



## ARETE – DELIVERABLE (D6.1)

### WP 6 – 6.1 Pilots Deployment Plan

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## Executive Summary

This report addresses ARETE Pilots 1 and 2 deployment plan and its implementation steps, including the definition of language and country requirements, research carried out within each pilot, recruitment of pilot operatives (teachers) and their training.

ARETE Pilot 1 aims to study the effects of WordsWorthLearning's (WWL) interactive Augmented Reality (AR) solutions to teaching and learning English language literacy skills with primary school students typically underperforming in English language literacy tests.

Pilot 1 pre-tests will be conducted between September and October 2021 (M23 and M24); the intervention phase will take place from November 2021 till April 2022 (M25 till M30); post-assessment will be conducted from May to June 2022 (M31 to M32).

The goal of Pilot 2 is to test the efficiency of CleverBooks (CLB) Augmented Reality application for STEM education as a tool to help improve pupils' test-score by up to 33% and increase retention rate by up to 100%, while developing 21st century skills and focusing on personalized learning through kinetic, audio and visual educational approaches.

Pilot 2 pre-tests will be conducted between September and October 2021 (M23 and M24); the intervention phase and post-tests will start in November 2021 and be finalised by April 2022 (M25 till M30); retention assessment will be conducted from May to June 2022 (M31 to M32).

Due to the participation of humans and of minors in the ARETE pilots, as well as the disruptive nature of the AR technology being tested in schools, significant attention and time were put on addressing ethics and data protection requirements and to ensure compliance with GDPR<sup>2</sup>. Thus, during the piloting phase a set of ethics-related documents, coordinated by UCD and prepared by the pilot managers (WWL and CLB) with the support of EUN and UNW, will be employed.

The recruitment process for Pilot 1 and Pilot 2 operatives is being conducted via a 2-step recruitment approach that allows to incorporate early feedback from target groups and better plan for the pilot implementation stage. The 1st step, which consisted of identifying teacher coordinators has been successfully conducted and resulted in the recruitment of 10 teacher coordinators. Three teacher coordinator workshops are also foreseen over the course of the project: the first one in June 2021 (M20), the second in November 2021 (M25) while the third one should take place in March 2022 (M29). The 2nd step, which consists in recruiting pilot teachers, is currently ongoing.

A COVID-19 risk analysis was carried out at the WP6 level in order to evaluate the impact of the current health situation on the deployment of pilots to schools.

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<sup>2</sup> Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC ([General Data Protection Regulation](#)).



## 1. Introduction

ARETE aims to revolutionise the use of Augmented Reality technologies in education through three unique and comprehensive pilot studies (Pilot 1: English literacy skills, Pilot 2: STEM and Pilot 3: Positive Behaviour Intervention) to validate the technology in real life settings. In this context, WP6 primarily focuses on the examination and implementation of both WWL (Pilot 1) and CLB (Pilot 2) platforms, while maintaining the contact with Pilot 3, which is primarily followed by WP5.

In this context, WP6 is tasked with defining the requirements for the implementation of Pilot 1 and 2 (Task 6.1); setting up the ARETE training platform, integrating the needs of pilot participants (Task 6.2); and finally, deploying and analysing the pilots' performance (Task 6.3).

The present deliverable reports on the work carried out by WP6 in preparing the piloting rollout and gives consideration to preparatory actions carried out at the level of WP6 to define, for Pilots 1 and 2:

- the intervention and assessment strategies (lead by UNW, in collaboration with WWL) – detailed in Chapter 2 of the present report,
- ethics considerations (lead by UCD, with contributions from CLB, WWL, EUN and UNW) – reported under WP1, but briefly outlined in Chapter 3,
- and the strategy for the recruitment and engagement of pilot operatives (lead by EUN in consultation with the WP6 partners) – detailed in Chapter 4 of this report.

Chapter 5 reflects on the impact of the COVID-19 pandemic on the recruitment of pilot operatives and the impact of a completely remote implementation of the pilots on the evaluation processes.

Conclusions and overall observations are provided in Chapter 6.



## 2. Research: Assessment Design, Instruments, and Timeline

### 2.1 Pilot 1: English literacy skills (WWL)

ARETE Pilot 1 aims to study the effects of WordsWorthLearning's (WWL) interactive Augmented Reality (AR) solutions to teaching and learning English language literacy with primary school students typically underperforming in English language literacy tests. Hence, it will observe and collect data to establish whether the employed AR solutions make both teaching and learning of the English language more accessible and successful for those teachers and students engaged in the process.

**The research question Pilot 1 addresses is:** how does AR impact on students' literacy attainment?

To answer this question, Pilot 1's design is following a multidisciplinary approach which encompasses clinical assessments, quantitative and qualitative data collections. The clinical assessment will be employed to analyse literacy attainments from a multi-disciplinary perspective, whereas the quantitative and qualitative data collection will capture a wide range of information, such as:

- Teachers' perceptions of the success, impact and pedagogical implications of Augmented reality;
- Students' interest and enjoyment, perceived competence and value/usefulness of the piloting activities;
- Students' performance in literacy learning pre and post intervention;
- Technical data to assess the usability of the ARETE WWL application.

Participation in Pilot 1 is limited to **English teachers or Special Needs Assistants of students in the 4<sup>th</sup>-6<sup>th</sup> grade of primary school** - i.e. pupils aged between 9 and 12 years old in January 2021 - active in schools where English is the main teaching language, who come from EU and H2020 associated countries<sup>3</sup>. A total of about 40 teachers (including 2 teacher coordinators), 240 students (approximately 6 pupils per classroom) and 240 parents from the target group will be involved in the study, as well as 120 additional parents from the Profiled control group to verify the metrics for the case history form analysis.

Participating teachers and pupils must have access to Android or iOS tablets/iPads in class. Pupils must be underperforming in standardised literacy tests (< 25th Percentile Rank), despite being deemed to be functioning within the average or above range of cognitive ability (usually 5-6 pupils per class). In addition, students with significant hearing impairment (e.g. requires bilateral hearing aids), significant visual impairment (e.g. on the blind register) and / or intellectual disability are excluded, as the WWL AR-App, would not suit their learning requirements due to its nature and complexity.

Pupils will be randomly assigned to 2 groups: a control group without WWL-AR intervention and an intervention group with WWL-AR intervention. All students will undergo a

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<sup>3</sup> [https://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/hi/3cpart/h2020-hi-list-ac\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf).





standardised assessment for reading and spelling skills prior to starting. Then, the WWL-AR intervention group will be asked to use the WWL-AR app in school over two academic terms.

It is expected that each intervention session will take 15 minutes: ideally, one session per day (Monday – Friday) or, if not possible, one session per day 3 times per week. Sessions will take place during school hours, under the supervision and guidance of a designated school staff member. Parents will also have access to the programme at home, should they wish to collaborate and support the work being done in school. Then, students in both groups will be reassessed to measure the impact of the WWL-AR app intervention as opposed to ‘normal’ school-based intervention.

To measure the effect of using AR, the pilot will involve parents as they will be requested to complete a detailed pseudonymised case history form (ProfileD) to establish participants' profiles. All students will undergo pre and post intervention literacy assessments, thus establishing a baseline from which to measure progress.

Seven different research instruments will be employed to carry out Pilot 1, i.e.:

- ProfileD Case History Form (pretest);
- NARA II: Form 1 (pretest) and Form 2 (posttest);
- Vernon Graded Word Spelling Test (pre and posttest);
- IMI Survey (posttest);
- Teacher Coordinator Interviews (pre and posttest);
- Teacher Surveys (pre and posttest);
- Collection of technical data (during intervention).

The **ProfileD Case History Form**<sup>4</sup> is an online survey which works from a multi-disciplinary perspective to provide information relating to Speech & Language Therapy, Occupational Therapy, Psychology and Academic (School) performance. The data collected includes early and current history and identifies areas of strength and difficulty of clinical interest to these multi-disciplines to help with assessment and intervention recommendations. The ProfileD Case History Form will be filled in by the parents of the primary school children participating in the pilot - i.e. 120 in the control, and 120 in the intervention groups - and the parents of 120 children not participating in the pilot, as means of control.

**NARA II - Form 1 (pretest) and Form 2 (posttest)** - is a standardised test of English reading accuracy, reading comprehension and reading rate, which provides standard scores and reading age equivalents for students up to 12 years. **Vernon Graded Word Spelling Test** is a standardised test designed to assess spelling attainment and progress from age range 5 to 18+ years. Both the NARA II and Vernon tests will be administered pre and post intervention to the 120 children in the control group as well as to the 120 assigned to the intervention group.

The **Intrinsic Motivation Inventory (IMI)** (Ryan & Deci 2003) is a multidimensional tool that allows to assess students' experience, motivation and satisfaction through a Likert scale. The survey, which has been designed based on validated and established IMI scales presented in

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<sup>4</sup> The instrument is already in place.



related literature, will be administered to children in the intervention group at the time of post- intervention, aiming to measure their interest/enjoyment and perceived competence as well as the value/usefulness of the piloting activities from the children’s perspective.

**Teacher Coordinator Interviews** will be conducted with the 2 Pilot 1 teacher coordinators during the third teacher coordinators’ workshop, currently scheduled around the end of the intervention period. The interviews will focus on the collection of qualitative information, aiming at clarifying the pedagogical implications of AR application in education, and take approximately one hour each. Similarly, **Teacher Surveys**<sup>5</sup> will collect qualitative data and target approximately 20 teachers in the control group and 20 teachers in the intervention group. They will be conducted both pre and post intervention to assess the success and impact of Augmented Reality in education.

Finally, the **collection of technical data** will concern all users involved in the project: it will be organised and conducted directly by WWL via its application.

The two teacher coordinators for Pilot 1 have successfully been selected and introduced to the project: more information on their selection and identity is available under chapter 3. The selection process for about 40 pilot teachers is currently ongoing: applications are accepted on an ongoing basis, with the aim of completing the pool of pilot teachers by August 2021.

Figure 1 here below illustrates the timeline established for the deployment of Pilot 1. Some of the established dates have not been confirmed yet and might change (e.g. workshop 2 and 3), also depending on the evolution of the current Covid-19 pandemic. The Pilot 1 intervention and assessment strategy are included as annexes to this report.

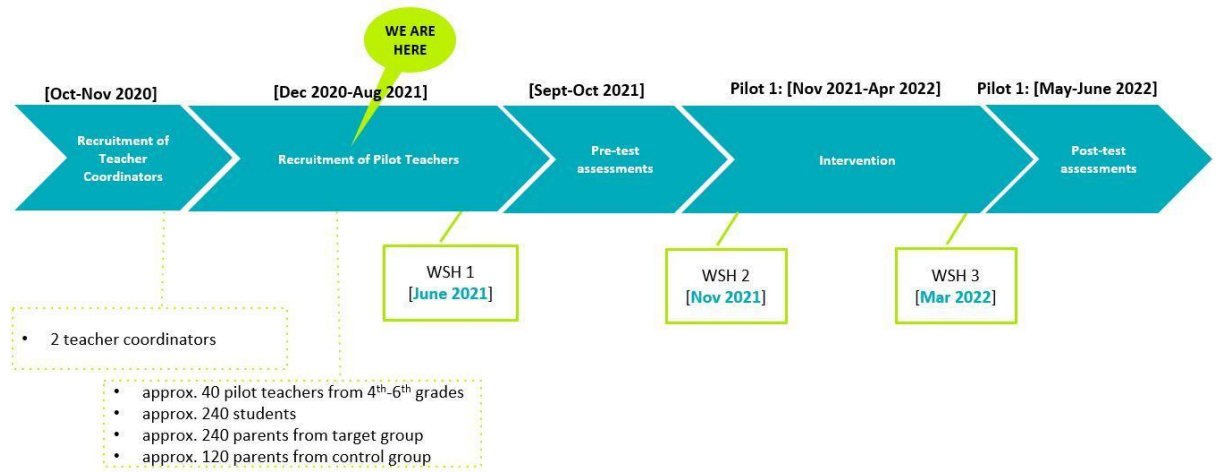


Figure 1: ARETE Pilot 1 - foreseen deployment timeline

<sup>5</sup> The document is already in place.



## 2.2 Pilot 2: STEM (CLB)

ARETE Pilot 2 focuses on learning geometry and geography through visualization and interaction. The aim of this pilot is to evaluate whether AR learning applications such as the CleverBooks (CLB) Augmented Reality applications can help improve pupils' test-score by up to 33% and increase their retention rate by up to 100% compared to teaching and learning approaches that do not employ AR, while developing 21st century skills and focusing on personalized learning through kinetic, audio and visual educational approaches.

**The research question Pilot 2 addresses is:** how does AR impact on students' STEM learning and retention?

To answer this question, Pilot 2 has been designed as a large-scale study involving quantitative and qualitative data collection to capture:

- Teachers' perceptions of the success, impact and pedagogical implications of Augmented reality for STEM learning and retention;
- Students' interest and enjoyment, perceived competence and value/usefulness of the piloting activities;
- Students' mathematics / geography knowledge and skills before and after the intervention with AR (intervention group) or without AR (control group);
- Technical data collection to assess the usability of the ARETE CLB application.

Participation in Pilot 2 is limited to primary school teachers (i.e. pupils of 4th and 5th grade as of September 2021) who are actively involved in teaching geometry (mathematics) or geography topics. A total of about 170 teachers (including 8 teacher coordinators) will be selected and divided in two groups of equal size, depending on the subject taught (i.e. 50% Geometry, 50% Geography). Hence, approximately 3 400 students will take part in the study assuming about 20 students per classroom. The selection of pilot teachers will prioritise the countries and languages presented in Table 1.

*Table 1: Pilot 2 country coverage and language of materials to be tested.*

No	Country*	Language
1	Croatia	Croatian
2	Greece	Greek
3	Italy	Italian
4	Poland	Polish
5	Portugal	Portuguese
6	Romania	English



No	Country*	Language
7	Serbia	Serbian
8	Spain	Spanish

*\*Pilot teachers may be recruited from additional European Union and H2020 associated countries (outside the main group listed in Table 1). The language of materials for participants from outside this group will be English.*

Participating teachers and pupils must have access to Android or iOS tablets/iPads/smartphones for implementing piloting activities. Significant visual impairment (e.g. on the blind register) is a criteria for exclusion, for practical reasons.

A control group design will be employed to measure the effectiveness of the pilots' intervention. This means that teams of two teachers will be selected per participating school; in each team of two teachers per school there will be: [1] one teacher in the intervention group, who will implement CleverBooks AR applications (either Geography or Geometry) and educational materials during the 2021-2022 school year and undergo evaluation with their students, and [2] one teacher in the control group, which will not access the CleverBooks AR application and educational materials, but still carry out all evaluation activities during the 2021-2022 school year. Control and intervention groups will be randomized after pretesting.

Five different research instruments will be employed to carry out Pilot 2, i.e.:

- TIMSS 2015
- IMI Survey
- Teacher Coordinator Interviews
- Teacher Surveys
- Collection of technical data.

**TIMSS 2015<sup>6</sup>** inventory is an established international standardized knowledge testing instrument. It is available upon authorization in all pilot languages except for Romanian, where a translation will be produced professionally, and includes items for 4th and 8th grade in mathematics and science. Pilot 2 will make use of a selection of 4th grade items for mathematics and geography that primary school students will complete in paper-based tests before and after the pilot. In particular, a pre-test, a post-test and a retention test will be administered on: approximately 750 students in the control and 750 students in the intervention groups from the mathematics group, and approximately 750 students in the control and 750 students in the intervention groups from the geography group.

As previously mentioned, the **Intrinsic Motivation Inventory<sup>7</sup>** (IMI) is a multidimensional measurement device intended to assess participants' subjective experience related to a

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<sup>6</sup> [TIMSS Trends in International Mathematics and Science Study \(bc.edu\)](https://nces.ed.gov/ipeds/data/timss/)

<sup>7</sup> [Intrinsic Motivation Inventory \(IMI\) – selfdeterminationtheory.org](https://selfdeterminationtheory.org/)



target activity. The instrument assesses participants’ interest/enjoyment, perceived competence, effort, value/usefulness, felt pressure and tension, and perceived choice while performing a given activity, thus yielding six subscale scores. The ARETE IMI survey, which has already been drafted based on validated and established IMI scales, will be administered to intervention group students at the time of post intervention, aiming to measure the students’ interest/enjoyment and perceived competence as well as the value/usefulness of the piloting activities from the students’ perspective.

**Teacher Coordinator Interviews** will be conducted with the 8 Pilot 2 teacher coordinators in two rounds. Per-intervention interviews will take place during the 1st workshop in June (M20) while post-intervention interviews will be conducted during the 3rd workshop, currently scheduled for March 2022 (M29). They will aim at clarifying the pedagogical implications of AR application in education and will be conducted as focus groups.

**Teacher Surveys<sup>8</sup>** will be administered to the over 170 pilot teachers both pre and post intervention, to assess the success and impact of Augmented Reality in education. Finally, during the intervention phase **technical data will be collected** as the CLB apps will gather anonymous user data on time spent in the apps and numbers of clicks.

The timeline for implementation is illustrated in Figure 2. The Pilot 2 intervention and assessment strategy are included as annexes to this report.

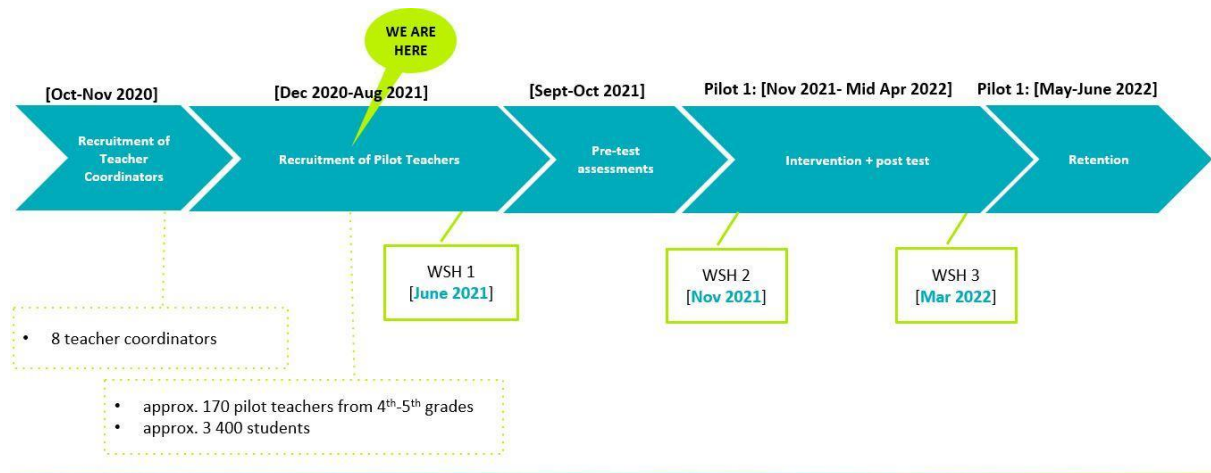


Figure 2: ARETE Pilot 2 - foreseen deployment timeline

<sup>8</sup> The documentation is already in place.



### 3. Ethics and data protection

WP6 bears significant links with WP1 (Ethics Requirements), due to the participation of humans and of minors in the ARETE pilots, as well as the disruptive nature of the AR technology being tested in schools. Therefore, significant attention was put on addressing ethics and data protection requirements - from setting up the ethics and data protection considerations under deliverables D1.1 and D1.2 already submitted<sup>9</sup>, to produce pilot-specific documentation which ensures that the data protection and ethics principles laid out at the beginning of the project will be appropriately implemented during the piloting phase. To prepare this stage, the following ethics-related documentation, which has been coordinated by UCD and prepared by the pilot managers (WWL and CLB) with the support of EUN and UNW, will be employed.

#### 3.1 Consent forms and information sheets

##### 3.1.1 Pilot 1: ethics documentation

###### **Informed consent forms:**

- Teacher consent form, to participate in ARETE research activities (collected by EUN);
- Student consent form, to participate in ARETE research activities (collected by the participating schools);
- Parent consent form, designed for parents whose children will participate in the pilot activities (collected by the participating schools);
- Parent consent form (Case History - Control Group), designed for parents whose children will not participate in pilot activities but who will fill in the “ProfileD” Case History Form, which will provide personal, but pseudonymised data about their child and to a lesser degree, parent/guardian (collected by the participating schools).

**Information sheets** outlining the research objectives, providing participation and data protection related specifications, i.e:

- Teacher information sheet;
- Student information sheet;
- Parent information sheet;
- Parent (Case History - Control Group) information sheet.

##### 3.1.2 Pilot 2: ethics documentation

###### **Informed consent forms:**

- Teacher’s consent form, to participate in ARETE research activities (collected by EUN);
- Student’s consent form, to participate in ARETE research activities (collected by the participating schools);
- Parent(s)’ consent form for their child to participate in the ARETE research activities (Collected by the participating schools).

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<sup>9</sup> The ethics and data protection considerations submitted under WP1 as D1.1 and D1.2 have been updated under WP2 with the submission of D2.2 and D2.3 as well as D2.7 and D2.9.



**Information sheets** outlining the research objectives, providing participation and data protection related specifications:

- Teacher information sheet;
- Student information sheet;
- Parent information sheet.

In addition, the following documentation was prepared and subjected to the review of the ARETE External Ethics Advisory Board in order to clarify the data management processes within the two pilots overseen by WP6:

- Data Protection Impact Assessment, which was prepared separately for Pilot 1 and Pilot 2, coordinated by the Pilot managers CLB and WWL, with contributions from EUN, UNW and UCD;
- Record of Processing Activities (RoPA), which was prepared jointly for both pilots by all data controllers involved in the pilots;
- Data Flow Diagram.

### 3.2 Assignment of Codes to Study Participants

As specified in Deliverables D1.1, D1.2 and elsewhere, to ensure the protection of personal data of children and vulnerable groups, no personal information from the students participating in the pilots will be collected at the consortium level, and the personal information of the pilot teachers will only be retained by EUN, as the partner responsible for the teachers’ recruitment. To avoid any unnecessary transfer of personal information a code assignment procedure has been put in place for both pilots.

The code system for Pilot 1 uses 6-digit codes, as exemplified by Table 2.

*Table 2: Code assignment system for Pilot 1*

<b>Example code</b>	<b>1</b>	<b>T</b>	<b>12</b>	<b>01</b>
<b>Function</b>	PILOT	CATEGORY	CLASS	PARTICIPANT



Example code	1	T	12	01
<b>Description</b>	Differentiation between the two pilots.	Differentiation between teachers / students / parents.	Differentiation between classes. Every class receives a 2-digit code which is the same for all teachers / students / parents from this class. This class code is unique for every class.	Differentiation between participants. Every participant receives a 2-digit code. This code is unique within his/her class.
<b>Range</b>	1 = pilot 1 2 = pilot 2	T = teacher S = student P = parent	Starting with 01 and ascending.	Starting with 01 in every class anew and ascending.

The code system for pilot 2 uses 7-digit codes, as exemplified in Table 3. As teachers are recruited pairwise in Pilot 2, with 2 teachers per school, the school should be included in the code.

Table 3: Code assignment system for Pilot 2

Example code	2	T	12	1	06
<b>Function</b>	PILOT	CATEGORY	SCHOOL	CLASS	PARTICIPANT
<b>Description</b>	Differentiation between the two pilots.	Differentiation between teachers / students.	Differentiation between schools. Every school receives a 2-digit code which is the same for all teachers / students from this school.	Differentiation between classes. Every class receives a 1-digit code which is the same for all teachers and students from this class. We are expecting 2 classes per	Differentiation between participants. Every participant receives a 2-digit code. This code is unique within his/her class.





Example code	2	T	12	1	06
			This school code is unique for every school.	school, potentially 4 classes in exceptional cases.	
<b>Range</b>	1 = pilot 1 2 = pilot 2	T = teacher S = student	Starting with 01 and ascending.	1, 2, 3, 4	Starting with 01 in every class anew and ascending.

Based on the coding system presented in Table 2 and Table 3 above, the procedure detailed hereafter will be followed to conduct the pilots and guarantee GDPR compliance:

1. After recruitment, EUN<sup>10</sup> creates a confidential assignment file where the below information is noted:
  - Teachers’ full names,
  - Countries where teachers teach,
  - All codes the selected teachers will receive i.e., teacher code, student codes, parent codes,
  - Teachers’ assignment (classwise) either to intervention group or to control group<sup>11</sup>.
2. EUN shares an anonymized code file with WWL and UNW (for Pilot 1) and CLB and UNW (for Pilot 2) which includes the codes that have been assigned, the countries and the allocation to either intervention or control group<sup>12</sup>,
3. EUN shares all codes of a class with the teachers<sup>13</sup>,
4. EUN informs teachers about their assignment to either intervention or control group after pretesting.

<sup>10</sup> The confidential assignment file will not be shared with consortium partners to ensure data protection.

<sup>11</sup> When assigning teachers to either a control group or an intervention group equal distribution within the countries involved will be sought. If not possible a randomized approach will be employed.

<sup>12</sup> The anonymized code file will not include any name nor information which can help identify participants.

<sup>13</sup> At this stage, to minimise late dropouts and reassure participants about the confidential treatment of all the information collected during the study, it will be emphasized that EUN and UNW are independent organisations which do not exchange personal data.



## 4. Recruitment and engagement of Pilot Operatives

### 4.1 Recruitment strategy: rationale

EUN is driving the recruitment process for Pilot 1 and Pilot 2 operatives, applying a **2-step recruitment design**, that allows to incorporate early feedback from target groups and better plan for the pilot implementation stage.

The first recruitment step consists of identifying the ARETE Pilot 1 and 2 ‘teacher coordinators’, whose role, apart from their participation in the pilots in the intervention group, is to support and advise the project team in the preparation and implementation of the pilots and support the training and coordination of pilot teachers. Regardless of the pilot, teacher coordinators were selected based on their proven experience in using EdTech for educational purposes (ideally experienced with integrating augmented reality technologies in their teaching), their previous experience and involvement in international/national/regional education programmes, and their track record in organising and facilitating (international) teacher communities.

The calls for teacher coordinators worked also as a first step for testing the ARETE recruitment strategy for Pilots 1 and 2, allowing the project to take decisions with regards to the geographical coverage of the pilots (by drawing from the general interest shown by teachers in this first call) and to adjust the strategy for recruiting pilot operatives, in the second step of the selection process.

The two steps process of selecting the pilot participants is described in detail in the following sections.

### 4.2 Pilot 1 and 2 teacher coordinators

#### 4.2.1 Recruitment

To recruit the most appropriate group of coordinators, at the beginning of October 2020, EUN launched two open calls for Pilot 1 and Pilot 2 teacher coordinators. The calls were published on the ARETE website and disseminated through the ARETE, EUN and project partners’ channels. Specific communications packages including news items, promotional videos, visuals and social media messages were developed by EUN and shared with the ARETE consortium to ensure an appropriate distribution. An overview of this is provided below:

- [The Call for Pilot 1 Teacher Coordinators](#) to select 2 teacher coordinators to coordinate activities in Pilot 1, which will test the English literacy application provided by WWL. The call, published on 5 October 2020 consisted of a briefing document and application form. In total, 46 applications from 16 countries across Europe and beyond were received: from these EUN selected 2 teacher coordinators for Pilot 1. Figure 3 below illustrates the geographical distribution of the call applicants.



Figure 3: ARETE Pilot 1 - Call for teacher coordinators, Geographical distribution of applicants (in blue) and selected (in green)

Further information about the appointed Pilot 1 coordinators can be found in Table 4 below.

Table 4: Appointed Pilot 1 teacher coordinators

Country	Name <sup>14</sup>	Profile
Albania	F.A.	F.A. has been involved in a project where educators from Albania worked with fellow colleagues from an international school on issues of early childhood development. F.A. is experienced in working in international school projects and has taken part in over 5 international projects in the recent past.
Ireland	M.J.	M.J. will teach pupils aged 10-11 in January 2021. For the last 2 years, M.J. has worked with an Irish company to develop educational resources that are reflective of a STEAM framework. M.J. is their Primary Education Specialist and the resources that M.J. creates integrate technologies with various subjects on the Irish primary curriculum. Many of the projects M.J. is involved in are funded and developed in tandem with various sectors of the Irish Department of Education.

- [The Call for Pilot 2 Teacher Coordinators](#) aimed to select 8 teacher coordinators from the 8 main countries / group of countries initially targeted in Pilot 2, i.e. Greece, Italy, Malta, Poland, Portugal, Romania, Spain, Serbia/Croatia/North Macedonia. The call, published on 5 October 2020, consisted of a briefing document and application form.

<sup>14</sup> In the table, names of teacher coordinators have been anonymised for confidentiality reasons.



In total, 57 applications from 11 countries across Europe (and beyond) were submitted: from these EUN selected 8 Pilot 2 teacher coordinators.



Figure 4: ARETE Pilot 2 Call for teacher coordinators, Geographical distribution of applicants (in blue) and selected (in green)

Further information about the appointed Pilot 2 coordinators can be found in Table 5 below.

Table 5: Appointed Pilot 2 teacher coordinators.

Country	Name <sup>15</sup>	Profile
Croatia	B.Đ.	An experienced educator, B.Đ. has knowledge of the use of augmented reality technology in school. B.Đ. has used AR in teaching geometric content in mathematics and has created AR educational content using the Metaverse Studio app-open source platform for creating AR experience (games, quizzes, geocaches, etc).
Greece	K.P.	K.P. has implemented AR for teaching the solar system with students. Currently, K.P. works at the university and mentors the preservice teachers: AR is one of the subjects that preservice teachers are trained for. By participating in ARETE Pilot 2, K.P. wishes to acquire new strategies, techniques, methods and approaches to implement AR in the classroom.

<sup>15</sup> In the table, names of teacher coordinators have been anonymised for confidentiality reasons.



Country	Name <sup>15</sup>	Profile
Italy	G.T.	G.T. has been using AR in science lessons in the recent past and is keen on further exploring how AR could facilitate teaching geometry. This year G.T. is involved in two schools' Erasmus partnerships related to STEM education. G.T. is also in charge of coordinating a group of 8 teachers within another EU funded project.
Poland	M.R.	M.R. has been using AR in math lessons since 2015 and even trains other teachers in the use of AR technologies. Hence, applying to the ARETE project came naturally to M.R.
Portugal	A.M.	A.M.'s interest in using AR tools is related to the need to innovate and seek diversified practices that can increase students' motivation and participation in learning. With the participation in this project, A.M. intends to develop skills to better plan and streamline activities which make use of AR solutions, in order to raise the interest and curiosity of students.
Romania	R.L.	R.L. is an ICT and computer science teacher interested in everything that is new in the field of digital technologies. Hence, taking part in the ARETE project was a perfect opportunity to learn and apply cutting-edge educational solutions.
Serbia	G.T.	G.T. is the creator and coordinator of a project for teachers. In the recent past, G.T. was also involved in a project established by the Serbian Ministry of Education. G.T. has already been using AR in classes for the last two years and is always looking for new and engaging teaching models.
Spain	M.A.	M.A. has successfully employed Augmented Reality solutions in teaching before and is willing to explore further this technology. M.A. has solid experience in both national and international projects.

#### 4.2.2 Corrective actions for the call for pilot teachers

Due to the low interest of Maltese teachers in the call, 2 pilot coordinators were recruited from Serbia and Croatia, where the project was deemed to be more successful in attracting pilot participants, based on the results of this initial call.

Another decision taken following the call for pilot teacher coordinators was to open the Pilot 2 participants to teachers from across EU and H2020 associated countries, following



enquiries received by the project team from teachers outside the main group of countries initially targeted by the call.

Consequently, while applications from the countries represented by the pilot teacher coordinators will be prioritised, participants can be recruited from additional EU and H2020 countries if some countries are under-represented in the sample. This decision to expand the pilot sample furthermore works towards mitigating the risk of low participation from those countries with education systems more severely affected by the COVID-19 crisis.

#### 4.2.3 Engagement of teacher coordinators

##### *4.2.3.1 Introductory meeting*

To give a broader introduction and provide with the latest updates regarding piloting timeline as well as to clarify potential issues, in the beginning of M17 EUN organised the first online meeting with Pilot 1 and Pilot 2 Teacher Coordinators. Besides the mentioned matters, the meeting also aimed at giving broader introduction regarding: 1) ARETE project and its specifications; 2) EUN and its representatives with whom ARETE Teacher Coordinators are supposed to maintain close contact throughout the project; 3) Teacher Coordinators' and Pilot Teachers' role in both piloting studies; 4) project timeline; 5) preparatory activities and tasks to be completed before the pilots' execution starts in M23; 6) reporting system. Besides, Teacher Coordinators were given a brief introduction concerning the AR solutions to be tested in each pilot; each pilots' requirements; benefits for teachers participating in the pilots and the research design employed in each pilot. All the topics were followed by small Q&A sessions.

It is important to mention that during the meeting special attention was given to the upcoming tasks that Teacher Coordinators need to perform before the execution of the pilots starts, most importantly Task 1, which consists in disseminating calls for ARETE Pilot 1 and Pilot 2 teachers. Teachers were updated with the status of the recruitment process and timeline. They were also presented with the updated communications materials, designed for the dissemination of the calls.



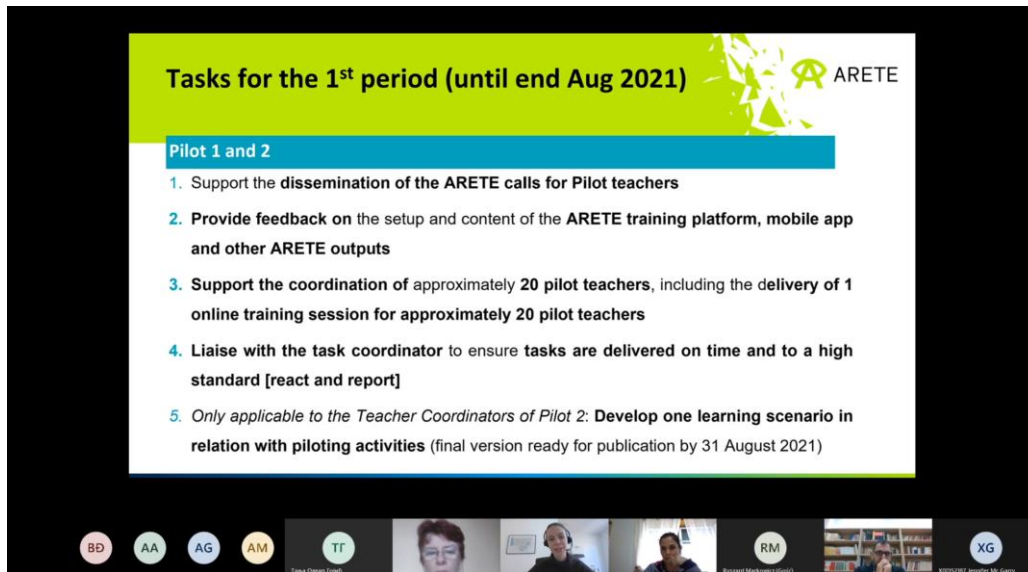


Figure 5: Introductory online meeting with Pilot 1 and Pilot 2 Teacher Coordinators

#### 4.2.3.2 Teacher coordinators' workshops

To train ARETE Teacher Coordinators and collect feedback on both piloting studies in various dimensions, EUN will organise 3 ARETE Teacher Coordinators' workshops over the course of the project. EUN has a sound expertise in organising teacher training workshops in the [Future Classroom Lab](#) as part of the piloting studies, where teachers have a space to debate the different piloting implementation aspects, brainstorm together and create pedagogical learning scenarios that are later implemented in their own and other colleagues' classrooms.

**The 1<sup>st</sup> ARETE Teacher Coordinators' workshop** is planned to take place online in June 2021, aiming to introduce the Teacher Coordinators with the solutions tested in both Pilots - i.e. WWL-AR in Pilot 1 and CLB-AR in Pilot 2 - before the pilots execution starts. This will also be the occasion to collect feedback on the pedagogical implications of AR in education and on the UI/UX requirements for AR technologies in education. The first Teacher Coordinators' workshop will also serve as an opportunity for clarifying pilots' implementation aspects such as pilots' evaluation and logistical aspects.

**The 2<sup>nd</sup> ARETE Teacher Coordinators' workshop** is foreseen to take place in M25 with the purpose to monitor the piloting implementation strategy and, if necessary, adjust it as well as troubleshoot possible issues of any kind.

**The 3<sup>rd</sup> ARETE Teacher Coordinators' workshop** is planned to take place in M28-M30, aiming at monitoring the pilots' implementation progress and preparing for the post-evaluation phase.

#### 4.3 Step 2: Selection of Pilot participants (Pilots 1 and 2)

Following the selection of Pilot 1 and Pilot 2 teacher coordinators, two open calls were launched for the recruitment of pilot participants, aiming to select participants on an ongoing basis until available places are filled. This measure is meant to ensure an appropriate dissemination of this important opportunity and allow WP6 to identify the most appropriate



pilot participants in a period when schools and teachers are under pressure due to the Covid-19 crisis. Details about the calls and the pilot specifications are presented in the following sub-sections.

### 3.3.1 Pilot 1

As detailed in the section above, Pilot 1 aims to engage 38 English teachers or Special Needs Assistants of students in the 4th-6th grade of primary schools (i.e. aged between 9 and 12 years old in January 2021), who typically underperform in English literacy tests. Pilot teachers should be active in **schools where English is the main teaching language** and come from EU and [H2020 associated countries](#). Ideal participants will feel comfortable communicating in English, be digital savvy and keen on applying technology in their teaching.

The call for Pilot 1 was published on the ARETE portal in December 2020 and is accessible at: <https://www.areteproject.eu/newsevents/body,527881,en.html>. It will remain active until all available pilot places are filled, presumably until September 2021.

The call is accompanied by a [briefing document](#) for teachers with information about:

- ARETE project;
- WordsWorthLearning (WWL) application;
- The responsibilities of ARETE Pilot 1 selected teachers;
- Teachers selection criteria;
- Benefits for teachers participating in ARETE Pilot 1;
- The timeline of the project;
- How to apply.

### 3.3.2 Pilot 2

As previously mentioned, Pilot 2 aims to engage 160 primary school teachers of students in 4th and 5th grade as of September 2021. Pilot teachers should **be actively involved in teaching geometry (mathematics) or geography topics in primary education** and preferably come from Croatia, Greece, Italy, Poland, Portugal, Romania, Serbia or Spain; nonetheless, Pilot teachers may be recruited from additional European Union and [H2020 associated countries](#). Ideal participants will feel comfortable communicating in English, be digital savvy and keen on applying technology in their teaching.

The call for Pilot 2 was published on the ARETE portal in December 2020 and is accessible at: <https://www.areteproject.eu/newsevents/body,527881,en.html>. Pilot 2 teachers have to apply in pairs. The call will remain active until all available pilot places are filled, presumably until September 2021.

The call is accompanied by a [briefing document](#) for teachers with information about:

- ARETE project;
- CleverBooks application;
- The responsibilities of ARETE Pilot 2 selected teachers;
- Teachers selection criteria;
- Benefits for teachers participating in ARETE Pilot 2;





- The timeline of the project;
- How to apply.



## 5. COVID-19 risk assessment and mitigation measures

While, at the moment of writing, COVID-19 did not impact the deployment of the ARETE Pilots 1 and 2, a risk analysis was carried out at the WP6 level in order to evaluate the impact of the current health situation on the deployment of pilots to schools. The main risks identified, and mitigating actions are described in this chapter.

### 5.1 Impact on recruitment and engagement

Two main risks were identified with regards to the recruitment and engagement of pilot 1 and 2 teachers, as illustrated in Table 6.

Table 6: IMPACT of COVID-19 on the recruitment and engagement of pilot teachers (P1 and P2)

Risk	Likelihood	Impact	Mitigation / Solution
Low engagement of teachers due to COVID-19 impact on schools	Medium	High	Selection process to be done on an extended period of time, to ensure sufficient time is allocated for recruitment. Calls for pilot teachers supported by the appropriate dissemination.
Lower engagement of participants to online events & potential technical issues	Low	Medium	Appropriate resources to be dedicated to ensuring technical support and the adaptation of event formats to online requirements

In particular, the risk of low interest or engagement of pilot participants is evaluated with a high impact on the deployment of the ARETE pilots. However, important mitigating actions are already in place to reduce the likelihood of this risk.

Most notably, the selection of pilot 1 and 2 participants will remain open until the beginning of the implementation phase (or until all pilot participants are selected), with places confirmed on an ongoing basis. Dissemination materials that put emphasis on the benefits of taking part in the pilots and that present in an attractive way the excitement of Augmented Reality applications were also created and published widely to support the dissemination of the calls. Examples include the two promotional videos that can be accessed below, or the dissemination flyer created to support teacher coordinators in their outreach activities (included as annex to this deliverable).

- Pilot 1 promotional video: <https://www.youtube.com/watch?v=puNQZR3ayJw>
- Pilot 2 promotional video: <https://www.youtube.com/watch?v=z0CEE52wph4&feature=youtu.be>



## 5.2 Impact on evaluation

As many of the evaluation instruments foreseen for the evaluation of Pilots 1 and 2 are designed to be applied primarily in a face-to-face context, a pilots evaluation risk assessment was led by UNW (with contributions from WWL) at the WP6 level. The risk assessment can be consulted in Table 7.



Table 7: ARETE Pilot Evaluation: Risk Assessment in case of fully online pilots (P1 and P2)

Pilot	Evaluation Instrument	Risk	Alternative Realization	Comment	Challenge	Mitigation / Solution
1	ProfileD Case History Form	None	-	Conducted online anyway	-	-
	NARA II	Medium	Online Administration	Given Guidelines for administration by test provider	Glitches with technology	Has to be accepted
					Suitable home test environment	Has to be accepted
					Clarity / visibility of reading material	Consider providing sealed paper versions of texts – to be opened at the time of assessment
					Parental/Guardian involvement needed	Part of selection criteria
					All participants need technical support	Written guidelines/ support provided by EUN/WWL
					Student need additional technical equipment	Part of selection criteria



Pilot	Evaluation Instrument	Risk	Alternative Realization	Comment	Challenge	Mitigation / Solution
	Vernon	Medium	Online Administration	Given Guidelines for administration by test provider	Glitches with technology	Has to be accepted
					Suitable home test environment	Has to be accepted
					Parental/Guardian involvement needed All participants need technical support	Part of selection criteria
					Parental/Guardian involvement needed	Written guidelines/ support provided by EUN/WWL
					All participants need technical support	Part of selection criteria
					Student need additional technical equipment	Part of selection criteria
	IMI (Motivation)	Medium	Online survey	Can be conducted online with medium high impact	No control over test setting → potentially biased or incomplete input, potentially less time and effort for response	Has to be accepted. Might be partially mitigated by asking parents to control the testing



Pilot	Evaluation Instrument	Risk	Alternative Realization	Comment	Challenge	Mitigation / Solution
					Potentially lower response rate	Has to be accepted
					Students need additional technical instructions	To be provided by UNW / EUN
					Students need technical support	Parents need to be asked to support their children with the online survey
					Students need technical equipment; this might exclude single participants	Has to be accepted unless tech equipment can be provided to single students (not realistic)
	Teacher Coordinator Focus Group & Interviews	Low	Online interviews	Can be conducted online with low impact. TCs can be expected to have appropriate tech equipment at their disposal.	TCs need additional technical instructions	To be provided by UNW / EUN
	Teacher Surveys	none	-	Conducted online anyway	-	
2	TIMSS2015	High	Students fill in paper tests at home	Students would have to fill in the tests at home,	Validity of data severely impacted: no control over timing & cheating, no standardized testing setting	Has to be accepted. Might be mitigated a bit by asking parents to control the testing



Pilot	Evaluation Instrument	Risk	Alternative Realization	Comment	Challenge	Mitigation / Solution
				<p>which would cause high impact on the results. An online realization is not feasible due to the design of the instrument.</p>	Higher risk of invalid data (tests filled in incompletely or incorrectly)	Has to be accepted. Might be mitigated a bit by asking parents to control the testing
					Significantly lower response rate to be expected: Less motivation and higher efforts for students to complete	Has to be accepted
					Less complete data sets to be expected (higher risk of students only filling in 1 or 2 out of 3 surveys (pre, post, retention))	Has to be accepted
					Additional post parcels: higher costs, higher efforts for participants and higher risk of data getting lost	Has to be accepted
	IMI (Motivation)	Medium	Online survey	<p>Can be conducted online with medium high impact.  Currently, IMI is part of our TIMSS test book. To consider whether it should remain there or</p>	No control over test setting → potentially biased or incomplete input, potentially less time and effort for response	Has to be accepted. Might be mitigated a bit by asking parents to control the testing
					Potentially lower response rate	Has to be accepted
					Students need additional technical instructions	To be provided by UNW / EUN



Pilot	Evaluation Instrument	Risk	Alternative Realization	Comment	Challenge	Mitigation / Solution
				become an online survey	Students need technical support	Parents need to be asked to support their children with the online survey
					Students need technical equipment; this might exclude single participants	Has to be accepted unless tech equipment can be provided to single students (not realistic)
	Teacher Coordinator Focus Groups PRE & POST	Low	Online Focus Group	Can be conducted online with low impact. TCs can be expected to have appropriate tech equipment at their disposal.	TCs need additional technical instructions	To be provided by UNW / EUN
	Teacher Surveys	none	-	Conducted online anyway	-	





## 6. Conclusions

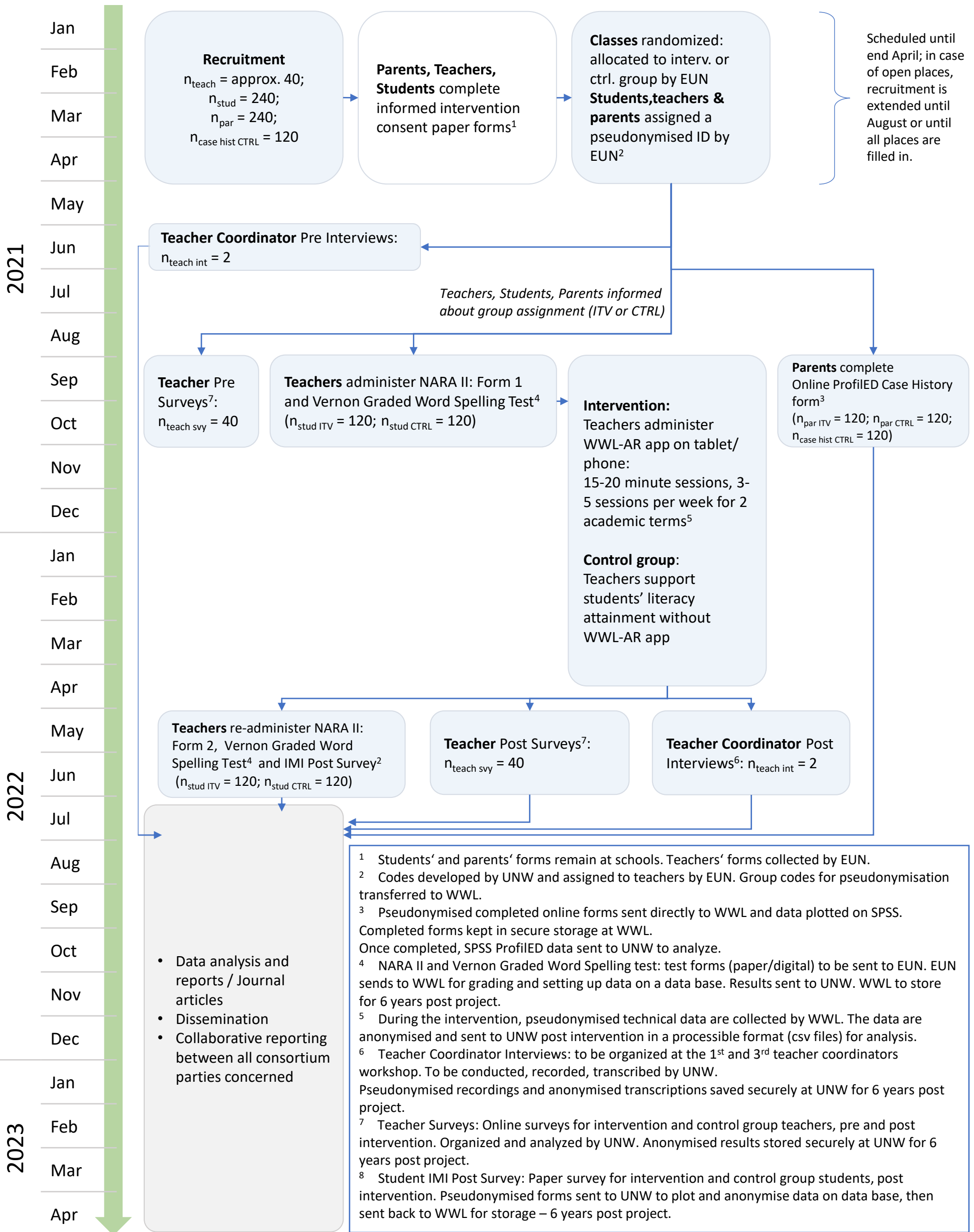
Over the course of the first 18 months of the project, WP6 partners put in place a comprehensive plan for the deployment of the ARETE pilots, fully aligned with the timeline foreseen in the description of work. The pilots' evaluation strategy and instruments are in place. Aspects related to ethics and data protection are also integrated and processes are established that will ensure a streamlined implementation that takes into consideration the protection of personal data from all pilot participants (including minors). While the impact of the COVID-19 pandemic on school systems across Europe cannot be ignored, an impact assessment was carried out at the WP6 level and solutions are foreseen to mitigate negative effects on the pilots' deployment.

The employment of a 2-steps approach for the recruitment of teachers proved to be a satisfactory solution, successfully allowing to incorporate early feedback from target groups and better plan the pilot implementation stage. As the recruitment of pilot teachers continues, EUN will keep leveraging on its network of teachers and Ministries of Education to maximise the dissemination of the call, while refining the scope of the communication thanks to the feedback and help of teacher coordinators. Within this framework, the 1st teacher coordinators workshop to be held in June will serve as a checkpoint to assess the strategy put in place so far.



## List of annexes

- Pilot 1 Intervention Strategy
- Pilot 1 Assessment Strategy
- Pilot 2 Intervention Strategy
- Pilot 2 Assessment Strategy
- Pilot 1 and Pilot 2 dissemination flyer



### ProfileD Case History form

Online Survey, filled in by parents

Sept-Oct 2021

$n_{par\ ITV} = 120$ ;  $n_{par\ CTRL} = 120$ ;  
 $n_{case\ hist\ CTRL} = 120$

#### Instrument characteristics

The form works from a multi-disciplinary perspective to provide information relating to Speech & Language Therapy, Occupational Therapy, Psychology and Academic (School) performance. The data collected includes early and current history and identifies areas of strength and difficulty of clinical interest to these multi-disciplines to help with assessment & intervention recommendations. It takes approx. 20 min to complete.

#### Handling of Data

Anonymous completed online forms sent directly to WWL and data plotted on SPSS. Completed forms kept in secure storage at WWL. Once completed, anonymized SPSS ProfileD data sent to UNW to analyze.

#### Analysis (Oct 2021-Dec 2021)

Identification of variables that distinguish intervention and control group from the case history control group:  
what variables are shared across groups so that they can be eliminated for the next stage of analysis? What variables are specific to students with literacy difficulties?

### NARA II: Form 1 (pretest) and Form 2 (posttest); Vernon Graded Word Spelling Test, IMI Survey (post)

Paper tests, administered by teachers  
Pre: Sept-Oct 2021; Post: Apr-Jun 2022  
 $n_{stud\ ITV} = 120$ ;  $n_{stud\ CTRL} = 120$

#### Instrument characteristics

Neale Analysis allows for Pre and Post testing of reading ability for English language. It is a standardised test of English reading accuracy, reading comprehension and reading rate, providing standard scores and reading age equivalents for students up to 12:11 years. Testing takes approx. 20 min for one teacher and one student. Vernon Graded Spelling Test is a standardised test designed to assess spelling attainment and progress from age range 5 to 18+ years. Testing takes 5-20 minutes and is realized by a teacher and either one student or a group of students. The Intrinsic Motivation Inventory (IMI) is a multidimensional tool that allows to assess the students' experience during the intervention phase through a Likert scale. The survey will take approx. 5-10 minutes.

#### Handling of Data

Pseudonymized test forms (paper) to be sent to UNW initially to plot and anonymise baseline data (pre) and intervention scores data (post) on data base, then sent back to WWL for storage – 6 years post project.

#### Analysis (Oct 2021-Apr 2023)

- Comparison of pre and post results
- Comparison of intervention and control group
- Identification of profile variables (decided upon from previous ProfileD Case History Form analysis) that contribute to or determine a positive response to WWL-AR; evaluation of profile variables that indicate suitability/ unsuitability of AR use

### Teacher Coordinator Interviews

Face to face interviews  
Organized at 1<sup>st</sup> & 2<sup>nd</sup> teacher coordinators' workshop by EUN / Administered by UNW

Pre: June 2021; Post: Mar 2022

$n_{teach\ ITV} = 2$

#### Instrument characteristics

Qualitative interview guideline developed based on relevant literature, to clarify the pedagogical implications of AR application in educational settings. The interviews will take approx. 1 hour.

#### Handling of Data

Interviews conducted, audio-recorded and transcribed by UNW. Data accessed by UNW only. Pseudonymized recordings and anonymized transcriptions saved securely at UNW for 6 years post project.

#### Analysis (Jun 2021-Apr 2023)

- Qualitative content analysis of anonymized transcripts
- Conclusions on the implications of AR on teaching and learning processes in school
- Identification of teachers' experiences and evaluation of the intervention, of factors that hinder or facilitate a successful implementation, and of the perceived impact of the AR-based intervention on the students

### Teacher Surveys

Online surveys  
Organized and administered by UNW

Pre: Sept-Oct 2021; Post: May-Jun 2022

$n_{teach\ ITV} = 20$ ;  $n_{teach\ CTRL} = 20$

#### Instrument characteristics

Subjective surveys, developed based on relevant literature, to identify intervention and control group settings and pedagogical implications of AR applications in education. The surveys take approx. 10 min (pre) / 30 min (post) to complete.

#### Handling of Data

Pseudonymised surveys developed, administered, anonymised and analysed by UNW. Data accessed by UNW only. Data saved securely at UNW for 6 years post project.

#### Analysis (Sep 2021-Apr 2023)

- Descriptive statistics, comparison of intervention and control group results
- Conclusions on the implications of AR on teaching and learning processes in school
- Identification of intervention and control group settings, of teachers' experiences and evaluation of the intervention, of factors that hinder or facilitate a successful implementation, and of the perceived impact of the AR-based intervention on the students

### Collection of technical data

Collection of research data will be organized and administered by WWL. Currently, all app data will be stored on the client device. Additional features will provide research data collection. The data will be anonymized and stored in the Arete Project repository.

#### Instrument characteristics

Data will include:

- Teacher dashboard access to student progress will be collected throughout the app
- Speech recognition App (COPPA & GDPR compliant)
- xAPI research data will be extracted and transferred.

#### Handling of Data

- Pseudonymised data will be collected from Events Logs (clicks) and stored as anonymized Json files.
- The data will be extracted by xAPI to the project Learning Locker and used for research purposes and teacher dashboard.

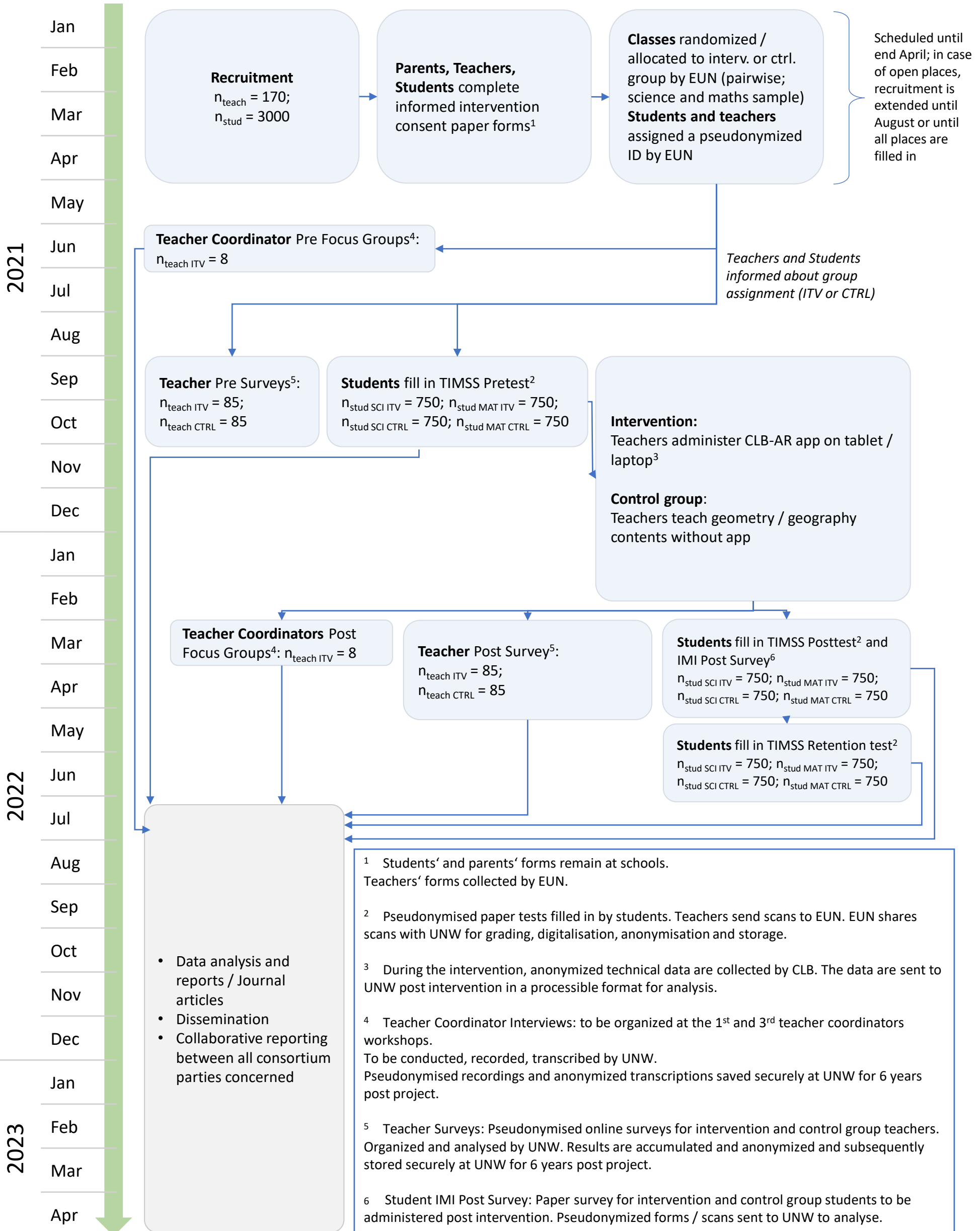
#### Analysis (Jul 2022-Apr 2023)

Future statistical data for analysis will include e.g. Tracking:

- Speed of progress through the app
- Scores: for games, awards, questionnaires
- Attempts at reading & spelling exercises
- No. of references to Vowel & Consonant charts

Data analysis and reports  
Journal articles  
Dissemination

Collaborative reporting between all consortium parties concerned



**TIMSS 2015 – Selected items;  
IMI Post-Survey - Selected items**

Paper test, filled in by students

Pre: Sep-Oct 2021; Post: Mar-Apr 2022;

Retention: May-Jun 2022

$n_{\text{stud SCI ITV}} = 750$ ;  $n_{\text{stud MAT ITV}} = 750$ ;

$n_{\text{stud SCI CTRL}} = 750$ ;  $n_{\text{MAT CTRL}} = 750$

**Instrument characteristics**

The TIMSS 2015 inventory is an established international standardised knowledge testing instrument. It is available upon authorisation in all pilot languages and includes items for 4<sup>th</sup> and 8<sup>th</sup> grade in mathematics and science. A selection of 4<sup>th</sup> grade items will be used for the ARETE study. Additionally, selected items from the TIMSS context questionnaire will be included to cover basic pseudonymised demographic data. The testing will take approx. 45 min (incl. break). The Intrinsic Motivation Inventory (IMI) is a multidimensional tool that allows to assess the students' experience during the intervention phase through a Likert scale. The survey will take approx. 5-10 minutes (an additional break may be required).

**Handling of Data**

Pseudonymised paper tests filled in by students. Teachers send scans to EUN who forward to UNW for grading, digitalisation, anonymisation and storage (6 years post project).

**Analysis (Sep 2021-Apr 2023)**

- Descriptive statistics, comparison of intervention and control group results
- Comparison pre – post – retention
- Development of subsamples
- Hypothesis testing, group performance etc.

**Teacher Coordinator Focus Groups**

Online / face to face focus groups  
Organised at 1<sup>st</sup> and 3<sup>rd</sup> teacher coordinators' workshops by EUN / Administered by UNW

Pre: Jun 2021; Post: Mar 2022

$n_{\text{teach ITV}} = 10$

**Instrument characteristics**

Qualitative interview guideline developed based on relevant literature, to clarify the pedagogical implications of AR application in educational settings. Focus groups will take approx. 2 hrs.

**Handling of Data**

Interviews conducted, audio-recorded and transcribed by UNW. Data accessed by UNW only.  
Pseudonymised recordings and anonymised transcriptions saved securely at UNW for 6 years post project.

**Analysis (Jun 2022-Apr 2023)**

- Qualitative content analysis of anonymised transcripts
- Conclusions on the implications of AR on teaching and learning processes in school
- Identification of teachers' experiences and evaluation of the intervention, of factors that hinder or facilitate a successful implementation, and of the perceived impact of the AR-based intervention on the students

**Teacher Surveys**

Online surveys  
Organised and administered by UNW

Pre: Sep-Oct 2021; Post: Mar-Apr 2022

$n_{\text{teach ITV}} = 85$ ;  $n_{\text{teach CTRL}} = 85$

**Instrument characteristics**

Subjective surveys, developed based on relevant literature, to identify intervention and control group settings and pedagogical implications of AR applications in education. The surveys will take approx. 10 min (pre) / 30 min (post) to complete.

**Handling of Data**

Pseudonymised surveys developed, administered, anonymised and analysed by UNW. Realised with SurveyMonkey. Data are password-protected and accessed by UNW only. Pseudonymised data saved securely at UNW for 6 years post project.

**Analysis (Sep 2021-Apr 2023)**

- Descriptive statistics, comparison of intervention and control group results
- Conclusions on the implications of AR on teaching and learning processes in school
- Identification of intervention and control group settings, of teachers' experiences and evaluation of the intervention, of factors that hinder or facilitate a successful implementation, and of the perceived impact of the AR-based intervention on the students

**Collection of technical data**

Organised and administered by CLB

Sep 2021-Mar 2022

$n_{\text{stud SCI ITV}} = 750$ ;

$n_{\text{stud MAT ITV}} = 750$

**Data collection characteristics**

During the intervention, the CLB apps will collect anonymous user data on time spent in the apps and numbers of clicks.

**Handling of Data**

The technical data will be collected anonymously in the CLB apps, secured on the local, password-protected CLB server and shared with UNW as Excel files. After transfer, it will be deleted from the CLB server and stored by UNW securely for 6 years post project.

**Analysis (Jul 2022-Apr 2023)**

- Descriptive statistics
- Identification of references between cumulated app data and post-testing / retention results



Data analysis and reports  
Journal articles  
Dissemination

Collaborative reporting between all consortium parties concerned



## ARETE PILOT 1

**ARETE Pilot 1** will investigate the effects of Augmented Reality (AR) on **English literacy attainment** by piloting the **WordsWorthLearning**'s interactive AR mobile application for teaching and learning English language literacy. The solution will be tested with primary school students, typically underperforming in standardised English language literacy tests.

The WWL-AR application was developed by a Consulting Speech & Language Therapist with over 30 years clinical experience and who is a specialist in resolving specific learning difficulties, including dyslexia.

All the **teachers and pupils** participating in ARETE Pilot 1 will **receive access to cutting-edge software free of charge**.

### Who can participate?

English teachers or Special Needs Assistants (SNAs) of pupils aged 9-12 years old in January 2021 in primary schools from EU, the UK and H2020 associated countries where **English is the main teaching language**. Teachers and students should have access to mobile devices for testing the app.

### Where to submit applications?

- [Call for ARETE Pilot 1 teachers](#) including more information about piloting specifications
- [Application form](#)

## ARETE PILOT 2

**ARETE Pilot 2** will study the impact of Augmented Reality (AR) technologies on **STEM skills learning and retention** by piloting two immersive AR mobile applications for learning **Geography and Geometry**, provided by **CleverBooks**, in schools from at least 8 European countries.

By using either application, pupils will develop both their spatial and visual cognition by learning the foundations of Geometry and Geography through critical thinking by engagement with and understanding of abstract objects.

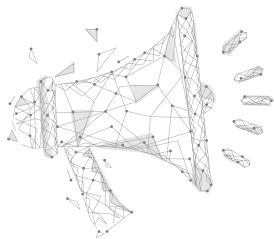
All the **teachers and pupils** participating in ARETE Pilot 2 will **receive educational materials and access to cutting-edge software free of charge**.

### Who can participate?

Teachers of subjects where geometry (mathematics) or geography topics can be addressed with **pupils in grade 4 or 5 (regardless of the age) as of September 2021**. Teachers and pupils should have access to mobile devices for testing the apps. Priority will be given to applicants from: Croatia, Greece, Italy, Poland, Portugal, Romania, Serbia and Spain. Teachers from other EU, H2020 associated countries, or the UK may be accepted, depending on the available places.

### Where to submit applications?

- [Call for ARETE Pilot 2 teachers](#) including more information about piloting specifications (i.e. country requirements)
- [Application form](#)



**Participants will be confirmed on an ongoing basis, until places are filled**

For more information, please contact *Giuseppe Mossuti* at [giuseppe.mossuti@eun.org](mailto:giuseppe.mossuti@eun.org)

