AI4T
AI FOR TEACHERS

Work Package 1:

Experimentation

Deliverable D1.2

Report on the experimentation

Full scale implementation

July 2022- December2023

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ABSTRACT	This report presents a comprehensive overview of the AI4T project's extensive experimentation phase (July 2022 - December 2023) in the field of AI in education across five countries: France, Luxembourg, Ireland, Italy, and Slovenia. It covers four distinct phases, with a particular focus on Phase 3, the full-scale implementation, where adaptations, challenges, and enhancements are meticulously documented in comparison to the initial plan. The primary objective is to assess the project's outcomes against the experimentation protocol, shedding light on deviations, challenges faced, and improvements achieved. Structured into four main sections, the report begins providing a detailed insight into the large-scale experimentation within each participating country. It encompasses the recruitment process, control group management, and questionnaire administration and dissemination, emphasizing adherence to the Experimentation Framework while making necessary local adjustments. Section 2 delves into the AI4T project's training pathway, highlighting the utilization of diverse training resources, such as the MOOC, the open textbook, and a common framework for training activities. This section underscores the dynamic interplay between these resources, ensuring a comprehensive training experience at the national level. Section 3 presents a SWOT analysis conducted for each country's project implementation, offering valuable insights that can inform educational innovation decisions on both national and global scales. This analysis aims to facilitate project expansion and support informed decision-making in education. Section 4 concludes the report by summarizing the global lessons learned and offering recommendations for future projects and policymakers. Through the extensive experimentation phase, the AI4T project has garnered a wealth of insights, providing guidance for improved outcomes in future endeavours within the future landscape of AI in education.
KEYWORDS	Experimentation, work packages, recruitment, evaluation, MOOC, professional training pathway, policymakers.

Dissemination level		
PU	Public	**X**
PP	Restricted to project partner (including the Commission)	
RE	Restricted to a group defined by the consortium (including the Commission)	
CO	Confidential, only for members of the consortium (including the Commission)	

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Introduction

This document serves as a comprehensive report of outcomes and experiences derived from the extensive experimentation phase of the professional training pathway (July 2022 - December 2023) in the AI4T project - Artificial Intelligence for and by teachers, aimed at exploring and supporting the use of AI in education. The project scope involved secondary schools, mainly Mathematics and English teachers of students aged 15-17 years old. It spanned across five participating countries: **France, Ireland, Italy, Luxembourg, and Slovenia**, involving Ministries, research laboratories and evaluators. The project, organized into 5 thematic work packages (WP1 Experimentation, WP2 Training architecture and resources, WP3 Evaluation, WP4 Dissemination and upscaling, WP5 Quality) and lead by a main central coordinating team (WP0), is being developed over 4 phases:

Phase 1 (March 2021 to August 2021): During this phase, evaluation tools and the AI training architecture were developed and tailored to the specific national contexts.

Phase 2 (October 2021 to June 2022): This phase involved a small-scale experimentation conducted with a limited number of schools and teachers across the five countries. The purpose of this phase was to test every aspect of the protocol, the experimentation methodology, the training resources, and the evaluation tools to provide guidance and improvements for the next phase. It included the adaptation of tools, protocols, and AI training architecture based on the feedback received during the small-scale experimentation conducted in the previous phase.

Phase 3 (November 2022 to July 2023): This phase, which is the primary focus of this report, marks the full-scale implementation of the project. The main activity of phase 3 for WP3 was the collection of data through the administration of questionnaires and the conduct of interviews.

Phase 4 (August 2023 – February 2024): The final phase primarily involves the evaluation of the project's outcomes and the dissemination of results as the analysis of data collected during the full-scale to evaluate the AI4T professional learning pathway. This phase occurs after July 2023 and is focused on assessing the project's overall impact and sharing the findings with a wider audience.

The primary objective of the present analysis is to evaluate the outcomes against the parameters originally outlined in the experimentation protocol. This evaluation aims to identify any minor deviations from the initial plan, challenges encountered during the execution, and enhancements achieved in comparison to the project's preliminary pilot phase. Furthermore, this report holds a twofold purpose. Firstly, it facilitates the compilation of valuable insights for lessons learned from the AI4T initiative. Secondly, it will provide a foundation for shaping policy recommendations that will guide future endeavours in the realm of artificial intelligence in educational settings. A thorough understanding of the interventions undertaken and the conclusive execution of the large-scale implementation hinges on the active participation and collaboration of all involved countries and the five Working Groups. This cooperation will substantially contribute to the substantive content of this report, making it an indispensable resource for the forthcoming stages of quality evaluation and dissemination of the AI4T project's outcomes.

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1. Report on experiences during large-scale experimentation

1.1. Recruitment and evaluation

The primary aim of this section is to provide a comprehensive panoramic overview of the interventions conducted within each participating country. These interventions include the selection of schools and teachers, in strict accordance with the precepts delineated in the Experimentation Framework that can be consulted as a separate document. The process from its inception to its conclusion, spanning the initial evaluation to the ultimate assessment, will be here reported.

Central to this endeavour are the parameters that were defined and ratified in the protocol. These parameters served as guidelines, agreed upon, particularly through the joint efforts of Work Package 1 (WP1) - Experimentation and Work Package 3 (WP3) - Evaluation. However, it is noteworthy that, on certain occasions, adjustments had to be made to accommodate local requirements.

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1.1.1. What kind of schools participated in the project?

Country	Type of schools: general, vocational, lyceum	% of different types of schools	National geographical coverage	Recommendations/ Lessons learned/ Observations
Luxembourg	All types of secondary schools participated in the project.	16% Lyceum (Classique) 11% secondary school offering technical and Classique diplomas. 32% secondary school offering technical and professional (VET) diplomas. 42% secondary schools offering all diplomas	All regions with the following distribution: Southern regions: 11% Northern regions: 21% Central regions: 68%	For a small country like Luxembourg, the selection criteria were very difficult to meet. We have a "natural" centralisation of secondary schools in the city of Luxembourg (central region). And for a number of years now, we have seen a trend towards diversification in secondary education, with many schools offering more than one diploma. As the schools are comparatively small, the criteria of 2 English and 2 maths teachers was also difficult to meet. Typically, there is one teacher who takes part in such a comprehensive training programme and then acts as a multiplier in his or her school - adapting the content and method to the needs of the school.
Ireland	All types of secondary schools participated in the project	62% JMB (Voluntary Secondary Schools) 14% ACCS (Community and Comprehensive Schools) 24% ETB (Education and Training Board)	Geographical diverse with the following distribution: Leinster:76% Munster: 19% Connacht: 5%	Ireland is a small country of approximately 700 secondary-post-primary schools. When implementing professional learning at a national level, frequently a cascade model is used where one digital leader works closely on an initiative or project and is supported to build capacity with other staff in the school. Therefore, any objective that seeks to have multiple teachers from one school is difficult to meet in Ireland.

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Slovenia	All types of secondary schools participated in the project	All schools (experimental + control): 67 schools Gymnasium: 29 schools = 38,16% Vocational: 47 schools = 61,84% Lyceum: 0	Eastern Slovenia: 40 schools: 52,63% Western Slovenia: 36 schools: 47,37%	There was quite a lot of interest from vocational schools. After we explained why the focus was primarily on English and Math teachers they understood, but a greater interest was from teachers of other subjects, where AI tools and enriched teaching are not so evident.
France	All types of secondary schools participated in the project	Secondary schools: Lower secondary schools: 20 % Upper secondary schools: 80 % In the upper secondary schools, the 80 % are distributed as follows: Secondary schools with a general diploma and technological diploma: 77 % Vocational schools: 3 %	Northern regions: 17% Western regions: 39% Central regions: 17% Southern regions: 21% Oversea (Guadalupe): 6% Diverse regions (north, centre and south), reflecting France as a whole, with territories in mainland France and an overseas territory.	The initial choice, in a complex context (COVID and the ability to guarantee training over face-to-face days), was to rely on willing academic territories that were representative of French diversity, including an overseas academy. Based on experience, it would have been more effective to open the programme up to all volunteer teams in France, including those who did not attend the face-to-face training session. Alternatively, a hybrid system could have been set up, with volunteer academic territories receiving full support and other national teams receiving partial support. In this way, the question of the number of participants would have been easier to resolve, but the question of assessing the impact would have been more complex.

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Italy	All types of secondary schools participated in the project	50% Lyceum 40% Technical Schools 10% Professional I schools	All Italian regions with the following distribution: Southern regions: 47% Northern regions: 29% Central regions: 24%	Italy was able to recruit different types of schools from different local contexts which helped to have a wide range of feedback for the evaluation process. It was interesting to engage many schools from the south of Italy with fewer opportunities and in more small areas. Also, there was a great request from other subject matter teachers, other than English and Maths, to join the project which testimonies the need to form and train teachers in the AI arena.

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1.1.2. Number of recruited schools and teachers (test and control group) vs. original forecasted numbers and reasons for possible discrepancies

In the original plan, it was calculated to have around 350 volunteer schools recruited by the Ministries across the 5 participating countries according to the following ratio:

- 100 schools in France
- 100 schools in Italy
- 100 schools in Slovenia
- 30 schools in Ireland
- 20 schools in Luxembourg

However, for different reasons which will be explained in further details in this section, the numbers were different from those originally planned. This paragraph provides a comprehensive understanding of the factors contributing to these deviations.

Country	Number of participating schools / head principals	number of total participating teachers (test and control group)	Numbers of teachers participating per subject matter	Recommendations/Lessons learned/Observations
Luxembourg	Number of schools: **14**	Number of recruited teachers: **21**. 19 included in the evaluation process (selected by WP3)	12 English teachers 7 Math teachers	Recruitment was very difficult in September 2022, with very little interest in the topic from headteachers and individual teachers. Only very few schools were interested in the topic and the considerable investment of about 20 hours of professional training in AIED. With the advent of ChatGPT, demand increased in early 2023 and the waiting list for AI4T training grew to 20 teachers. In this context, and in line with WP3, we decided to offer a second cycle of AI4T professional development from March to May 2023.

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Ireland	Number of schools: **21** Initial numbers: **79** expressed interest	Number of recruited teachers **21**. 11 in the experimentation group and 10 in the control group. Number of teachers - initial numbers: 38 Math teachers 41 French teachers	12 Maths 9 French	The Covid pandemic has had a noticeable impact on the willingness of teachers to engage in elective professional development. Professional development that is mandatory or core to the teaching of their subjects is prioritised. There are also systemic factors that currently impact with teacher supply affecting the ability of schools to release teachers for professional development. The timing of the EOI also impacted on uptake. Before the explosion of Generative AI and its proliferation in the media there was an interest among school leaders and teachers about AI, but it was reported as quite external to their identity and something that was a future rather than immediate consideration. However, the growing use of Generative AI in schools has stimulated a national conversation and an EOI would get a huge response.
Slovenia	Number of schools: **76**	Number of recruited teachers :**269**	121 Math teachers 97 English teachers 51 Others	Immediately after COVID, it was very difficult to raise schools' interest and recruit them. The schools were overloaded with work and teachers were reluctant to participate. The biggest motivation was that the invitation came from the Ministry and that we ensured recognition for teachers'' CPD.
France	Number of schools: **120**	Number of recruited teachers **256**	142 Math teachers 113 English teacher	In terms of recruitment, initially, the target group was Mathematics and Foreign language teachers (English for France) and 2 teachers for each subject matter. However, given the recruitment difficulties encountered during the pilot-phase, in strict cooperation with the

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				evaluator team WP3, some modifications were made to recruit more easily. For instance, in France, it was agreed to open the recruitment to teachers with 14–15-year-old students ("collèges" and "classes de 3ème") and schools with only one teacher interested. It was decided to avoid recruiting teachers from other subjects. Initially, in the early stages of the project, recruitment in a complex context (COVID in particular) was a major challenge, even though the AI subject was of interest to some teachers. The year 2022-2023, with the arrival of generative AI (including ChatGPT), has greatly strengthened the interest of teachers, trainers and management staff.
Italy	Number of schools: **91**	Number of recruited teachers: **438**	262 Stem teacher 152 English teacher 24 others	Due to contractual issues with the coordinator, Italy started the recruitment later. The process; however, was very fast ad successful due to two key elements: in cooperation with WP3 it had been agreed to enrol also STEAM teachers - not only Maths and English - and also the recruitment process started with the arrival of ChatGPT, arising teachers' interest in AI, which had been relatively low until that moment.

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1.1.3. Recruitment process of schools & participants

This paragraph outlines the chronology and methodology of the national-level recruitment process. It provides details on the manner and timing in which the recruitment procedure was conducted on a nationwide scale.

Country	When? Month/year	Which schools were addressed or considered?	Which information was provided to whom?	What went well Or helped	What went wrong and why	Recommendations/Lessons learned/Observations
Luxembourg	Presentation of project in "Collège des directeurs" (assembly of all secondary school principals) on 4.10.2022 Letter sent to all secondary schools on 7.10.2022 Reminder sent to all secondary schools on 28.10.2022 Publication in the national newsletter on media literacy education (edumedia) targeting 2.500 teachers in LU (October 2022).	Schools with digital-related projects and initiatives Teacher networks dealing with digital topics.	Official presentation / letter with project's objectives, timeline, target groups, etc	Personal contacts to school leaders and teachers	Very little to no response to the recruitment call in September/October 2022. Schools and teachers were not interested in AI topics, they did not consider it relevant to their work in the short term.	Recruitment at the beginning of the school year may not be the best time to start with very innovative topics. Schools are trying to focus on everyday school life and issues at this time. As there was little to no public awareness or discussion of AIED, the investment in about 20 hours of training was considered too much. The focus on English and maths teachers made recruitment even more difficult. A broader range of subjects would have helped to attract participants.

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Ireland	Expression of interest (EOI) issued on November 7th for a November 30th launch. PDST Technology in Education has strong connections with schools through previous and ongoing initiatives and projects.	All Schools and teachers could participate but notification of the EOI was specifically issued to teachers that had previously or were currently participating in other digital-related initiatives.	Official presentation / letter with project's objectives, timeline, target groups, etc	Extensive previous networks and familiarity for teachers of engaging with PDST Technology in Education.	For many teachers who had expressed an interest the timeline was too robust for them. Some registered their interest but were hoping to be placed on a programme in the next academic year.	It is difficult to find a suitable time to implement professional development but earlier in the academic year might have been more fruitful. There are opportunities now though to build on the successes of this initial foray with use cases and case studies to promote activities.
Slovenia	1st letter – circular was sent to all secondary schools on 20 September 2022; recruitment activities ended on 7 December 2022. We published a news segment on our national school platform and an invite on our LinkedIn account in November 7, 2022.	All schools – gymnasium, vocational, music schools, schools for children with special needs. We invited all schools regardless of their prior experience in the field of digital education.	Official presentation of the project, with project's objectives, timeline, target groups, what certificate of participation they will receive, defining tasks for teachers, school coordinators, headmasters, etc	It was well received that the 1st invitation/ information came in the form of a circular supported by the Ministry. In the latter stage we strengthened the recruitment and asked for help from the Institute of Education and previous projects that helped us animate other schools.	The schools were just overwhelmed with other – prior or new engagements and were reluctant to commit to such a comprehensive project that included various phases, an intensive online training and required an input from several teachers (including the headmaster and students).	Recruitment at the beginning of school year maybe not the best starting period for very innovative topics. Schools at this point of time try to focus on everyday school life and issues. As there was little to no public awareness or discussion on AIED, the investment in approx. 20h of training was considered too much. Focus on English and math teachers made recruitment even harder. A broader scope of subjects would have helped in finding participants.
France	June 2022 until the end of October. Official launch at the engagement webinar on 17 November.	Voluntary academies, and preferably schools with ICT equipment and/or with digital-related	Official presentation / letter with project's objectives, timeline, target groups, etc	The Digital Technology department (DANE) of each academy relayed the official	Teachers were reluctant to spend extra time on a training that would not include any possible partnership for the next academic	As in the case of Luxembourg, the arrival of generative AI means that many more different lessons can be tackled than those initially selected.

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		projects and initiatives.		presentation to schools and selected schools with digital-related projects.	year.	
Italy	Letter sent end of January 2023	We selected schools who had participated in a public call to act as centre of innovation in for the digital transition and teacher training.	The recruitment process was done through a national call, using the same criteria in the five countries and a shared template letter provided by WP4, slightly customized. In Italy the project was presented also as part and the DEAP 2021-2027 and in the framework of the National Resilience and recovery plan. The teacher training was part of the national training platform and in the letter, it was said the participants would have had a certificate of attendance.	To address the letter to a network of schools keen on digital innovation and not only to send the letter by also to directly contact the headmasters by phone call explaining the goals and value if the project	It was quite easy to work with schools and teachers keen on innovation and also teachers of foreign languages and Maths are normally more inclined in participating in this kind of project. It would have been challenging to address the letter to schools who had low rate of participation in digital projects.	Leverage on the good results of the project and also involve teachers of other subject matters normally less keen on digital: human sciences, literature, philosophy, Greek/Latin.

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1.1.4. Management of the control group

In alignment with the designated scope of work, the recruited teachers were divided into test and control group, replicating the approach adopted during the pilot phase. The test group assumed an active role in the experimentation process, whereas the control group predominantly undertook control functions for the evaluation of impact (WP3-Evaluation). Building upon the insights gained from the experiences of the control group during the pilot phase, a collective decision was reached at the project level to extend selected activities to involve the control group as well. This paragraph shows the strategic decisions made at the local level.

Country	What activities were planned for the control group	Duration	What went well or/and wrong	Recommendations/Lessons learned/Observations
Luxembourg	Due to the small number of participants, we decided - in accordance with WP3 - not to have a control group, but only a test group.	N/A/	N/A	The methodological setting of an RCT with a test and a control group is quite "unusual" for many schools and teachers. Therefore, good communication/explanation from the beginning is key. In this respect, it should be defined in advance which activities will be proposed to whom and when.
Ireland	The control group received a modified professional learning framework. All meetings were conducted online, and the duration of activities was condensed, given the time of year.	March 6th - April 18th, 2023	Interestingly, as a result of the intensive media response to Generative AI, our control group were probably more engaged with the possibilities of AI than the treatment group.	Culturally our system is not used to the RCT methodology. Teachers don't expect to be assigned to control groups, so at the very least, a similar PD experience to the experimentation group should be implemented for any control group. However, this was not possible at this time as at a very busy time of the secondary school year.
Slovenia	All participating schools, control and test group, were invited to the introductory (February 13, 2023) and closing webinar (March 20, 2023). Introductory email was sent to school	May 29th - July 7th, 2023.	As mentioned in the section on Luxembourg, our teachers were not so familiar with the division between the test and control groups. The control group felt a little left out. To be honest,	A similar or even the same training pathway should have been implemented for the control group to ensure that the teachers received the same treatment (guidance, support) as the test group.

	coordinators on May 29th with basic instructions. A forum was available in the e-classroom for possible questions and discussion. The control group followed independently the online course with all the elements (textbook, recorded webinars, final assignment). One last meeting will take place for the test and control group in October 2023.		the training was not as intensive for them as it was for the test group.	
France	For the first webinar (17/11/22) both, control and test, groups were invited. An initial assessment was made on both groups in November 2022. The test group was selected by random draw in December 2022. The control group had a final assessment in April 2023 It could have access to the MOOC and the textbook after the end of the evaluation process but not to the face-to-face training.	November 2022- April 2023	The control group was sometimes disappointed not to have been chosen to follow the training course (webinars, MOOC, Textbook, and face-to-face training). At least, they had the opportunity, after the test group, to have access to online material (MOOC and the textbook).	As teachers were eager to learn new digital methodologies in both groups, after the final evaluation it should have been interesting to offer the control group the face-to face training as well the webinars. Unfortunately, by lack of time (end of the school year) and trainers it was impossible to propose this group such alternatives. It should be noted that with the disruptive arrival of generative AI, the evaluation methodology chosen (by WP3) makes it possible to manage the shock of interest on the part of teachers and students without disrupting the measurement of the proposed training system.
Italy	MOOC and face to face session will be made available to the control group after the intervention phase, starting from the month of October.	October-November 2023	During the pilot phase one of the main complaints from the teachers belonging to the control group was their disappointment for not having the opportunity to participate actively in the	The pilot phase was a key phase also in this case to improve the project and meet teachers' expectations. For future projects where a control group is

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	Materials and sessions will keep the same structure and organization. Teachers will register on the platform and upon completion of the training path they will be granted the certificate of attendance.		training path. So, at project level it was agreed to open the course to them as well, after the evaluation phase, not to impact the final results.	needed for evaluation purposes, we should take into consideration in advance what kind of activities they can do to engage all participants more actively in the project.

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1.2. Administration and dissemination of questionnaires to teachers, headmasters and students

This section gives an overview of the actions taken by WP3- Evaluation to assess the impact of the AI4T professional learning experience on teachers' knowledge, perception, and use of AI tools for education.

As stated in the WP3-Evaluation Protocol, the evaluation of the AI4T project is both quantitative and qualitative. Under the leadership of WP3-Evaluation, each national evaluation team administered two questionnaires (baseline and endline) to teachers and one questionnaire to pupils and school leaders. They also conducted interviews with teachers and school leaders from the intervention group.

For the quantitative evaluation, teachers were surveyed before and after the intervention group was engaged in the professional learning while school leaders and students were only surveyed after. To compare the two groups, the intervention and control groups received the same questionnaires except for specific questions (such as questions on the training) which were placed at the end of the questionnaires.

A qualitative evaluation was conducted in a subset of schools from the intervention group. For the qualitative evaluation, the ministries helped the evaluators identify the schools where AI tools were implemented. To avoid biasing the responses to the endline questionnaires, the qualitative evaluation took place after the administration of the questionnaires.

The chosen method was a stratified randomisation, matching schools that were as similar as possible. Homogeneity within strata was determined based on the following criteria:

- Region
- Type of schools (academic/vocational)
- An indicator of the social composition of the school
- The number of volunteer teachers
- Teachers' personal information (sex & teaching experience)

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Under the supervision of WP3, it was agreed that the criteria might have varied from one country to the other depending on data availability and national contexts. Within each stratum, half of the schools were randomly assigned to the intervention group, through the generation of random numbers. Ministries were responsible for providing the anonymized list of participating schools to the evaluation partners and associating each school with the administrative data necessary for the randomisation (i.e, region, type of school, etc.).

Country	When?	How?	Which information was provided to whom?	Response rate of teachers - headmaster and students	What went well or helped?	What went wrong	Recommendations/Lessons learned/Observations
Luxembourg	The baseline questionnaire for teachers was administered on January 17, 2023. The endline questionnaires were administered in: **Teachers**: March 14, 2023 School leaders: April 12 to May 29, 2023 **Pupils**: May 10 to June 6, 2023 The interviews with teachers	Ministry assigned anonymized numbers to participants and provided the anonymized list to the evaluation partners. Access links to the questionnaires for teachers, headmasters and students were provided by the evaluation partner to the corresponding teacher trainers. These provided the participants with the links and the codes.	As in the pilot phase: an email with teachers' ID, and link to questionnaire was sent to teachers. An email with pupils' ID and links to questionnaire to teachers to communicate to their participating pupils. An email with schools' ID and links to questionnaire to head principals	Teacher baseline: 19 Teacher endline: 12 School leaders: 5 Students: 47	Division of tasks and responsibilities was clear from the beginning on.	Involvement in translation process (German) quite time intensive for Ministry.	The anonymity of the process for the evaluator unit was essential to ensure impartiality. Participants expressed some doubts and dissatisfaction with the questions (e.g. discrimination between questions).

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	were conducted in July. It was not possible to interview the headmaster, apart from one teacher working in the school direction.						
Ireland	The baseline questionnaire for teachers was administered from November 23 to January 9, 2022. The endline questionnaires to **teachers** were administered from: March 1st, to March 3rd, 2023 **School leaders:** April, 1st to May 8, 2023 **Pupils**: March 27 to May 11, 2023 The interviews with teachers were conducted from 17th - 20th April, but it was not possible to	The Evaluation Partner assigned anonymized numbers to participants and then randomised the teachers into two groups: a treatment group and a control group. Codes were assigned for questionnaire respondents. The Ministry communicated directly with the teachers and sent the student and headmaster code through them.	As in the pilot phase: an email with teachers' ID, and link to questionnaire was sent to teachers. An email with pupils' ID and links to questionnaire to teachers to communicate to their participating pupils. An email with schools' ID and links to questionnaire to teachers for distribution to their headmaster	Teacher baseline: 24 Teacher endline: 14 School leaders: 4 Students: 92	Division of tasks and responsibilities was clear from the beginning	The level of follow-up from the Ministry to ensure participant participation.	None at this point.

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	interview any school headmaster.						
Slovenia	Baseline questionnaire for all **teachers**: December 9 until 19, 2022 Endline questionnaires for all **teachers**: from March 28 until April 7, 2023. **Headmasters**: from April 18 until May 9, 2023. **Pupils**: from April 20 until May 12, 2023.	Ministry assigned anonymized numbers to participants and provided the anonymized list to the evaluation partners. Access links to the questionnaires for teachers, headmasters and students were provided by the evaluation partner to the corresponding teacher trainers. These provided the participants with the links and the codes.	Each time an email including a letter with clear instructions was sent to the school coordinator. The school coordinator received the information how each teacher, headmaster and latter on a student can access the questionnaire.	Teacher baseline: 269 Teacher endline: 257 School leaders: 75 Students: 4.690 95 % of teachers 98 % of headmasters 4.500 students	Division of tasks and responsibilities was clear from the beginning on.	On some occasions the link was redirected to the English questionnaire thus the teachers and some students needed to redo the questionnaire.	None at this stage.
France	The baseline questionnaire for teachers was administered from November, 18 to December 22, 2022. The endline questionnaires were administered	Ministries assigned anonymized numbers to participants and provided the anonymized list of participating schools to the evaluation partners. The national	As in the pilot phase: An email with teachers' ID, and link to questionnaire was sent to teachers. An email with pupils' ID and links	Teacher baseline: 239 Teacher endline: 185 School leaders: 65 Students: 1134	Division of tasks and responsibilities was clear from the beginning (WP3 advice and recommendations)	The level of follow-up from the Ministry to ensure participant participation.	All the information provided by WP3 was very coherent and clear. The Ministry's team sometimes found it difficult to follow the progress of each academic territory on a school-by-school basis. There was no

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	for **Teachers**: March 27 to June 3rd, 2023 **School leaders:** March 27 to May 12, 2023. **Pupils**: April 3 to May 30, 2023 The interviews with teachers and school leaders were conducted in May and June 2023.	evaluation partner then randomised the teachers into two groups: a treatment group and a control group. The Ministry communicated directly with the teachers and sent the student and headmaster code through them	to questionnaire to teachers to communicate to their participating pupils. An email with schools' ID and links to questionnaire to head principals				dashboard-type tool for all the participants to monitor the various stages. This led to a lot of back-and-forth, sometimes necessary to reactivate the teams in the high schools.
Italy	The baseline questionnaire for **teachers** was administered from March 7 to March 24, 2023. The endline questionnaires were administered from **Teachers**: May 17 to June 19, 2023 **School leaders**: May 5 to June 1rst, 2023	The Ministry communicated directly with the teachers and sent the student and headmaster code through them	As in the pilot phase: An email with teachers' ID, and link to questionnaire was sent to teachers. An email with pupils' ID and links to questionnaire to teachers to communicate to their participating pupils. An email with	Teacher baseline: 401 Teacher endline: 280 School leaders: 55 Students: 1591	Fast and high rate of teachers, response, and involvement. During the face-to-face meeting online teachers were invited to participate actively in the questionnaire which looked less anonymously.	Italy started the whole process of recruitment only end of January 2023, it ended the process end of May, when it was difficult to get feedback from students to the questionnaires. That explains the relatively low-rate response of students.	The Ministries acted as guarantor body to certify the quality of the project. The anonymity of the process for the evaluator entity was fundamental to guarantee impartiality

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	Pupils: June 6 to July 2, 2023 The interviews were conducted from July to September 2023.		schools' ID and links to questionnaire to head principals				

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Conclusions on Section 1 – Experiences during the large-scale experimentation

In the initial phase of the project, the focus was primarily on school selection and teacher engagement. The original plan aimed to recruit approximately 350 volunteer schools across the five participating countries. However, a total of **316 schools** and approximately **1,040** teachers were ultimately engaged.

The most significant deviation from the original recruitment numbers occurred in Ireland and Luxembourg. The COVID-19 pandemic and the workload at the beginning of the school year noticeably impacted the willingness of teachers in these countries to engage in professional development. Additionally, there was limited attention to AI initially. However, with the emergence of chat GPT, renewed interest was observed, leading Luxembourg to establish a new call for the professional training pathway within the AI4T project and Ireland to get a final committed and interested response from Irish teachers.

Slovenia, France, and Italy demonstrated a high level of participation. Several factors contributed to the late good response to the project, including a growing interest in generative AI technology, the successive expansion of invitations to teachers beyond just Maths and English teachers (to overcome the initial reluctance of teachers to be engaged), direct invitations to schools from the Ministry, and the provision of certificates of attendance as an incentive.

Schools were selected from various regions within each country, providing a comprehensive view of local contexts. The recruitment process encompassed all types of schools, including lyceums, technical, and professional institutions. Notably, vocational schools showed strong interest in Slovenia and Luxembourg, while lyceums and technological schools were more prominent in Italy, and JMB (Voluntary Secondary Schools) in Ireland. Engagement of schools in less privileged areas, particularly in the south of Italy, and collaboration with diverse academic territories in France added depth to the project.

To streamline recruitment and benefit from lessons learned during the pilot phase, a consistent approach was adopted across all five countries and a standardized letter prepared by WP4 was used. Except for Slovenia, where all schools were invited regardless of their prior digital education experience, there was a tendency to invite schools already involved in digital transition and teacher training and schools with ICT equipment or digital-related projects.

At the project's outset, challenges included limited public awareness of AIED, teacher workload at the start of the school year, and a focus only on English and Math teachers, which made recruitment more challenging. In hindsight, a broader range of subjects would have facilitated initial recruitment. The introduction of chat GPT, generated increased interest and highlighted the importance of involving teachers from various disciplines, but also highlight the importance of being ahead of times in Technology and Education.

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As outlined in the implementation framework, recruited teachers were divided into test and control groups. As it was foreseen in the initial project proposal teachers were selected for the control group (so not taking active part in the training but just providing feedback to the perception questionnaires), however, taking into account the lessons from the pilot phase were they showed their dissatisfaction and low interest in the project, at project level it was decided to extend training activities to include the control group in the large-scale implementation. In most cases, a lighter version of the training was offered to all participants in the control group. Finally, contrary to some initial problems in the pilot phase, the project successfully recruited a diverse number of European participants for both the test and control groups.

Despite encountering challenges and deviations from the originally planned numbers, WP3 successfully conducted an evaluation of the impact of the AI4T professional learning experience on teachers' knowledge, perceptions, and utilization of AI tools for education.

Prior to commencing the professional learning activities, evaluators implemented a randomization process for participants and shared the results with the respective ministries. In collaboration with WP1, WP3 meticulously oversaw the administration of the survey, aiming to achieve the highest possible response rate for the teacher baseline questionnaire. Subsequently, WP3 initiated the development of a standardized analysis methodology. This involved the creation of analysis grids for interviews and open-ended questions within the questionnaires, as well as the production of common guidelines and documents for the analysis of closed-ended questions. Analysis of the teacher baseline questionnaire results revealed some variances in response rates across participating countries. Specifically, there was a relatively low response rate from Luxembourg and Ireland, which can be attributed, in part, to the smaller number of participants. France and Italy also exhibited response rates slightly below the target, while Slovenia notably achieved a 95% response rate from teachers, 98% from headmasters, and engagement from 4,500 students.

Throughout this evaluation process, the anonymity of the participants and the protocol among evaluators played a key role in ensuring impartiality, and it was effectively maintained across all countries[1]. The information provided by WP3 remained consistently coherent and clear. However, challenges arose when it came to the Ministry's possibility to monitor the progress of each academic territory on a school-by-school basis. A lack of a centralized dashboard-type tool for participants to track various stages posed a hurdle in this regard.

[1] The evaluation protocol and instruments were validated by ethics committee in each country before the beginning of the full-scale.

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Training pathway (MOOC, textbook, AI resources, Trainings)

This section gives a comprehensive portrayal of the diverse training resources used, along with their tailored integration within the distinct countries, mainly under responsibility of WP2. After a first delivery of the MOOC version 1, produced by Class'Code and INRIA and experimented in all countries' adaptation during the pilot phase (September 2021 to June 2022) and related evaluation, WP2 leaders worked in close collaboration with WP1 and WP3 to create new contents for the MOOC V2. Additional resources and pedagogical methodology were also created. As for the pilot phase, in the full-scale experimentation, all contents were shared for translation and adaptation to the national platforms. Special attention was taken on the possibility of the traces collection on this resource for WP1 for the full-scale experimentation.

Thanks to the experience gathered during the small-scale experimentation, in comparison to the initial version of the MOOC (MOOC V1) the final training path was enriched with extra training resources and mainly organized as follows:

A. **MOOC V2**: Version 2 of the online course in asynchronous modality (hybrid MOOC) used during the pilot phase, focused on a general understanding of AI in education.

B. An interactive **textbook** made available by WP2 and translated in each country as a guideline for the design of interactive activities with the teachers in the context of the webinars or the face-to-face meeting, or as a resource for the trainers.

C. A common **framework of training activities** to give the common guidelines to the different countries.

WP1 and WP2 worked on a joint programme to deliver a common framework for the teacher face to face training activities where there are compulsory activities and optional activities, within the framework of 6 main pedagogical objectives, below reported:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing, and
4. selecting their AI for teaching, learning and assessment.
5. Being aware of legal considerations when using AI in educational setting.

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6. Being aware of ethical considerations when using AI in educational setting.
7. Being aware of generic AI tools and being able to reflect on their impact on education to critically
8. Immersing in the peculiarities of each country's approach, this section gives an overview of the complex structure based on strategic utilization and adaptation of these training modalities. Great emphasis was placed on the dynamic interplay between the MOOCs, textbooks, and hands-on training sessions. Additionally, the strategic integration of AI-specific tools and software enriched the training experience customized to each country ‘s context

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2.1. Synthesis of National-Level MOOC Adaptation and Implementation

This segment provided a detailed exploration of the complex technical aspects involved in the adaptation and deployment of the MOOCs within each nation. It gives an overview of the customized processes undertaken to assimilate these online educational modules into the context of each country's educational landscape.

The MOOC's integration was not only confined to the technical realm, but it also involved pedagogical alignment and contextual harmonization.

Country	When?	Platform used?	What went well or helped?	What went wrong and why?	Recommendations/Lessons learned/Observations
Luxembourg	November 2022	MOODLE	Technical and general support by the MOODLE technician/responsible of IFEN (National Institute for Teacher Training) in the implementation of the French and German versions on MOODLE. INRIA has been very responsive to questions.	The external translator in charge of the German translation delivered poor quality, so we had to double check and correct every text and video subtitle (a very time-consuming process).	Implementation issues (such as platforms, etc.) should have been discussed and clarified at the beginning of the process to avoid poor comparability and usability of learning tracks provided by different platforms.
Ireland	January 2023	MOODLE on the PDST Technology in Education platform	The technical and general support from INRIA was very helpful	Transferring content from the GitHub site to the format we use for online courses took considerably more time than anticipated.	MOOCS are useful but work best as part of a more transformative CPD framework where the content is unpacked and tailored to the school context.
Slovenia	January/ February 2023	MOODLE on the Slovenian educational platform – ARNES učilnice	A forum was open in the ARNES e-classroom where teachers could ask questions and discuss to some extent the content of the MOOC. A person from the ministry and a person from the university were	The process took quite a long time – from translation to transferring the training content to another platform. There were numerous problems with the traces, or rather, how to ensure tracking in the environment of	Implementation issues (like platforms etc) should have been discussed and clarified at the beginning of the process to avoid poor comparability and usability of learning traces provided by different platforms.

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			available for help.	MOODLE. These things were not thought of in advance and they were not well planned.	
France	November 2022-March 2023	MOODLE on Fun-Campus platform: https://lms.fun-campus.fr/courses/course-v1:inria+41029+spococtober/info	Each day during the MOOC training, one person from the French ministry and MOOC team (INRIA Labs) was available to help the teachers if needed thanks to Fun-Campus forum.	For the MOOC we encountered no difficulties whatsoever, with perfect implementation between the design and ministerial teams.	This is key point to keep in mind during periods of rapid technological change (such as the industrial revolution), as was the case with the arrival of generative AI such as ChatGPT for the general public in 2022-2023. Adaptations and additions are necessary for this type of rapidly evolving subject. However, the initial points raised and shared are of high quality and, through their joint construction by five countries, could correspond to the “fundamentals for teachers of AI and education”. Update and complete the recent elements linked to the arrival of generative AI (this work is in progress in the training materials with the teams MOOC and Open Textbook)
Italy	February 2023 – May 2023	MOODLE	CNR-ITD implemented the Italian version of the course, including the translations, the setup and management of both the MOODLE platform (http://ai4t.itd.cnr.it/) and the learning analytics system, as well as the definition and implementation of the webinars and the online INRIA was very responsive to all sorts of issues	The content of the course (version 1), while presenting interactive activities, does not adequately guide the teachers on how to exploit the awareness gained on AI and how this translates into the innovation of teaching practices. There is a lack of guidelines on possible teaching activities to be	It might be useful to provide concrete activity sheets to be carried out with students (examples to be used as guidelines). Might be important to invite teachers to construct new teaching activities that take advantage of AI technologies and that are mindful of the context of the real classrooms involved.

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				carried out in the classroom with students. This was addressed in the online workshops but an integration inside the course would help its effectiveness. The format with which the final quizzes were defined and the subsequent export in Scorm format led to some issues in the collection of answers' analytics. The videos, although subtitled, were a bit complex for users to follow. The lack of an Italian dub of the videos diminished their impact on some teachers. The subtitles helped, but a dub would have been a lot more effective.	To improve the assessment part, the format of quizzes and tests could be changed into a format more compatible with the MOODLE system and learning analytics management systems.

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2.1.1. Feedback on MOOC completion training per country

Country	Use of MOOC. Participation percentage rate per country: Percentage of participants above 70% Drop rate percentage	What went well or helped	What went wrong and why	Recommendations/Lessons learned/Observations
Luxembourg	Overall feedback on MOOC version 1 was mixed: Videos considered superfluous, too much text to read, too little interaction, lack of coherence / perhaps more storytelling to connect different parts / aspects, objectives of MOOC to be clarified. Overall feedback on MOOC version 2 was positive: understandable and well structured. Some teachers missed the link to their actual teaching practice (which was then part of the live sessions during the teacher training).	Responsiveness of INRIA in adapting contents. Mixed format of the training pathway (MOOC, webinar, face-to-face sessions) ensured teacher engagement.	Technical problem with access to the MOOC / enrolment of students, so we had to resend the emails with the logins.	Teachers are not willing to engage with generic content. It needs to be more bespoke to their context (e.g. activity sheets). MOOC is not a stand-alone solution, but part of a comprehensive teacher training pathway.
Ireland	Some general observations from participants included: It's not a huge time commitment so should be manageable for teachers to engage with and complete. The title is, 'artificial intelligence to and for teachers' but there is no mention of or reference to AI in education in any of the modules. I think teachers would like to	The animation or augmentation of the MOOC content with online check ins. These milestone meetings ensured ingoing engagement with the MOOC.	We encountered a minor delay in having the MOOC ready for the start of the CPD. Teachers received access a few days later than intended.	Teachers will not engage well with generic content. It needs to be more bespoke to their context. The MOOC/learning scenarios need to be part of a broader CPD offering. The intention of the MOOC needs to be clarified and made more explicit. The content as well as the interactions

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	see some examples of AI in education, practice, give context. The actual aim of the MOOC for teachers who participate does not seem particularly clear. It is difficult to see how teachers will be able to apply what they learn from the MOOC to their teaching, learning and assessment. In its current form the MOOC would be very useful for teaching students what AI is, how it works, how it may affect their lives, etc. but it is hard to see how it could be used to help teachers see how AI could improve their practice. A specific focus on how AI can improve teaching, learning and assessment is needed.			needs to be revisited.
Slovenia	The feedback on MOOC V1 was quite negative. The content was described as not motivating, captivating and informative enough. The MOOC V2 was perceived much better, even though some teachers considered it too extensive and too demanding. Opinions differed. Participation **% test group:** 148 participants 9 participants reported that they were	Test group: Regular communication and support in the form of the e-Classroom was very useful. The organisation of webinars and online meetings to share experiences and practises. An active engagement of the training organiser (Ministry and University) to encourage regular attendance and engagement.	Test group: Face-to-face meetings would be more interesting and stimulating to deepen the debate on the state of AI in education. We only had one padlet. More concrete examples from practise and a shared community where participants could discuss them would be even more	Teachers need this kind of training in AI, especially in their own national language. In Slovenia, we will continue to use the AI4T training pathway (MOOC, textbook and sessions) to train other teachers, but we will also ensure that there is a facilitator to encourage participation, discussions and implementation in the classroom.

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	withdrawing from the training for various reasons - 6 % drop rate. 122 participants (88 %) completed at least 70% of the training. Participation **% control group:** 120 participants According to our export only 88 participants attended the online training. According to the latter we had a 27 % drop rate in the control group. Of the 88 participants (46,6 %) 41 of them completed at least 70% of the training.	The webinars were live (later also available as a recording), but the fact that they were live really helped and motivated the participants. Control group: We offered them the same content. We maintained a frequent correspondence with the schools' coordinators. All teachers who have completed the training receive a certificate of attendance and the number of points to help them in their career advancement and CPD.	practical and considered extremely useful. Control group: We offered them the same content, except there was much less 'live' activity. External encouragement and motivation are very helpful to achieve final results in online activities. At the same time, the problem was that we offered the training at the end of the school year. Many teachers were too busy to attend the course and at the same time they read the correspondence too superficially where we informed them that they could do the course after the end of the school year.	
France	The analysis data has been done by the LORIA. The 2nd version of the MOOC was well received by the test teachers. Depending on the subject, the use made of the resources offered varied between 80% completeness (per chapter) and 50%. However, before the CNESCO-led evaluation is analysed, it is premature at	Responsiveness of INRIA in adapting contents. People available from the French Ministry to help the teachers during the MOOC training.	For one of the academies involved, the Ministry had to provide special monitoring to maintain the initial commitment (which was initially based on voluntary work) to ensure that they were mobilised throughout the experiment.	The MOOC is an element that provides the fundamentals you need to know; it provides the first elements of reflection. Teachers have appreciated the fact that it is simple, short, and suitable for teachers new to digital subjects (in general) and AI in particular. It works very well, complemented by time for discussion, presentation and face-to-face training. While more detailed 'tailor-made' training can be envisaged locally, the

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	this stage to conclude whether completeness is linked to the quality of the proposals or to the fact that teachers already have a good knowledge of the subject. Teachers' expectations have not been fully met, particularly with regard to the use of AI-based resources (dedicated to education). We lacked these resources for secondary education.			MOOC makes it possible to define and share the essential elements to know when teaching in the age of AI, which is now available to everyone. The most advanced teachers on AI subjects have not necessarily learned much from the shared content and resources. It's important to remember that the Ministry's main target was the 80% of teachers who are not experts or insiders on AI and education (or more generally on the pedagogical uses of digital technology).
Italy	The MOOC V2 was perceived much better than the V1, being more cohesive and structured. There was a varied range of feedback from teachers who were new to Artificial Intelligence, with some expressing difficulties with the training's level of complexity and lack of personalization for educators, in particular with regard to specific teachers' resources. Conversely, more experienced teachers found the training well done and sometime lacking technical depth. Overall it was very well received as demonstrated by the level of participation and completion, with a percentage of participants above 80%, a completion of 81,6% and a very small drop rate percentage(8,8%).	The online workshops really helped to drive the interest of teachers in the MOOC contents. Creating 4 groups of teachers inside the MOOC helped to create micro-communities and to facilitate active participation.		Videos help to break the amount of text to read, but dubbing might be important to improve teachers' engagement in the MOOC. Activity sheets might be useful to contextualize the contents to the reality of each classroom and to help teachers in the planning and definition of AI-based teaching plans.

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2.2. Organization and Implementation of the training pathways per country

Within this context, the configuration and implementation of training pathways, tailored to the distinct specificities of each country, was of pivotal importance. While the MOOC and the textbook constituted a foundational element —customized and linguistically adapted to the local context— additional dimensions such as face-to-face meetings, webinars, and AI resources were customized at country level. Significantly, these endeavours were aligned with the predetermined learning objectives, integrating the essence of the agreed-upon educational pathways, as delineated in the following section.

The dynamic training activities for teachers were meticulously realized by the collaboration between Work Package 2 (WP2) and Work Package 1 (WP1). This comprehensive matrix of educational activities was made accessible to all partners through Basecamp[2], fostering an environment of shared knowledge.

[2] Shared online space for the project management.

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Luxembourg

Overall, in Luxembourg, the alternation between the AI4T MOOC, webinars and live sessions was very successful: teachers first had the opportunity to learn from the MOOC and then to practice, experiment and discuss with the trainers. The webinars were only used to deepen some topics (e.g., generative AI in education).

The Luxembourg experience shows that synchronous training is key to the success of a project, both because it encourages interaction and communication, and because content, formats and discussions can be easily adapted to current situations and needs.

Detailed training pathway

Full-scale experimentation period: 17th January 2023 to 14th March 2023 (17 hours)
Number of schools: 9
Number of recruited teachers: 20

Objectives of the training:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Sessions

Session 1
Live session – MOOC activities and pre-questionnaire
Date: 17.01.2023, 15-18h
Format: Face-to-face

Program of the session:

15h	Warming up – Introduction to AI4T project.
15.30h	Organisation of training pathway: timeline, materials, logins, questionnaire
16.30h	Representation of AI: science fiction vs research/reality, definitions, history

Impacted Learning objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system

Number of expected participants: 18

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Session 2
Online self-study - MOOC first chapters
Date: 27.01. – 04.02.2023
Format: Online/self-study

Program of the session:
Self-study

Impacted Learning objective:
1. Being able to understand the basic principles of AI system
2. Being aware of AI educational applications and key considerations when identifying, assessing, and selecting their AI for teaching, learning and assessment.

Number of expected participants: 20

Session 3
Webinar - MOOC understanding & AI in Office 365 tools
Date: 01.02.2023, 18-19.30h
Format: Online

Program of the session:
18h Warming up – Different perspectives on AI in education
18.15h Existing AI tools in Office applications
19.15h Discussion & transfer

Impacted Learning objective:
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of expected participants: 19

Session 4
Online self-study - MOOC last chapters
Date: 05.02.- 21.02.2023
Format: Online/self-study

Program of the session:
Self-study

Impacted Learning objective:
2. Being able to understand the basic principles of AI system
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.

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Number of expected participants: 20

Session 5
Live session – Content and activities in compliance with MOOC
Date: 21.02.2023
Format: Face-to-face

Program of the session:

15h	5 big ideas of AI & concrete (unplugged) activities to do in class for each idea.
16.30h	AI in education: use cases of learning with, about and for AI
17h	Focus on student & teacher supporting systems: testing & discussion.

Impacted Learning objective:

3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on education

Number of expected participants: 18

Session 6
Live session - Content and activities in compliance with MOOC
Date: 28.02.2023
Format: Face-to-face

Program of the session:

15h	Interconnections with national media competence framework including AI and data literacy.
15.30h	Focus on student & teacher supporting systems: testing & discussion
17h	Legal and ethical considerations
17.45h	Definition of task

Impacted Learning objective:

3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on education

Number of expected participants: 18

Session 7
Webinar – Ethical guidelines for teachers
Date: 06.03.2023
Format: Online

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Program of the session:

18h	Warming up – Summary of previous discussions on ethics
18.15h	Presentation of ethical guidelines for teachers
19h	Discussion and questions

Impacted Learning objective:

4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.

Number of expected participants: 18

Session 8
Live session - presentation & discussion of task, closing, post-questionnaire.
Date: 14.03.2023
Format: Face-to-face

Program of the session:

15h	Input on the use of generative AI
15.45h	Presentation and discussion of task
17h	Post-questionnaire
17.30h	Closing, feedback and outlook

Impacted Learning objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on education.

Number of expected participants: 18

Luxembourg Second wave of training

Full-scale experimentation period: 18th April 2023 to 16th May 2023 (17 hours)
Number of schools: 13 (9 of them did not take part in wave 1)
Number of recruited teachers: 20

Objectives of the training:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

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Sessions

Session 1
Live session – MOOC activities and pre-questionnaire
Date: 18.04.2023, 15-18h
Format: Face-to-face

Program of the session:

15h	Warming up – Introduction to AI4T project.
15.30h	Organisation of training pathway: timeline, materials, logins, questionnaire
16.30h	Representation of AI: science fiction vs research/reality, definitions, history

Impacted Learning objective:

7. Being able to express ones understanding and attitude towards AI and discuss it.
8. Being able to understand the basic principles of AI system.

Number of expected participants: 18

Session 2
Online self-study - MOOC first chapters
Date: 28.04. – 04.05.2023
Format: Online/self-study

Program of the session:
Self-study

Impacted Learning objective:

6. Being able to understand the basic principles of AI system.
7. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.

Number of expected participants: 20

Session 3
Live session – Content and activities in compliance with MOOC
Date: 02.05.2023
Format: Face-to-face

Program of the session:

15h	5 big ideas of AI & concrete (unplugged) activities to do in class for each idea.
16.30h	AI in education: use cases of learning with, about and for AI
17h	Focus on student & teacher supporting systems: testing & discussion.

Impacted Learning objective:

8. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
7. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

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Number of expected participants: 18

Session 4
Webinar – Ethical guidelines for teachers
Date: 05.05.2023
Format: Online

Program of the session:

18h	Warming up – Summary of previous discussions on ethics
18.15h	Presentation of ethical guidelines for teachers
19h	Discussion and questions

Impacted Learning objective:

9. Being aware of legal considerations when using AI in educational setting.
10. Being aware of ethical considerations when using AI in educational setting.

Number of expected participants: 18

Session 5
Online self-study - MOOC last chapters
Date: 05.05.- 16.05.2023
Format: Online/self-study

Program of the session:
Self-study

Impacted Learning objective:

2. Being able to understand the basic principles of AI system
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.

Number of expected participants: 20

Session 6
Webinar - MOOC understanding & AI in Office 365 tools
Date: 11.05.2023, 18-19.30h
Format: Online

Program of the session:

18h	Warming up – Different perspectives on AI in education.
18.15h	Existing AI tools in Office applications
19.15h	Discussion & transfer

Impacted Learning objective:

7. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

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Number of expected participants: 19

Session 7
Live session - Content and activities in compliance with MOOC
Date: 12.05.2023
Format: Face-to-face

Program of the session:

15h	Interconnections with national media competence framework including AI and data literacy.
15.30h	Focus on student & teacher supporting systems: testing & discussion
17h	Legal and ethical considerations
17.45h	Definition of task

Impacted Learning objective:

9. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
10. Being aware of legal considerations when using AI in educational setting.
11. Being aware of ethical considerations when using AI in educational setting.
12. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of expected participants: 18

Session 8
Live session - presentation & discussion of task, closing, post-questionnaire
Date: 16.05.2023
Format: Face-to-face

Program of the session:

15h	Input on the use of generative AI
15.45h	Presentation and discussion of task
17h	Post-questionnaire
17.30h	Closing, feedback and outlook

Impacted Learning objective:

2. Being able to express ones understanding and attitude towards AI and discuss it.
7. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
8. Being aware of legal considerations when using AI in educational setting.
9. Being aware of ethical considerations when using AI in educational setting.
10. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of expected participants: 18

Due to low participant numbers, we agreed with WP3 not to have a control group, but only test group.

Distribution of textbook: We provided access to the textbook in the third live session of each wave.

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Ireland

In Ireland, it can be affirmed that synchronous training is key to the success of a project, both because it fosters interaction and communication and because contents, formats and discussions can be easily adapted to current situations and needs.

The multi-modal professional learning pathway was an accomplishment. Also, the short timeframe for engagement retained commitment as did the milestone check ins that were a key component of the pathway. The ability to be adaptive and capitalise on the growing interest surrounding ChatGPT ensured that the course content remained relevant.

Detailed training pathway

Full-scale experimentation period: 9th of January to 11th March 2023 (12 hours)
Number of schools: 21 schools (12 Maths, 9 Language (French)
Number of recruited teaches: 11 teachers.

Objectives of the training:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Sessions

Session 1
Introduction

Date: 09.01.2023, 5 hours.
Format: Face-to-Face
Participants: Training led by PDST Technology in Education (DWEC) with support provided by H2Learning and DCU (National Partners) where relevant. Guests from UCD, Microsoft and Google also provided input on the day.

Program of the session:

10h	Warming up – Introduction to AI4T project and introduction to AI
11h	AI in Society (Professor Patricia Maguire (Healthcare)
11.30h	AI in Education (Google and Microsoft representatives
12.30h	Ethical guidelines on the use of artificial intelligence and data in teaching and learning for educators
14.00h	Teachable Machine and Ethical Considerations
15.00h	AI Software: Objects to Think With- Tool demos (Duolingo for Schools and Photomath)

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Impacted learning objective:
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of participants: 11

Session 2: Online Check-in (See note)
Date: January 19th, 2023
Format: Online – Zoom Meeting format

Program of the session:
The session was a facilitator-led, inquiry-based interaction.
The following question set was used to unpack the content of Module 1

- How can AI be leveraged to enhance education?
- How can we ensure AI's ethical, inclusive and equitable use in education?
- How can education prepare humans to live and work with AI?
- With what class group will you run the project? Why have you chosen that group?
- Have you used technology (based on AI or otherwise) for student-led learning with any class groups in the past?
- What did you learn from that experience?
- How will your role - and your students' roles - change before, during and after class?
- What do you envision/hope will be the advantages of using AI in your class?
- What do you think will be the challenging aspects of incorporating AI tools in your class?

Impacted Learning Objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
5. Being aware of ethical considerations when using AI in educational setting.

Number of participants**:** 11
Note: Participants were asked to engage with Module 1 of the MOOC.

Session 3
Online Check-In
Date: 07.02.2023
Format: Online – Zoom Meeting format

Program of the session:
The session was a facilitator-led, Inquiry-Based interaction.

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The following question set was used to unpack the content of Modules 2 and 3

- What are some of the potential advantages of natural interaction applications, e.g. ChatGPT, in your subject area?
- What are some of the potential risks or disadvantages of natural interaction applications, e.g. ChatGPT, in your subject area?
- Given the possible biases of AI applications, would you trust AI applications to plan learning pathways for your students?

Impacted Learning Objective:

3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.

Number of participants**:** 11

Session 4
Date: 01.03.2023
Format: Face-to-face, 1 day, 5 hours.

Program of the session:

10h 4 corners debate. Participants to choose a corner either strongly agreeing, agreeing, strongly disagreeing or disagreeing with a set of statements (Sample statements included)
AI technology will close the digital divide.
AI technology should be used to grade student work and determine their academic performance.
AI technology in education is leading towards the devaluation of human interaction and critical thinking skills in the classroom.

11h- 13h Professional Learning pathway review
All participants reviewed the two softwares, the MOOC and the overall pathway.

14h-15.30h All participants engaged with ChatGPT as an administrative, pedagogic and assessment support.

Impacted Learning Objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of participants: 11

An alternative professional learning approach consisting of access to the MOOC and online support was made available to the control group after the intervention phase, starting on March 6th. The sequence of supports was as follows.

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Control Group

An alternative professional learning approach consisting of access to the MOOC and online support was made available to the control group after the intervention phase, starting on March 6th. The sequence of supports was as follows.

On March 6th, access to the MOOC was provided, and the first online professional learning event was hosted. The focus of this session was:

Warming up – Introduction to AI4T project and introduction to AI
Teachable Machine and Ethical Considerations
AI Software: Objects to Think With- Tool demos (Duolingo for Schools and Photomath)

On March 13th and 27th, online check-ins were hosted with the same facilitated approach and focus as the experimentation group.

On April 18th, there was an online shared learning event which focused on

A 4 Corners Debate on AI in Education
A review of the professional learning pathway
Engagement with ChatGPT as an administrative, pedagogic and assessment support.

Distribution of the Textbook

The textbook was a supporting document for the facilitators who conducted the check-in meetings. The textbook helped the facilitator prepare for each check in and to extend the learning.

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Slovenia

From the point of view of Slovenia, synchronous training is key to the success of a project, both because it fosters interaction and communication and because contents, formats and discussions can be easily adapted to current situations and needs.

The multi-modal professional learning pathway was a success. Also, the short timeframe for engagement retained commitment as did the milestone check ins that were a key component of the pathway.

The ability to be adaptive and capitalise on the growing interest surrounding ChatGPT ensured that the course content remained relevant.

Detailed training pathway

Full-scale experimentation period: 17th of February until 20th of March 2023 (24 hours of 45'')
Number of recruited teachers: 269
121 Math teachers
97 English teachers
51 Other

Test group:
63 Math teachers
56 English teachers
29 Other

Objectives of the training:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Sessions

Session 1
Introductory online meeting
Date: 13. 2. 2023
Format: Online

Program of the session:

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14.15 - 15.00h Key information about the training / timeline / communication

Impacted Learning objective:
No learning objectives foreseen.

Number of expected participants: 148 (108 attended)

Session 2
Start of the training in the e-classroom
Date: 17. 2. 2023
Format: Online

Program of the session:
Content from the MOOC transferred to the Slovenian educational online environment.

Impacted Learning objective:

The goal is to achieve the following goals through this training:

- Being aware of what AI can bring in the field of education.
- Being able to examine and use resources related to the field of AI.
- Being able to develop relevant digital skills in the field of AI.

Number of expected participants: 148

Session 3
Webinar 1 - Presentation of InstaText, prof. dr. Matej Guid, University of Ljubljana
Date: 22. 2. 2023
Format: Online

Program of the session:
18.00-19.00h Introduction / Presentation / Discussion

Impacted Learning objective:

- Being able to use a tool for writing and editing professional and scientific words.
- Being able to develop a critical and self-critical assessment.
- Being aware of the importance of AI in different fields of personal and professional life.
- Being aware of the data and AI underpinning the writing and editing tool.

Number of expected participants: 148 (108 attended)

Session 4
Webinar 2 - AI4T Textbook for teachers, prof. dr. Colin de la Higuera, University of Nantes
Date: 28. 2. 2023
Format: Online

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Program of the session:
18.00-19.00h Introduction / Presentation (AI in education, ChatGPT) / Short discussion

Impacted Learning objective:

- Being able to obtain, select, and incorporate new information in this field.
- Being able to use and locate information in the manual.
- Being able to analyse the anticipated impact of AI and, most importantly, the role of the teacher in this domain.
- Being aware of the dual role of AI in education, encompassing teaching about AI and teaching with AI, and recognizing its significance.

Number of expected participants: 148 (115 attended)

Session 5
Webinar 3 - Presentation of the Orange tool, prof. dr. Janez Demšar
Date: 7. 3. 2023
Format: Online

Program of the session:
18.00-19.00 Working with data.

Both presentations will be a concrete demonstration of the use of the Orange tool (more at https://orangedatamining.com/), which we have already tested in Slovenian schools when working with pupils and students in various subjects.

Impacted Learning objective:

- Being aware of the concrete demonstration of the use of the Orange tool by the teacher.
- Being able to use and visualize different data from various fields within the Orange tool.
- Being aware of the importance of data for AI to function effectively, as understood by teachers.
- Being able to explore various examples of effective use and innovative ideas for utilizing the Orange tool in teaching various subjects, as found here: https://pumice.si/#aktivnosti

Number of expected participants: 148 (116 attended)

Session 6
Closing online meeting
Date: 20. 3. 2023
Format: Online

Program of the session:
14.00 - 15.00 h Conclusive elements of the training.

Impacted Learning objective:
No learning objectives foreseen.

Number of expected participants: 148 (103 attended)

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Session 7
Webinar 4 - Presentation of the Orange tool, prof. dr. Janez Demšar
Date: 20. 3. 2023
Format: Online

Program of the session:
18.00-19.00 Prediction

Impacted Learning objective:

- Being able to introduce teachers to a concrete demonstration of the Orange tool's usage.
- Being able to utilize and visualize diverse data from various fields within the Orange tool.
- Being aware of the critical role data plays in enabling AI to function effectively, as grasped by teachers.

Number of expected participants: 148 (72 attended)

Control Group

The e-classroom for the control group was open/the training took place: from **29th May 2023 until 7th July 2023**.

An introductory email was sent to school coordinators on May 29th with basic instructions, like those sent to the control group.

Description of the training:

- In the e-classroom, you can access the online course (4 modules) and the textbook.
- Recordings of all 4 lectures are available in the online classroom. Select and view at least two:
  - doc. dr. Matej Guid: InstaText
  - prof. dr. Colin de la Higuera: Artificial Intelligence in Education
  - prof. dr. Janez Demšar (UL FRI): Working with data - the Orange tool
  - prof. dr. Tomaž Hočevar (UL FRI): AI4T - Swinging with Orange (modelling and interpretation of data).
- A forum is available in the e-classroom for possible questions and discussion.
- The deadline for submitting the final assignment is June 30th, 2023.
- The deadline for submitting feedback among colleagues is July 7th, 2023.
- Completion of training on July 7th, 2023.

Distribution of the Textbook

The AI4T textbook was available during the training for participants in the control and test group. Prof. Colin de la Higuera presented the textbook in one of the webinars. The latter was available for both groups of the training.

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France

In France, the great complementarity between the resources offered by the MOOC, the presentation and discussion time during the webinars and the time spent practising, testing and clarifying in small groups during the on-site training days was particularly appreciated.

The arrival of generative AI at the end of 2022 has been a fantastic catalyst for increasing interest among teachers, trainers and managers. It is rare and perhaps unique in a career to reflect on and support subjects that generate so many questions and transformations in the way we teach and learn. This is what happened during the AI4T project.

The MOOC alone can be strengthened by in-person presentations, but its existence and the fact that it has been designed by several teams from different countries is a unique asset in a period of intense change. What's more, this information and training resource is available 24 hours a day, 7 days a week, unlike face-to-face training.

The face-to-face sessions were a great success, and their content was a model shared with the academic training teams. These sessions provided an opportunity for rapid Q&A on generative AI. The content of these sessions was adapted to allow for this time.

We therefore need to be aware of the strengths and weaknesses of each training system and make the most of each. From the point of view of the French ministry team, what has been thought through, discussed and built together in 5 countries is far superior to what we could have hoped to build alone.

It is thanks to the wealth of questions raised by the various national and research teams that we have been able to converge on initial AI and education ideas which, without being perfect (looking for that is a waste of time in a period of rapid change), are balanced, accessible to all teachers in terms of difficulty and available in open access.

Detailed training pathway

Full-scale experimentation period: 17th of November to 25th March 2023 (12 hours)
Number of schools: 60 schools

Number of recruited teachers: 270
46 Math teachers
124 English teachers

Test group:
126 teachers, randomly selected, who attend the training.

Objectives of the training:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.

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5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Sessions

Session 1
Engagement webinar to introduce the training.
Date: 17.11.2022
Participants: All the French partners of the project (Inria, Cnesco, Ministry, University of Nantes), the academic leaders implied in Digital education, some trainers and the teachers involved in the project
Format: Online
Duration: 1,5 hours.

Program of the session:

18-19h30 AI4T project introduction (aims and partners) and training schedule
Content of the training: online (Mooc with 4 modules), Webinars (x2), live session in each academy
Evaluation protocol of the AI4T project by Cnesco-Cnam: why evaluating? an independent evaluation, an experimental approach with a control group, different items assessed.
Participants' questions

In further details: Presentation and discovery of the project and its challenges

1. The main topic: make the teachers aware of what is AI in general and more specifically in education.
2. The training sessions:
    a. MOOC: presentation of contents and Forum, registration on the FUN-Campus platform, access to the Mooc, navigation thought modules and resources, types of contents)
    b. live session: presentation of face-to-face training
    c. experts webinars: presentation of the two editions and place given to interaction with experts and AI4T French team
3. Presentation of the evaluation process (Questionnaire, oral reviews, selection of the training group and the control group by CNESCO)

Impacted Learning objectives:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.

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Number of participants: 175

Session 2
MOOC
Date: 04.01.2023 -025.03.2023
Format: Online
Duration: 2 to 3 hours

Program of the session:

The MOOC course is organized in 4 modules and a conclusive chapter about the future of education and AI.

A forum is implemented along the content of the MOOC to offer an asynchronous exchange space for learners and serve as the basis for a community of practice (CoP). Particular attention was paid to AI pedagogical tools offered to learners during the large-scale experimentation phase (Maths: Kwyk, Vittascience; English: Duolingo for Schools).

Impacted Learning objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education – Partly

Number of participants**:**
120 + (5 randomly selected teachers not enrolled), plus 30 Academic leaders + AI4T French team.

Note:
It was proposed to the officials involved in digital education in the participating academies to register for the MOOC. Their involvement in the training, as they could also attend the face-to-face training sessions, was seen as a way of enhancing the visibility and effectiveness of the AI4T project. Their engagement during the dissemination process will be greatly facilitated.

Session 3
Experts Webinar n°1
Date: 25.01.2023
Participants: Expert speakers: Anne Boyer, Bastien Masse (Class'Code), Inria, Ministry, Academic leaders, Selected teachers
Format: Online
Duration: 1,5 hours

Program of the session:

18h-19h30
Artificial intelligence in education

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1. What is AI anyway? From algorithm to deep learning - Bastien Masse
2. What can AI bring to my teaching job? Positioning, uses and typologies of AI, learning analytics, use of data, trust and explainability - Anne Boyer
3. Questions, discussions with participants (Ahead of the seminar, a call for questions was launched in the Mooc forum. In parallel, a word cloud was created with the information given by the participants on their expectations and motivation to participate in AI4T)

Impacted Learning objective:
2. Being able to understand the basic principles of AI system
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of ethical considerations when using AI in educational setting

Number of participants**:** 105

Session 4
Live Session – Training: One day training in academy (local level of organisation of national education in France)
Date: 6 days of training in February and March 2023.
Format: Face-to-face
Duration: 1 day / 7 hours

This session was organized in 6 different cities as follows:

- 06-02 academy of Nantes: 31 participants
- 07-02 academy of Rennes: 13 participants (strike day)
- 09-02 academies of Aix-Marseille and Nice: 21 participants (strike day)
- 16-02 academy of Versailles: 17 participants (strike day)
- 23-02 academy of Poitiers: 25 participants
- 03-03 academy of Guadeloupe: 9 participants

Program of the session:

Morning
Ice-breakers
Example of an AI tool in the research field (Titane Project by Loria)
Imagining our own AI to cope with school drop outs.
Learning data in AI tools in education, models, and bias
Experimenting with a classifier: Vittascience application

Afternoon
How to learn and teach in the AI age? The case study of ChatGPT.
Discussion about how to use ChatGPT or generative AI in class for the students and the teachers.
Practices and skills transformation. Demo of Midjourney and generative AI, discussion about the 21 century skills.
Select and evaluate AI tools in education: what criteria and what methodology? Loria template

Impacted Learning objective:

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1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of participants: 116

Note:
1. during each training session, academic leaders involved in Digital Education were attending on a small or larger scale.
2. element of national context to be taken into account: For 3 training sessions, and for the second expert webinar, there were national strike days in France. Attendance rates were high in relation to this context.
3. for each training day, a debrief has been made with the local coordinator and feedback will nurture the proposition of a generic training day for the dissemination phase.

Session 5
Expert Webinar n° 2
Date: 15.03.2023 (strike day)
Participants: Colin de la Higuera (University of Nantes - WP2 leader) and Bastien Masse (Class'Code), Inria, Ministry, Academic leaders, Selected teachers
Format: Online
Duration: 1,5 hours

Program of the session:
6PM-7.30PM

Teaching with artificial intelligence
1. AI as an actor in education: what changes and invariants for the teaching profession
2. Questions, discussions with participants

Impacted Learning objectives:

1. Being able to express ones understanding and attitude towards AI and discuss it.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education – Partly

Number of participants: data non available. Around 100 people.

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Closing session

Date: first semester 2024
Participants: AI4T French team, teachers involved (Test and control group), academic leaders implied in Digital education, all hoist of the face-to-face training of Spring 2023
Duration: 1,5 hours

Program of the session:
A final feedback seminar will be organised, considering all the results of the project and in particular the final AI4T conference in January 2024.

The results of the project, including the evaluation and recommendation work of the Cnesco, will be presented to the participants.

At this time, an extended version of the Mooc in French (taking into account feedback from the current large-scale evaluation phase) will be offered on the FUN-Mooc platform, whose Courses are both free and accessible to all.

Attended Number of participants**:** 80

Control Group

Opening of the Mooc

Session
MOOC
Date: 23.06.2023 until November school holidays.
Format: Online
Duration: 2-3 hours.

A forum is implemented along the content of the MOOC to offer an asynchronous exchange space for learners and serve as the basis for a community of practice (CoP). Particular attention was paid to AI pedagogical tools offered to learners during the large-scale experimentation phase (Maths: Kwyk, Vittascience; English: Duolingo for Schools).

Number of participants: 126 + AI4T French team.

Textbook

The AI4T textbook was made available late in the experimentation phase in French after the training had started for participants in the control and test groups. Professor Colin de la Higuera presented the intentions and then part of the manual during the webinars.

Access to the manual was provided during the training sessions for the test and control groups. We received a number of favourable comments on the quality of the Textbook, although we were unable to obtain reliable quantitative measurements (due to the initial choice made in the design of the TextBook, there were no usage or connection statistics).

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Italy

In Italy, synchronous training is key to the success of a project, both because it fosters interaction and communication and because contents, formats and discussions can be easily adapted to current situations and needs. Budget for an onsite all hand meeting would have been a real added value to further strengthen the teachers' community and open the floor to further collaborations.

The fact that Italy started later the webinars was a positive element in relation to the breakthrough of generative AI, but negative in terms of the school calendar. In the last months (April-May) the teachers were overloaded with school assignments and could not always complete the project "homework".

Alternating MOOC sessions and online interactive webinars was very successful: the teachers had before the opportunity to learn from the MOOC and then to practice, experiment and discuss with the trainers. Moreover, the idea to divide the participants in 4 classes allowed the trainers to follow and interact with the teachers more closely, it was an opportunity for the teachers to interact and share opinions actively and it proved the importance of the human factor in this kind of asynchronous MOOC.

Also, even though generative AI were not part of the MOOC and the textbook, the face-to-face webinars gave the trainers the opportunity to deal with the cutting-edge technology of the moment and engage the teachers

Detailed training pathway

Full-scale experimentation period: 2 months, March- April for the experimental group and October-November for the control group

Number of recruited teachers: 432 divided among test and control group

262 Stem teacher
152 English teacher
24 others.

Objectives of the training:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

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Sessions

Session 1
Webinar – presentation for all the recruited teachers
Date: 24 February
Format: Online

Program of the session:

15.00-15.20	Warming up – Introduction to AI4T project.
15.20-15.50	Introduction to the AI4T training path.
15.50-16.20	Introduction to the AI4T assessment protocol.

Impacted Learning objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.

Number of participants: 432

Session 2
MOOC
Date: from 13 to 20 March
Format: Online

Program of the session:
General presentation of the MOOC

Impacted Learning objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.
2. Being able to understand the basic principles of AI system.

Number of expected participants: 218

Session 3
Webinar interactive session
Date: 20-21 March
Format: Online

Program of the session:
Introduction about the training path
Socialization among the virtual class members

Impacted Learning objective:

1. Being able to express ones understanding and attitude towards AI and discuss it.

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2. Being able to understand the basic principles of AI system.
3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.

Number of participants: 177

Session 4
MOOC
Date: from 20 to 27 March
Format: Online

Program of the session:
Module 1: Using Artificial Intelligence in Education

Impacted Learning objective:

3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of participants: 218

Session 5
Webinar interactive session
Date: 27-28 March
Format: Online

Program of the session:
A walk through the world of ChatGPT from the teacher's point of view
Open discussion
Homework

Impacted Learning objectives:

4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of participants: 186

Session 6
MOOC
Date: from 27 March to 3 April

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Format: Online

Program of the session:
Module 2: What is meant by AI?

Impacted Learning objective:

1. Being able to understand the basic principles of AI system.
2. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
3. Being aware of legal considerations when using AI in educational setting.
4. Being aware of ethical considerations when using AI in educational setting.
5. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of participants: 218

Session 7
Webinar interactive session
Date: 3-4 April
Format: Online

Program of the session:
Difference between symbolic and sub-symbolic AI
AI-Based tools for
language teaching and learning
Math
STEM
Open discussion
Homework

Impacted Learning objective:

2. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of expected participants: 177

Session 8
MOOC
Date: from 3 April to 10 April
Format: Online

Program of the session:
Module 3: How does AI work?

Impacted Learning objective:

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1. Being able to understand the basic principles of AI system.
2. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.

Number of expected participants: 218

Session 9
MOOC
Date: from 10 April to 17 April
Format: Online

Program of the session:
Module 4: AI at our service as teachers?

Impacted Learning objective:

3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education

Number of participants: 218

Session 10
MOOC
Date: from 17 April to 24 April
Format: Online

Program of the session:
Conclusion

Impacted Learning objective:
5. Being aware of legal considerations when using AI in educational setting.
6. Being aware of ethical considerations when using AI in educational setting.

Number of expected: 218

Session 11
Webinar interactive session
Date: 20-21 April
Format: Online

Program of the session:
Use of AI-Based tools to build a teaching plan

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How to integrate AI-Based tools into lessons
How to integrate AI-Based tools into homework assignments
Creation of case studies

Impacted Learning objective:

3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
5. Being aware of ethical considerations when using AI in educational setting

Number of participants: 177

Session 12: webinar interactive session
Date: 11 May
Format: Online

Program of the session:
Discussion of the created case studies
Open discussion on case studies of different subjects
Open discussion on lessons learnt.

Impacted Learning objective:

3. Being aware of AI educational applications and key considerations when identifying, assessing and selecting their AI for teaching, learning and assessment.
4. Being aware of legal considerations when using AI in educational setting.
5. Being aware of ethical considerations when using AI in educational setting.
6. Being aware of generic AI tools and being able to reflect on their impact on education to critically consider the possibilities for AI tools on the education.

Number of participants: 177

Control Group

MOOC and face to face session will be made available to the control group after the intervention phase, starting from the month of October. Materials and sessions will keep the same structure and cadence. Teachers will register on the platform and upon completion of the training path they will be granted the certificate of attendance.

Textbook distribution

As part of the training materials the textbook has been distributed to the treatment group and, as for the other training materials and interventions, will be distributed to the control group starting from October.

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2.3. Utilization of AI tools and resources in classroom training experimentation

This paragraph gives insight on which AI tools and resources were used in class during the training activities experimentation: either general ones (not especially focused on education) like automated translation or Duolingo vs. more specific educational applications like Knowji, MATHiaU or Checkmath, as well as the breakthrough arrival of ChatGPT.

Within the context of training activities experimentation, this paragraph focuses on the variety of AI tools and resources integrated into classroom settings. This array of AI tools encompasses both non-specialized AI applications such as automated translation and Duolingo and more targeted educational solutions like Knowji, MATHiaU, and Checkmath.

The training experience in the classrooms acquires a pivotal inflection point with the advent of ChatGPT. This introduction introduces an unprecedented opportunity of interactive learning, reshaping pedagogical paradigms but also claiming for a revision of the original modules of the MOOC and the textbook which had been delivered before the advent of ChatGPT.

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Country	AI resources used	How were resources selected	What went well	What went wrong	Recommendations/Lessons learned/Observations
Luxembourg	ChatGPT DALL-E O365 Speaker coach Duolingo Deepl (write) Vocacoach Kwyk PhotoMath	They have been selected from a file previously agreed at project level: Selected and agreed teacher resources. The list was then extended with similar examples or products that were considered relevant (in particular generative AI).	Teachers were not familiar with most of the tools, but they were keen on getting to know them.	Time was needed to allow teachers to access and interact with the tools.	Ethical issues and practical in-class use cases of the different tools are important.
Ireland	Duolingo Photomath ChatGPT	They were chosen from a previous agreed on file at project level: Selected and Agree Teacher resources. ChatGPT was added to meet the emerging needs to address this in the sector and to ensure content responsive.	Both tools were somewhat useful but more so for extension activities or to support some personalised learning. The treatment teachers had to spend much time developing meaningful activities for their use.	Need to find tools that more seamlessly support curriculum delivery in Ireland.	Support provided around how the use of AI software fits with other broader school policies, AUP and assessment policies for example and wider regulation such as GDPR.

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Slovenia	Orange InstaText Participants had to submit a final task - to use an AI tool in the classroom and report on the use and feedback from the students. These AI tools varied a lot.	We were looking for something developed in a national context, something that could be accessed for free (at a basic level) and that would give participants an insight into how AI works (use of data, algorithms, etc.). We also wanted tools whose developers could come and present them, give additional information and have a discussion.	The webinars were well attended, and the developers of the tools came and presented them.	Teachers expected more on hand experiences with AI tools that they can use in their classrooms.	To include more AI tools for concrete examples. Focus on ethical aspects of use of AI tools.
France	Duolingo Vocacoach Kwyk ChatGPT (Generative AI)	The French Ministry has decided to use AI tools that were in line with GDPR policy. For IA generative services, these were examples and illustrations intended for teachers, without requiring students to create an account.	The services available were of interest to many teachers, many of whom were either new to them or were accessing them to test them for the first time with accounts made available to them free of charge for the paid services.	A minority of teachers did not wish to use the services made available free of charge, even though a subscription was required after the trial to continue using them. This difficulty had not been anticipated.	Services based on generative AI have completely changed the initial assumptions about whether services were available for teaching and learning. The exceptional nature of this event does not allow us to draw any conclusions beyond the fact that we need to know how to support the unexpected. This is what the AI4T teams did.

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Italy	AI-based Language tools: Duolingo DeepL Google translator Grammarly AI-Based STEM tools: Wolfram alpha MathSolver Cymath Amy.app Socratic Generative AI-Based tools: ChatGPT DALL-e	They were chosen from a previous agreed on file at project level: Selected and Agree Teacher resources. Then the list got expanded with similar examples or with products that were considered of relevance.	Teachers didn't know many of the proposed tools. During the training path a special emphasis was put on the ethical and constructive use of such tools, and how they can be integrated into the day-to-day school-related activities.	ChatGPT was difficult to access to from Italy during part of the training path.	It was important to discuss ethical uses of AI-Based tools, especially in the context of Generative AI.

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2.3.1. Textbook

Within the scope of D2.5, which relates to training resources, the University of Nantes, operating under WP2, produced an open-access textbook titled "AI for Teachers." This resource was meticulously elaborated to empower educators in making informed decisions regarding their pedagogical approaches. Additionally, it serves a dual purpose by being an invaluable guide for individuals engaged in the training of teachers. The subsequent section shows the textbook's utilization at the national level, its practical implementation and impact.

Country	How was the textbook used	What went well or helped	What went wrong and why	Recommendations/Lessons learned/Observations
Luxembourg	We provided access to the textbook in the third live session.	We used it as advanced material after the teachers had already received basic training in AI. Response of the University of Nantes and ministries to include generative AI in the textbook.	Generative AI was not part of the first version of the textbook but will be integrated in the new one.	The textbook should be integral part of the training path as it bridges the gap between basic knowledge and practical implications.
Ireland	The textbook was used as a supporting document for the facilitators who conducted the check in meetings. The textbook helped the facilitator prepare for each check in and to extend the learning.	One of the challenges in this domain is ensuring that those providing professional learning are competent. The textbook is an excellent curation of key areas of consideration and proved invaluable to our facilitators who are all teachers.	The challenge with the textbook is ensuring that it always remains current. Colleagues in the University of Nantes were very responsive to the rapidly evolving space.	The textbook should be a showcase resource for policy makers. The proliferation of content is a challenge but well written curated content such as this is invaluable.
Slovenia	The textbook was used during the training. We have integrated it into the training path. All the participants (test and	The webinar we had with one of the authors of the training - Colin de la Higuera.	Since the textbook is in Scalar, we can't really measure how many Slovenian participants used, referenced and followed the textbook.	The textbook serves as a valuable resource not only for educators, but also for teacher trainers, policy makers and parents who want to keep abreast of the latest developments in the field.

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	control) group had access to the textbook at the beginning of the training.			It can also provide crucial support to ICT teachers in schools as it offers a bridge between basic knowledge and practical applications. In addition, the textbook is a showcase resource for policy makers.
France	The textbook was used as a support to the MOOC sessions and the face-to-face sessions. Its access was provided during the MOOC training.	The French translation was much appreciated.	As the French version was delivered a little later than our initial training plan, when it was available it was shared with the teachers after the MOOC sessions had started. Without teacher authentication, this resource cannot be used to analyse usage in detail. The resource also contributes to a desire for resources published in open science. It was sometimes redundant as regard the MOOC content. Generative AI was not present in the first version, during the training, but it is in the new version.	An attempt was made to strengthen the coherence between the MOOC (which came first) and the TextBook (which came later), for example, in our point of view, by considering the MOOC as a basis with possible extensions "to go further if needed" with the TextBook. There was a desire to offer a wide range of courses to satisfy very different audiences and needs, which is a good intention. Sometimes, however, there are redundant elements between the MOOC and the TextBook, which presents the advantage of autonomous use but may be confusing for those involved in the course initially proposed. The TextBook does not allow as precise an assessment of usage as the MOOC. The strengths of the teams were sometimes dispersed over different deliverables, no doubt to the detriment of each of the deliverables given the difficulty of the subject.

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Italy	As part of the training materials the textbook has been distributed to the treatment group and, as for the other training materials and interventions, will be distributed to the control group starting from October.	It was valuable material to add to the general training pathway. Also, it was an advanced tool once the teachers had already received a basic formation on AI.	Technology has a faster pace than research and projects. ChatGPT and generative AI were not part of the first version of the textbook as when the book was written this technology was not a must-know as today. University of Nantes in collaboration with the ministries is working on a new chapter of the book on generative AI	The textbook could also be useful for teacher trainers, policymakers and parents who want to keep updated about developments in this field. It could be also a useful support for teachers of ICT in schools.

Conclusions on Section 2 – Training pathway

The heart of the project revolves around the training program. While it remained aligned with the original pedagogical framework and objectives, it underwent modifications, adaptations, and customization tailored to each country's context. Furthermore, it was enriched with additional pedagogical objectives as listed in the introductory paragraph of this section.

Several key variations and adaptations were made. These included the development of Version 2 of the MOOC, the creation of an open textbook on AI, and the formulation of a framework for training activities. These changes aimed to provide a common guide for the different countries while addressing their specific needs. These updates were grounded in the experiences of the pilot phase, ongoing research and studies conducted at various universities involved in the project, and the feedback received from teachers during the small-scale implementation. One significant concern raised by teachers during the pilot phase was that the MOOC was too theoretical and lacked practical insights for the classroom. In response, a tailored synchronous training program was developed through collaboration between WP2 and WP1.

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Overall, the training program received a positive response from teachers. While more experienced educators occasionally found it too basic, the project's primary goal was to raise awareness and provide fundamental AI knowledge. The MOOC was viewed as part of a comprehensive teacher training pathway rather than a stand-alone solution. Teachers appreciated its simplicity, brevity, and suitability for those new to digital subjects and AI. The inclusion of videos added dynamism, and the complementary activities, which allowed for discussions, presentations, and face-to-face training, provided significant added value.

As a recommendation for the future, teachers expressed the desire for more hands-on activities. Activity sheets, for instance, could prove useful in contextualizing the content to individual classroom realities and aiding teachers in the planning and development of AI-based teaching plans. A notable challenge arose in the implementation of the analysis of traces, which targeted only the AI4T MOOC training resource. This issue cut across all countries and appeared to stem from implementation problems using different hosting platforms between countries and also small recruitment numbers in others. It is evident that addressing these implementation issues from an earlier stage of the project should have been discussed and clarified at the project's outset to ensure better comparability and usability of learning traces provided by different platforms regarding the MOOC. However, it was possible to finally perform analysis of traces for this training resources, as reported and detailed in the related document “Analysis of traces”.

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SWOT analysis per country

The following tables provide a breakdown of the **Strengths, Weaknesses, Opportunities, and Threats (SWOT**) that characterize the project's implementation at the national level.

This comprehensive analysis serves a dual purpose: to provide valuable lessons on both a national and global scale, and to offer some recommendations to facilitate the project's expansion. These insights might benefit schools, policymakers, and other stakeholders, collectively paving the way for informed decisions in the realm of educational innovation.

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Luxembourg

Strengths	Weaknesses
• Cooperation, communication and teamwork between evaluation partners, ministry, teacher trainers and technical staff. • Good responsiveness of WP2 members to adapt resources and provide help when needed. • The hybrid format of live sessions, MOOC and webinars proved successful. The interactive webinars were key in enabling teachers to experiment with AI in the classroom, share ideas and create a community of teachers. • Positive feedback from teachers on the training pathway in terms of content and structure.	• Recruitment process very difficult due to lack of interest in the topic. • RCT not adapted to the school/teacher context. • Some important decisions were not made at the beginning of the project: platform for MOOC / format of learning tracks, development of a complementary textbook, ... • Teachers are not ready to deal with generic content. It needs to be more adapted to their context (e.g. activity sheets). • Translation process is very time consuming.

Opportunities	Threats
• Networking initiatives with and between teachers • Develop and share good practice. • Starting with the pioneering project to develop a national teacher training pathway. • Upcoming new projects on AI and data literacy will benefit from the experience gained.	• The transfer of materials and experiences to the national level needs to be well designed and rigorously implemented. • Acculturation to AI is no longer the perceived need of teachers, but the focus is on how to handle/use AI tools in the classroom.

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Ireland

Strengths	Weaknesses
• Positive feedback on the professional learning pathway and the multi-layered supports. • Commitment of participants to effectively engage in all facets of the professional learning pathway. • Support from INRIA and University of Nantes with the MOOC and textbook. • The cohesiveness of the national partners in Ireland.	• Teachers want to engage with applied content rather than generic content. This is a challenge for the MOOC. • Recruitment was a challenge and we failed to meet the project goals in this regard. • The RCT methodology is not common in the education sector in Ireland. Teachers are not willing to give of their time to participate in control groups. They expect their interest and time to be optimised.
• Opportunities	**• Threats**
• Build on the learning from this project to develop follow-on projects. • Design enhanced professional learning pathways for new cohorts of teachers. • Capitalise on the growing interest in the sector to raise awareness of good practice	• Ensuring that policy keeps pace with practice. • Maintaining presence as a key provider, a key project as more projects develops.

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Slovenia

Strengths	Weaknesses
• Direct involvement from the Ministry of Education. • Cooperation between different stakeholders on national level (ministry, university, and institute). • Direct correspondence between ministry and schools. • Recognition of the training and the number of points for the career advancement of the participants. • Establishment of training on an already existing national platform with e-classrooms. • Regular communication with participants, via the forum on the platform and email correspondence. • Online training allowed teachers to adjust their pace to their time.	• Online training, with only 2 face-to-face and 3 webinars. • Little time for networking and exchange of practices between teachers. • The training pathway was not coordinated between countries, so the results are more difficult to compare. • In monitoring the users and their traces in the learning environment, the parameters were not predefined. • A poor initial estimate of the investment, both in terms of time and resources, in translating content. • Difficulties in recruitment, training and difficulties in recruitment, training and evaluation due to teacher overload. • The content of the training was reflected as too generic.
Opportunities	**Threats**
• The training prepared is CC licenced, open, implemented and validated by 5 EU countries. • More teachers in all participating countries can undertake the training. • The training can be implemented and used in other projects and teacher trainings. • The training can be adopted in other countries and translated into other languages. • The training can be adapted for other levels of education in Slovenia. • HEI institutions can use the training, the textbook and other project output in pre-service and in-service training. • The training can be used for training in adult education. • All participating schools have gained competencies that will enable and support them in future projects.	• No transfer of the lessons learnt and the training into regular, ongoing trainings and/or CPD. • Due to different training paths and numbers of participants over the five countries the project results will not be relevant enough.

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France

Strengths	Weaknesses
• Research and construction of training resources between European partners on a disruptive subject: AI and education. • Project management and quality of exchanges and work carried out between the different working teams (Work packages). • Each of the meetings, work sessions and presentations organised by each country was particularly well thought out and inspiring for improving the project. • The project has been very well received in the various academic areas and is one of those that have helped to establish the subject as a priority for study and support by providing information that can be used immediately via AI4T.	• Initiating the work during recruitment and monitoring the commitment was complex and time-consuming (in a COVID context). • The number of partners was complex for the decision-making and construction phases, this had a particular impact in the first year of the project.

Opportunities	Threats
• The subject of AI and education and the shock of generative AI is a fantastic one to tackle. • The project has gone from being a "peripheral" topic initially to "indispensable" in 2023-2027. • There is a massive need for information, acculturation, and training at all levels of education (not just secondary). Adaptations and additions will be needed, particularly for primary schools. • In addition to the initial languages of the project, new translations would be an asset, particularly for Spanish.	• The subject of AI and education and the shock of generative AI are leading to extremely rapid developments that are difficult to keep up with. It is possible that some of the proposed resources will become obsolete quickly, even though the essential issues (education, informed citizenship and ethics) will remain essential and will be addressed. • The need for training in AI and education is great and will remain so for many years to come. While the project provides digital resources, it does not offer a methodology for scaling up. It is up to each country to find the means to succeed.

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Italy

Strengths	Weaknesses
• Cooperation, communication, and teamwork among INDIRE, the CNR and the Ministry. • The hybrid format of teacher training MOOC and Live sessions proved successful. The interactive webinars were key to let the teachers experiment with AI in classroom and to share ideas and create a community of teachers. • Reward/ certificate of attendance for teachers.	• Disappointment for some of the teachers who participated in the control group. • Teachers overloaded with work, in some case course and evaluation survey drop out. • Contractual issues between the coordinator and the Ministry.

Opportunities	Threats
• Networking initiatives. • Develop and share best practices. • Start from the pioneer project to develop a national initiative for secondary schools.	• New similar upcoming projects, how to keep the momentum. • Keep the USP.

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Global lesson learned and recommendations for future projects and policy makers.

The conclusion of the AI4T project's extensive experimentation phase has provided a wealth of insights and recommendations that hold valuable implications for future projects and policymakers. This section provides key learnings and suggestions gained through the project's progression, giving a sort of compass for enhanced outcomes in subsequent endeavours.

First of all, during the second year of the experimentation of the AI4T project, the world experienced a huge transformation in the field of AI in Education. To contextualize the work done and the lessons learned in the project, it must be said that some long-term projects are strongly impacted by disruptive developments, as it was the case with the boom of generative AI in 2022-2023 (the ChatGPT shock). Having the ability to redefine or refine assumptions and objectives (or to abandon some and set new ones) during the project would be an asset for these circumstances. Within the framework of the AI4T project, the consortium has been able to redefine some objectives and to deeply revise assumptions made during the first phase; however, the project has been successful in maintaining and achieving the initial objectives.

Within this general observation, the Experimentation team observes the following set of lessons:

1. **Structured Approach to School Recruitment:** A more structured approach to school recruitment, compared to the pilot phase, emerged as a vital element. The implementation of a public call of interest, accompanied by a standardized document customized for each country, facilitated engagement and participation.
2. **Incentivizing Through Certificates of Attendance:** The concept of providing teachers with certificates of attendance, borrowed from the deployment phase, proved instrumental in fostering a sense of recognition and motivation among educators, culminating in more enriched participation.
3. **Streamlined Communication and Information Exchange:** Enhanced communication and information dissemination emerged as a hallmark of the large-scale phase. A harmonized approach to shared information, agreements, and timetables, complemented by the efficient utilization of the Basecamp platform, fostered seamless project management. Regular and well-timed meetings further fortified project oversight.
4. **Evolution of Teacher Training Framework:** A significant achievement accomplished by WP1 and WP2 was the definition of a standardized teacher training framework. This framework balanced both mandatory components, such as MOOCs and textbooks, with customizable elements, including webinars, in-person sessions, and AI tool utilization. The consolidation of multiple training paths in a common document streamlined this evolution.

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5. **Hybrid Training Format's Efficacy:** The hybrid format of teacher training, combining MOOCs with live sessions, emerged as an optimal pedagogical solution. This approach accommodated individualized learning paces while offering dynamic interactions through live training sessions. The latter facilitated hands-on exploration, enriching comprehension of intricate AI concepts.
6. **Transition to Learning with AI:** A significant paradigm shift unfolded during the large-scale phase – a transition from solely learning about AI to embracing learning with AI. This transformation was realized through the strategic integration and utilization of diverse AI tools and resources, resonating deeply with teachers' expectations.
7. **Effective Data Collection and Tracing:** A marked contrast emerged between the pilot and large-scale phases in terms of data collection. In the initial stage, challenges such as local agreements, pandemic-induced disruptions, and communication inefficiencies hindered data collection. Conversely, the large-scale phase witnessed improved processes, resulting in more effective data gathering.
8. **Targets and KPI:** Incorporating a framework of Milestones, Targets, and Key Performance Indicators (KPIs) would have significantly enriched the project by enhancing its tracking and evaluation capabilities. This structured approach would ensure a higher level of value through systematic monitoring of progress and achievement, ultimately contributing to more informed decision-making and a more comprehensive understanding of project outcomes.
9. **Teachers' overload:** One prevailing challenge encountered was the potential overload experienced by teachers, leading to instances where participation in the course and engagement with evaluation surveys faced a decline or dropout.
10. **Networking events:** These, events organized by the Dissemination and Upscaling Work Package (WP4), brought together teachers from the five countries, with a notable emphasis on Italy and Slovenia, gaining significant success. To enhance the project's impact, the inclusion of European kick-off and concluding events would be recommended. Allocating a specific budget for in-person gatherings could further amplify the project's reach and effectiveness.
11. **Contractual issues:** An important issue emerged in relation to contractual agreements with Ministries. Certain Ministries encountered difficulties in accepting the allocated budget, necessitating the exploration of alternative solutions. A shift in approach could prove beneficial to prevent such situations, mitigating potential loss of time and resources.

The culmination of these insights may provide a roadmap for subsequent projects and informs policymakers. By embracing structured recruitment strategies, motivational incentives, streamlined communication protocols, standardized training frameworks, hybrid pedagogical models, and immersive AI integration, future project can amplify their impact and drive meaningful advancements in the realm of AI-driven education.

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