It is thus likely that iRead will be focusing on both Wave 2 and 3 interventions in a small group setting (between 4-5 children). During an intervention session, highly structured activities are given to children working on phonics and transference of phonics skills to whole book reading/practice. These practices closely align with early reading instruction although they are at a higher intensity, are more structured and with more teacher scaffolds. Within the pilot we will include children with dyslexia statement, or suspected to have dyslexia. This is because in the UK children are not required to have a statement and the process of getting one is often up to the parents.

6.3 Pilot-2: Dyslexia-Greek

Partners involved: (OUI)

The situation in Greece is very similar to that of the UK with the exception that the school system requires formal diagnosis for receiving special support at schools. Participating children will be formally diagnosed with specific learning difficulties (mainly dyslexia) who attend special education classes (parallel immersion classes) in state primary schools.
Similar to the UK, despite the prevalence of ethnic minorities in Greece, participants included in the analysis will be monolingual students. Immersion classes are delivered 3 days per week and their duration ranges between half an hour and 45 minutes. Learning activities are normally done as group work. Individual work is also common in these classes for specialized learning activities. Literacy activities in immersion classes target areas included in iRead such as vocabulary, phonics, grammar, and thus the iRead apps will supplement these learning activities.

6.4 Pilot-3: Novice Readers-English

Lead Partner: (UCL)

Context: Rural and urban schools
Contact time with children: Within literacy, reading typically takes place for 50 minutes each day. There is a phonics practice activity for 20 minutes usually done as a whole class. There is a 'guided reading' activity for 30 minutes, which is the primary activity supporting children's whole book reading in the UK.
Mode: Depending on whether the school is rural or urban, class sizes can vary from 20 to 30 students. Typically, each year group has 1 teacher and 1 teaching assistant.
Current practice that aligns with the iRead apps: In guided reading, children are grouped by ability and each group is given one book to read. The teacher and the teaching assistant will facilitate the reading of two groups with the rest working independently. Reading can also be part of 'carousel' activities that are designed to engage children's literacy e.g. book reading, writing, games etc.

6.5 Pilot-4: Novice Readers-Greek

Lead partner: (DOUK)

Context: the pilot is connected to the part of the curriculum concerning the Greek Language. Furthermore, the pilot could take place during the two hours per week that are called "Evelikti Zoni" (Flexible Zone).
Contact time with children: 2 hours per day, focusing on grammar, syntax, vocabulary as well as reading comprehension.
Mode: Usually the learning activities are done as a class or in groups. However, for iRead we would like to also use individual activities.

6.6 Pilot-5: English as a Foreign Language

Partners involved: (BC, UGOT, ULBS, UB)

This pilot evaluation will take private tuition schools and mainstream schools in four European countries (Greece, Sweden, Romania, and Spain). Mid-way BC will also conduct knowledge transfer activities in its school network to ensure the adoption of the iRead technology in additional schools.

6.6.1 Greece

Context: EFL classes
Contact time with children: 3 hours/once per week. Estimated literacy-based time 1 hour/week.
Mode: Class of 14 children usually with a variety of interaction patterns ranging from individual, groups of 3 or 4, to whole class.
Current practice that aligns with the use of the iRead apps:

- Prediction from title/topic sentence/accompanying picture(s)
- Mind-mapping expected content/text development
- Comprehension tasks (varied – lexical, sentence-based, paragraph-based)
- Post-reading exploitation – word-building, writing, schema development

6.6.2 Sweden

Context: EFL, 4th-5th grade in both urban and rural schools around Gothenburg
Contact time with children: Around 2 hours per week.
Mode: Class of 25-30 children usually with a variety of interaction patterns ranging from individual, pairs, small groups of 3 or 4, to whole class.
Current practice that aligns with the use of the iRead apps:

- Vocabulary and pronunciation of words in text
- Individual reading e.g. News in Levels
- Listening to recording of a text
- Comprehension tasks

6.6.3 Romania

Context: EFL classes in 5th to 6th grade
Contact time with children: 2-3 hours/week (2 are mandatory, 1 is optional).
Mode: Learning activities are usually done with the whole class (20-28 children), but with adaptation for individual differences. Pair and group activities are also possible.
Current classroom practice that aligns with the apps:

- Listening to recording of a text
- Pronunciation of words in text
- Comprehension tasks

6.6.4 Spain

Context: Extra reading or technology classes in 5th to 6th grade
Contact time with children: 1 hour/week
Mode: Individual, small group and class reading activities
Current classroom practice that aligns with the apps:

- Silent individual reading
- Small group reading
- Group reading

6.7 Pilot-6: Novice Readers-German

Partners involved: (DHBW)

Context: Rural and urban schools, of varying size. Varied collection of kids in classrooms from small classroom of German native speakers to large classrooms of mostly kids with migration background. One school is in a poor area, another can be in an affluent area.
The first pilot will most likely take place in a school that is located in a poorer area with mostly native German speaking children. This school has shown the most enthusiasm for testing the new technology. The director of the school has worked in another school that has used technology and has the vision to make this happen.
Contact time: Most likely, the iRead system will be used in dedicated sessions once a week. Since the technology is new, it is not likely that it will be a natural part of the daily routine or available for kids who want to do extra work. We assume the time spent per week will be between 45-90 minutes.
Mode: Individual, small group within class reading activity. Text will probably not be read at home due to the setting in less affluent homes. Teachers are hoping for current classroom activities to align with the iRead content for easier integration.

6.8 Pilot-7: Novice Readers-Spanish

Partners involved: (UB)

Context: General language learning classes as well as dedicated reading classes. However, schools deal with reading in slightly different ways. All of them include different reading activities in their language lessons, but some schools have a separate and focused reading workshop, and others have informal reading throughout the day (e.g. one school reported that their learners read three times a day in 10-minut periods after coming from the playground just for pleasure). We believe piloting can take place both when the focus in regular classes is on reading (e.g. reading aloud activities, reading in small groups when working towards a task or project goal, among others). A decision will have to be made on a one-to-one basis.
Contact time with children: 0.75-2.0 hour/week
Mode: Individual, small group and class reading activities. Texts also read at home
Current classroom practice that aligns with the apps:

- Silent individual reading
- Small group reading
- Group reading

7 Conclusions

This deliverable describes the user stories identified through 50 interviews with 57 teachers in all countries involved in iRead. The user stories are a high-level description of the teachers' needs regarding the iRead system, and should be regarded as the user requirements. The user stories provided in the document lead to further design work to determine the specifics for each of the applications within the iRead system. The deliverable also includes an analysis of the curricula in those countries for the different reader groups in order to make sure that the iRead system aligns with the curricula. Finally, this deliverable provides a first overview of the pilot studies, including the contexts, modes of teaching, and time spent on reading and literacy activities.

Based on the information provided in the interviews, in some countries iPads (iOS) are the standard instead of Android tablets (18 of the 40 schools interviewed here). However, iPads are generally more expensive than Android tablets, as well as development for iPads. Android tablets are also more likely to be available in the home environment. Given the resources for the project, we will focus on developing the complete system for Android to be used during the evaluations. However, the adoption trends will inform future exploitation of the project which may be expanded to include iOS depending on the market targeted.

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Appendix

Interview Guide

Although all questions can be asked for all contexts you need to focus on the types of readers relevant for your country. So, if iRead in your context focuses on dyslexia and beginning readers you will ask the questions only in relation to those reader groups. You don't have to consider the other reader groups although you are allowed to talk about them as well. A test interview has shown that teachers may find it hard to focus on reading skills only. Make sure to remind your respondent of this focus of iRead when necessary.

When you make an arrangement with the school to come for the interview, ask the teacher(s) to prepare for the interview by preparing three things (if possible):

1. Assessment example based on different areas of curriculum
2. Lesson plan involving use of technology (if available)
3. Think about specific difficulties your students have with the target language that could be practiced through reading

As an interviewer you should bring with you the scenario from the iRead proposal for the correct user group(s). In the questions below, we want you to replace X with the reader group(s) relevant to your context. So, if the focus in your country is on beginning readers and dyslexic readers, you ask the questions specifically for those groups. The questions should not be asked sequentially, just try to have a real conversation with the respondent.

General questions
What is your age?
How long have you been teaching?
How large is your class?
Pedagogical Challenges for teaching reading or EFL (make sure this is not just about technology)
What common issues/difficulties related to reading do beginning readers/dyslexic/EFL students experience for the age group you are teaching? How do you support these issues?[prompts for iRead areas: reading, decoding, syntax, comprehension]
Which mother tongues are represented in your classroom? Which kinds of particular difficulties to children with another mother tongue face?
What types of texts do the students like to read? Which kinds of texts do they not like to read? If possible, what are specific examples, can you show them?
What is your current routine on teaching reading in X in particular?
Learn about practices, challenges and opportunities of existing use of digital technology in schools
Can you describe your use of digital technology (e.g. websites) within your teaching practice?
Are other teachers using any technologies in the classroom?

What is your attitude towards using technologies in the classroom? What do you want to see in the technology?
Did your teacher training include the use of media in the classroom?
Do you have any technologies that communicate with each other? (e.g. into a learning management system)
How does technology help you with teaching x? How does it help the students?
How does technology hinder you in teaching x? How does it hinder the students?
Does technology benefit any particular groups of students in the grades you are teaching?
What technology is available within your school, and within your class? [prompt for subjects]
How and how often do pupils access it? Any problems with logging in? [prompts for pupil configuration of tech use: computer ratio, class vs small groups, types of class activities]
Does your school have a stable internet connection?
Getting attitudes about iRead concept
Show the potential scenario for iRead (separate document). What are your first reactions?
How do you think you could incorporate the specific example given in the scenario into your routine?
Do you have any experience with games for x? What are your experiences? [prompt for concerns or benefits with specific examples]
Do you have any experiences with e-readers or e-books for supporting x? What are your experiences? [prompt for concerns or benefits with specific examples, and ask what criteria they use when selecting e-books and how they decide whether an e-book is too complex, too easy or appropriate]
How do you expect the children to respond to this technology?
How do you expect the parents to respond to this technology?
Do you feel that you might be able to have more differentiated teaching with this technology?
Is your classroom open for independent work?
Adaptivity and learninganalytics
How comfortable do you feel with the technology making pedagogical decisions (prompt/link scenario: content/activity, learning stategies, feedback)? How much control would you want over this?
How do you assess what knowledge a child has in order to move on? (e.g. give examples of specific linguistic skills, find out at what level they are assessing, e.g. fine-grained individual letter decoding)
For personalised learning technologies to work, individual profiles of the child must be set up (one-off). Can your existing assessment data be used? How much time would you be willing to spend on this? Is there someone in your school that typically helps with this?
What kind of information would you need to have in order to assess your students' learning progress/process?
If you could capture students' progress with technology, would you share with others and if so with whom?

How can technology reflect your assessment needs and make your reporting easier?
When students are working real time (in the classroom) with the apps, what key information would you like to know and for what purpose? [Some examples: time spent on games, whether they are stuck in a game, repeated attempts, specific failures, what book they are reading and for how long, what vocabulary they are tapping on, what reading strategies they are using in the reader]
Parents (only ask when this seems appropriate)
What common issues/difficulties have you experienced with the parents of dyslexic/EFL pupils?
If you could capture students' progress with technology, would you share it with their parents?
What kind of information would you share about your students learning progress/process? And how often do you think such communication should take place?
What kind of response would you expect from parents? (i.e. would you like one way communication with parents and would you expect parents to share feedback/comments e.g. on a shared space/platform?)
Evaluation (questions with * only for schools involved in the actual evaluation)
When a new technology is introduced to your school what are the training and support arrangements?
What would be your preferred mode of Continuous Professional Development? (Online/face to face, length of time.) Who is responsible for the professional development at your school?
Can you describe Continuous Professional Developmentactivities that have been most helpful/valuable for you in the past?
What kind of technical support have you received in the past at your school that has helped you?
Where has technical support failed you? [try to understand the exact nature of the problem]
*When would participation in an evaluation be suitable? E.g. particular times of the year that are more or less suitable/groups? Arethereanyconcernsregarding planning of an evaluation?
What kind of help would you need for integrating iRead into your classroom? [Distinguish between ramp-up time and support vs. regular usage integrated into classroom (they can participate for months, but would only have time to start using it in January for example.]

Scenario Beginning/Dyslexic Readers

Maria enters the iRead platform. She is directed to play a mini game that supports learning of reading skills (e.g. a new letter combination). Since guided training is important to acquiring accuracy and fluency in reading, Maria has practiced this skill previously in a different game. The game relies on her 'user model' which is a record of her past performance and her current skillset to decide what content to provide. Content is chosen so that it is neither too difficult, nor too easy for her. When Maria makes an error, the game provides her with suitable pedagogical feedback and an opportunity to correct her error. Once Maria has reached a higher level in the game, the iRead platform prompts her to do a different activity, such as reading an **e-book** or using an **e-Reader app** to practice whole book reading.

E-books are interactive picture books, and the iRead platform can offer Maria an e-book that presents vocabulary that she encountered in the game. The e-book allows her to explore interactive images which can be tapped to pronounce the word and read its written form.
The e-Reader app is focused on text. Maria can use text to speech to listen to the text. This helps her listening comprehension, exposes her to vocabulary she is not able to read yet, as well as pronunciation. The e-Reader app also offers a set of text reading strategies to support her comprehension of the text. For example, Maria is prompted to first engage with the general topic of the text by identifying the structure within it.
Maria's interaction within these various apps has been orchestrated by her teacher Rita. Rita uses her teacher tools to view a recommended sequence of activities for the whole class to engage in. She also uses each student's past performance to make some personalised recommendations to the whole class materials. This means that while the whole class is engaged in a common activity, extra attention can be placed on the things a particular student is struggling with. For example, since Maria had previously found it difficult to read words with the letter combination 'ng' Rita requested that the learning programme delivered through the apps covers this. Thus, while the games present activities with relevant words (e.g. long), the e-Reader app begins with a brief learning task that asks Maria to first identify words with this letter combination in the text before proceeding with her reading.

Scenario EFL Readers

Maria enters the iRead platform. She is directed to play a mini game that supports learning of reading skills (e.g. a particular syntax construction). Since guided training is important to acquiring accuracy and fluency in reading, Maria has practiced this skill previously in a different game. The game relies on her 'user model' which is a record of her past performance and her current skillset to decide what content to provide. Content is chosen so that it's neither too difficult, nor too easy for her. When Maria makes an error, the game provides her with suitable pedagogical feedback and an opportunity to correct her error. Once Maria has reached a higher level in the game, the iRead platform prompts her to do a different activity, such as reading an **e-book** or using an **e-Reader app** to practice whole book reading.
E-books are interactive picture books, and the iRead platform can offer Maria an e-book that presents vocabulary that she encountered in the game. The e-book allows her to explore interactive images which can be tapped to pronounce the word and read its written form.
The e-Reader app is focused on text. Maria can use text to speech to listen to the text. This helps her listening comprehension, exposes her to vocabulary she is not able to read yet, as well as pronunciation. The e-Reader app also offers a set of text reading strategies to support her comprehension of the text. For example, Maria is prompted to first engage with the general topic of the text by identifying the structure within it.
Maria's interaction within these various apps has been orchestrated by her teacher Rita. Rita uses her teacher tools to view a recommended sequence of activities for the whole class to engage in. She also uses each student's past performance to make some personalised recommendations to the whole class materials. This means that while the whole class is engaged in a common activity, extra attention can be placed on the things a particular student is struggling with. For example, since Maria had previously found it difficult to understand long and complex sentences with lots of embedded elements and internal references, Rita requested that the iRead platform delivered through the apps may cover the issue of sentence complexity. Thus, before going to the next reading task, a number of games help Maria break long sentences into smaller ones and to identify what certain referential elements (e.g. 'he' or 'she', 'that' or 'which') actually refer to within a text. These can later appear in the e-Reader app which may show highlighted pronouns (e.g. 'he' or 'she') and their referent noun phrases (e.g. 'the man' or 'Peter'; or 'the elderly lady' or 'Scheherazade') with the same colors in order to facilitate understanding.