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List of acronyms

Acronym	Description
4Cs	Creativity, Critical thinking, Collaboration, Communication
ADDIE	Analyze, Design, Develop, Implement, and Evaluate
AI	Artificial Intelligence
AIED	Artificial Intelligence in Education
augMENTOR	Augmented Intelligence for Pedagogically Sustained Training and Education
DMP	Data Management Plan
DPIA	Data Processing Impact Assessment
DPO	Data Protection Officer
EAB	Ethics Advisory Board
EC	European Commission
ET	Emerging Technologies
FAIR	Findable, Accessible, Interoperable, and Reusable
GDPR	General Data Protection Regulation
KG	Knowledge Graph
KPI	Key Performance Indicator
LMSs	Learning Management Systems
ML	Machine Learning
PESTEL	Political, Economical, Societal, Technological, Environmental & Legal Analysis
PF	Pedagogical Framework
RoPA	Record of Processing Activities
RRI	Responsible Research and Innovation
SCORM	Sharable Content Object Reference Model)
SLR	Systematic Literature Review
SWOT	Strengths, Weaknesses, Opportunities and Threats Analysis
TESA	Technology-Enhanced Student Assessment
TETPACK	Technological Emerging Technologies Pedagogical Content Knowledge
TPACK	Technological Pedagogical Content Knowledge
UI/UX	User Interface/User eXperience
WP	Work Package
XAI	eXplainable AI
xAPI	Experience API

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Executive summary

This progress report summarizes the scientific and technological advancements of the project, detailing progress toward achieving its objectives. It covers updates on the work packages and tasks, the achievement of milestones, and the project's scientific, economic, and societal impacts. Additionally, it includes an updated plan for exploiting and disseminating results as well as updates on the contributions to Open Science practices and deviations from Annexes 1 and 2 of the Grant Agreement. Finally, it addresses recommendations from the EC reviewers specific to this report.

During Year 2, the project achieved key milestones across technical, ethical, and operational domains. Effective collaboration, regular communication, and adherence to quality and risk management frameworks ensured smooth execution. Nine deliverables were submitted on time, and budget adjustments addressed ethics-related costs.

Key results include a) the interim augMENTOR pedagogical framework which leverages Activity Theory and extends the global teaching/learning approach, TPACK to TETPACK, by integrating Emerging Technologies (ET) and particularly AI, b) the augMENTOR reference learner profile, a dedicated model that aims to provide dynamic information and assessments regarding learners' states (delivered in WP3), c) Fostering 4Cs (Critical Thinking, Communication, Collaboration, and Creativity) development through creative pedagogy guidelines and assessment tools within pilot activities (delivered in WP4), c) the release of the beta version of the augMENTOR solution, enabling educators to make queries, receive recommendations, and share them digitally with learners (delivered in WP5).

The pilot implementation phase has also begun (within WP6), with activities including delivery of a structured demonstration plan, ethical oversight, and alignment with project strategies. Preparatory tasks ensured smooth execution across pilot activities.

Dissemination activities in WP7 included the promotion of the project through workshops, podcasts, social media campaigns, scientific publications, talks at scientific conferences and other events that involved EU policy makers. Fostering collaboration with sister projects and business model development are also among the highlights of WP7. Ethics and GDPR compliance remained a priority, with all required documents finalized and approved by the external Ethics Advisory Board (EAB).

Overall, Year 2 marked significant progress, setting the foundation for the next phase of the project.

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1 Explanation of the work carried out and overview of the progress

1.1 Objectives

O1: To design and implement a digitally enhanced pedagogical framework for the adoption of emerging technologies in teaching, learning and training settings through the active involvement of educational actors.
Our team delivered the interim version of the augMENTOR Pedagogical Framework (PF), (D3.1) which extends the TPACK model to include Emerging Technologies (TETPACK), where ET stands for Emerging Technologies and specifically Artificial Intelligence (AI). This framework supports the design of technology-enhanced learning scenarios by leveraging pedagogical and technological affordances. It expands the traditional teaching triangle, incorporating all facets of the teaching triangle's information while taking into consideration all the knowledge that teachers should possess when teaching technology. Active participation from educational actors has been ensured through their involvement in the design process, pilot course creation, and pilot phase feedback.
O2: To deploy an AI-boosted blended learning toolkit that builds on the strengths of big data analytics to provide different types of stakeholders with explainable recommendations for smart search identification of educational resources, as well as for designing personalised learning profiles.
Building on insights from WP2 workshop and input from WP3 and WP4, we developed two ontologies and corresponding knowledge graphs, forming the operational prototype of the AI-boosted augMENTOR solution (Milestone 6, D5.1). Following this work, and making use of the data collected during the pre-pilot phase, the beta version of the augMENTOR solution, that offers recommendations to learners and educators, enabling them to form personalized learning paths was released.
O3: To advance the proficiency and knowledge capacity of teachers and learners on technological solutions that promote both basic skills and 21st century competencies, such as communication, collaboration, digital literacy, critical as well as design thinking and creativity.

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An interim version of our Creative Pedagogy framework in the augMENTOR solution has been delivered, combining methods developed in the framework of the project. Building on a state-of-the-art analysis of 21st century skills, — Creativity, Critical thinking, Collaboration, and Communication (4Cs) — presented in D4.1, the framework supports cross-cutting skills in tech-enhanced learning environments. Through participatory design workshops done in the framework of WP4 in coordination with WP3 and WP6 the assessment methodology of the 4Cs was designed, resulting in tailored rubrics adapted by each pilot to meet their learners' specific needs.
O4: To support policy makers with informed decision-making capabilities towards promoting and ensuring inclusion and equity in education and training.
Following the resubmission of the first policy brief (D7.4), our team delivered the second one (D7.5) which focuses on policy briefs around integrating AI into current teaching pedagogies and the pedagogies that focus on developing 21st century skills. The project team has set in motion a plan for reaching out to EU policy makers, EC Officers and project coordinators of similar EU projects including augMENTOR's sister projects through dedicated events. Several events that targeted EU policy makers have taken place already. Additionally, a new component is being designed for the augMENTOR solution (set for integration in a future release) to support policymakers in advancing decision/policy making for the needs of education and training in the settings under consideration.
O5: To fully understand and effectively support the shifting role of educators through a solution that facilitates engagement, participation, knowledge co-creation and learning, while it can be massively deployed in cases of crises and major emergencies.
Our team has delivered the interim version of the project's pedagogical framework, addressing the evolving role of educators in dynamic and increasingly complex learning settings. The ongoing pilot phase across four settings provides valuable insights into interactions between educators, learners, and technology. Throughout this process, we are actively monitoring progress and providing comprehensive support, both technologically and pedagogically, to ensure the success of the pilots , while providing a toolset to capture and analyze the experiences of both educators and learners. To address the scalability of the solution for deployment during crises or major emergencies, we have adopted an agile design methodology. This ensures that the augMENTOR solution

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remains flexible and adaptable, capable of seamless integration with diverse Learning Management Systems (LMSs) to meet the needs of varied educational contexts and challenges. The augMENTOR solution is tested in conjunction with two different LMSs (namely, Moodle and TryHackMe).
O6: To demonstrate the applicability and effectiveness of the augMENTOR approach across alternative pedagogical paradigms (e.g., social constructivism, cognitive science, connectivism) tested in diverse educational and training settings.
The project's pilots are quite diverse and span across a spectrum of pedagogical paradigms including social constructivism, cognitive science, and connectivism. Thus, through pilot implementation our aim is to test and validate the augMENTOR approach within these paradigms. Activities are being closely monitored to make sure that end-users receive assistance when needed as well as to ensure that the process is well documented collecting all the necessary data and information that will allow us to measure the impact and added value of our approach.
O7: To develop and thoroughly assess innovative training programmes that augment the digital competences of pre-service teachers
The "Information and Communication Technologies in Education" course delivered at the University of Patras has been redesigned to enhance pre-service teachers' digital competence and confidence. Aligned with WP3 and WP4 strategies, the course integrates TPACK, educational scenarios, and 4Cs development and assessment. Delivered to around 200 students during the last spring semester, comprehensive data were collected and are currently being analyzed to evaluate effectiveness and guide future improvements, ensuring the course meets its pedagogical goals.
O8: To ensure wide communication, scientific dissemination and vertical exploitation of augMENTOR outputs
Our team maintains a strong online presence through an updated website, social media posts, newsletters, podcasts, and info packs. By blending scientific dissemination with targeted communication, augMENTOR ensures its outputs are accessible and impactful across sectors. Research publications and participation in academic conferences share

findings with scientific and educational communities, while workshops with stakeholders and policymakers support the broader adoption of project' outcomes.
O9: To guarantee the ethical use of data being elaborated or generated by the augMENTOR solution
augMENTOR's consortium partners follow established protocols and documentation to ensure the ethical use of data generated by the solution. Informed consent forms have been finalized and implemented by all pilot partners, while all key documents are regularly updated and consulted. The project employs two (2) human oversight approaches: "Human-on-the-loop" for monitoring system operation and intervention during the design cycle, and "Human-in-command" for overseeing the broader impact and decision-making on AI system usage. Data protection measures include GDPR compliance, EU-based servers, and anonymization/ pseudonymization before sharing data with technical partners. Collaboration with organizational DPOs, Ethical Committees, and the project's Ethics Manager ensures adherence to ethical standards, while the external Ethics Advisory Board (EAB) oversees legal and ethical compliance. One (1) more version of the Data Management Plan (M36) will be delivered to maintain FAIR datasets and align with open science practices.

1.2 Explanation of the work carried out per WP

1.2.1 Work Package 1 (UNI, M1-M36)

Year 2 overall progress:

All beneficiaries actively contribute to the tasks they are involved in, supported by the scientific and technical coordinators ensuring collaboration and adherence to risk management and quality control frameworks. Communication remains consistent through regular meetings, dashboards, and trimester performance reviews. The team finalized the first-year report, completed the project review, and the 3rd and 4th plenary meetings were held successfully. Nine (9) deliverables were submitted on time, and a second amendment finalized in February 2024 enabled budget adjustments to cover ethics-related costs.

Data management focused on collecting pseudonymized datasets with participant consent, alongside monitoring Zenodo uploads. Ethics compliance progressed with updates to the

Legal and Ethics Manual, completion of the second RRI survey, and regular coordination with the Ethics Manager.
KPI monitoring shows alignment with project targets. One risk (R1 -Use cases do not meet the expectations of augMENTOR) was flagged due to an unforeseen issue with the LMS platform used by Pilot 4. A mitigation plan was implemented to minimize its impact. Additionally, proactive measures were taken to avoid flagging R2 (Insufficient number of end-users).

Submitted deliverables:

- D1.2 - Progress report (submitted on time, M24)

Milestones achieved:

Milestone 2: Definition of Management Structure and Steering Committee

D1.4 was revised and accepted after resubmission. Other remarks referred to D1.1 have been addressed in Annex 2 under WP1.

Milestone 3: Alignment of the Pedagogical and Technical dimensions of the AUGMENTOR solution

Comments from the reviewers have been fully addressed. Responses to comments related to the present report are addressed per WP as indicated and presented in Annex 2.

Milestone 4: Educational Resources identification (delivered on time, M14)

Based on the work done originally in WP2 and later in WP3 and WP4, the pilots' educational courses were designed and the educational resources were identified. Identification refers to learning objectives, lesson plans, list of learning materials per pilot (name, type, position in lesson plan, connection to learning objectives), learning assessment methods (type, position in lesson plan, contribution to overall assessment, connection to learning objectives). This work was accomplished by M14, as scheduled. These courses were then transformed – with the guidance of the technical and the scientific coordinators – to technology-augmented educational scenarios in the LMSs selected by each pilot. As mentioned in the executive summary of D5.1 (the means of verification of this milestone), "*data and educational resources were then derived from the LMSs deployed by the pilots. By using mapping and fusion techniques we accomplished their efficient representation through semantically-rich knowledge graphs that exploit the advantages of complementarity while removing redundancies created by different modalities.*"

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Milestone 5: Technology-augmented educational scenarios (delivered on time, M18)

As also mentioned in milestone 4 the educational courses were turned to technology-augmented educational scenarios in the selected LMSs (Moodle and TryHackMe) enhanced with digital resources and tools. To achieve this, pilot partners followed the Technology-augmented Educational Scenarios and e-Activities (TESA) model of the augMENTOR Pedagogical Framework (presented in D3.1). This work is also reported in D6.1 (section 2.2): "*To be able to use the courses, pilots had to add all the content in the LMS they plan to deploy, thus creating an online course which learners and educators will be able access online. These online courses were also used during the pre-pilot course beta-testing.*", submitted in M18.

Milestone 6: Operational Prototype of the AI-boosted augMENTOR Platform (delivered on time, M18)

Following the educational resources identification, the operational prototype was delivered as planned in M18 and reported in D5.1 in M20 (the planned submission date for D5.1). The operational prototype was also made available in github[1]

Milestone 7: Pilots Launched (delivered on time, M19)

Pilots were officially launched in M19 along with the initiation of WP6 as planned. It should be noted that in accordance with Activity 12 of our alignment strategy mentioned in D2.1 (page 98), pilots had already done a lot of preparatory work prior to M19 running a beta testing pre-pilot phase between M10 and M18.

Milestone 8: Adoption of the augMentor Pedagogical Framework by Pilots (delivered on time, M24)

Pilot partners designed their courses based on the educational scenario template available in D3.1, ANNEX 6, which is part of the augMENTOR framework. The pilots carried out the design of the courses using a preliminary version of the Technology-Enhanced Student Assessment (TESA) micro-level augMENTOR framework (also linked to milestone 5), which is reported in D3.1, (chapter 2). Dedicated elements namely, design and development of the learning resources and the development of learning e-activities which the TESA framework includes (the different aspects of creative pedagogy) were introduced in D4.1 (chapter 2). To achieve this milestone, partners worked collaboratively, under the guidance of the scientific coordinator (UPATRAS,

[1] https://github.com/novelcore/EU_augMENTOR

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also leading WP3) exchanging feedback and expertise with each other. This work, reflecting the adoption of the augMENTOR framework is also reported in D6.1, section 2.1 submitted in M18. Since M18 and until M24 pilot partners collaborated with the technical coordinator to further refine their courses based on the augMENTOR framework, also taking into account the lessons learned from the pre-pilot beta-testing.

T1.1 Project Management (UNI, M1-M36)

In the second year, project management and coordination progressed as planned. Key activities included finalizing the first-year report, completing the project review, and successfully organizing the 3rd and 4th plenary meetings (held in Kaunas, Lithuania in June 2024, M18; held in Waterford, Ireland in December 2024, M24). Both meetings offered hybrid participation via Google Meet for remote attendees. An additional online general assembly was held in September 2024 (M21).

Internal reporting tools were systematically used and updated, with quarterly reporting tracking progress and resource usage. Regular monthly WP leaders' meetings, individual WP meetings, and cross-WP sessions ensured smooth collaboration and alignment, reinforcing the interconnected nature of the project's WPs.

Several deliverables have been prepared, including the resubmission of three (3) deliverables originally submitted during the first year and the submission of nine (9) additional deliverables during this period including the present progress report. All deliverables were submitted on time without any delays. A second amendment, effective February 2024, facilitated budget adjustments to cover costs related to the Ethics Advisory Board (EAB) and Ethics Manager, enabling the coordinator to manage payments on behalf of the consortium.

Achievements and Results

- Project management tools and process updated and used continuously
- Two project plenary meetings done as scheduled
- Monthly WP and WP leaders' meetings held as planned
- All deliverables have been submitted on time
- 2nd amendment is complete
- Partners' and WP leaders' quarterly reports collected and reviewed

T1.2 Scientific & Technical Coordination and Innovation Management (UPATRAS, M1-M36)

During the second year, significant efforts were made to coordinate research and development across WPs 2, 3, 4, 5, 6, and 7. This included overseeing activities and fostering collaboration through in-person and virtual meetings with technical and pedagogical teams.

Key achievements included successful coordination of WP3, WP4, and WP5 to finalize the augMENTOR solution design and integrate assessment strategies for the 4Cs (critical thinking, communication, collaboration, and creativity) into the courses through the tools of the LMS platforms. WP3, WP4, and WP6 meetings supported pilot and pre-pilot phases, focusing on course implementation, pedagogical assistance, and technical support, especially for Moodle, used by three (3) of the four (4) pilots.

Research publications showcasing project outcomes have been published, with more under review. Collaboration with the advisory board also guided the development of the LLM-based recommendation system, designed to provide educators with insights about students' performance. These coordinated efforts have been essential for advancing scientific, technical, and pedagogical objectives while ensuring alignment across work packages.

Achievements and Results

- Scientific and technical coordination to bridge the understanding of the project's scope among the educational and the technological partners
- Coordination of the state-of-the-art reviews
- Published three (3) scientific papers

T1.3 Risk Management and Quality Assurance (UNI, M1-M36)

In the second year, project progress was closely monitored to ensure high-quality results and timely delivery. KPI owners (UNI, UNIGR, UDE, CSI, NVCR, and MSX) tracked targets, with all KPIs meeting internal benchmarks so far. Deliverables up to M24 were submitted on time.

The risk management strategy from D1.1 was consistently followed, with regular updates to risk and quality management tools. WP leaders reviewed and added 13 new risks, including those highlighted by EC reviewers. The Risk Register and List of Open Points Register were actively monitored.

One risk, R1 (Use cases do not meet the expectations of augMENTOR), was flagged due to an unforeseen change in the TryHackMe LMS used by Pilot 4 (led by KTU). This change prevented the pilot from running as originally planned. As TryHackMe is an external platform, the issue was beyond the team's control. A mitigation plan was implemented, and the team is confident the

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pilot will still meet its goals (details in Annex 1). Additionally, proactive measures were taken to prevent R2 (Insufficient number of end-users) from being triggered. KTU expanded its target group to include students preparing for civilian security and defense missions, aligning with the original target group profile. All other project risks remain unflagged at this stage.

Achievements and Results

- Risk register and List of Open Points register constantly reviewed and monitored
- Update of risk register, new risks were added
- Mitigation measure for R1 and proactive measures to avoid flagging R2 applied
- KPIs monitoring reviewed and updated, in line with internal targets set per trimester
- All deliverables were submitted on time

T1.4 Data and Tool Management Strategy (NVCR, M1-M36)

Enhancements were made following the mid-term review recommendations, leading to the revised Data Management Plan (DMP) II (D1.4), submitted in May 2024. This version focused on improving data management, accessibility, interoperability, and security of the project's datasets. It explicitly identified datasets managed by pilot partners, clarified their roles as data owners, added use case data flow schema layers, and specified tools for storage, sharing, and pseudonymization.

To enhance FAIR data practices, knowledge graphs were utilized for better findability and interoperability. Open sharing platforms like Zenodo and GitHub were introduced, along with detailed FAIR guidelines, partner roles, and risk management protocols. Updates on data security highlighted personal data handling and pseudonymization methods. ANNEX I of the DMP II included a revised dataset registration template with updates from M1-M12.

The data management framework was refined and implemented effectively across partners up to M24. In addition to public deliverables (to be made available upon approval), Year 2 produced research publications, presentations, dissemination materials, and datasets, including the "*augMENTOR Monitoring Report 2024 for Responsible Research and Innovation*" and pre-pilot datasets from pilot sites.

Achievements and Results

- Implemented substantial enhancements in data management practices and tools to align with FAIR and open science principles
- Successfully revised and submitted DMP II (D1.4) to EC services

- Clearly identified and described datasets from pilot partners, emphasizing their roles as data owners and incorporating details of data flow schema layers and tools for storage, sharing, and pseudonymization.
- Revised ANNEX I of DMP II with a new registration template
- Effective support to all partners for the overall data management framework

T1.5 Legal Compliance and Ethical Assurance (UDE, M1-M36)

During this period, significant progress was made in the areas of ethics monitoring, RRI (Responsible Research and Innovation) activities, and updates to the project's legal and ethics documentation. The second round of the RRI survey was conducted as planned in M18, with data collection and analysis completed. The collected data[2] and the informal report[3] are publicly available.

Coordination with the Ethics Manager included planning an ethics seminar[4] and designing consent forms for upcoming studies to ensure compliance with ethical standards. D1.6 was systematically updated, incorporating insights from RRI activities and survey results. Updates also addressed gender as a personalization feature, highlighting associated risks and the importance of considering gender in future implementations.

D1.6, originally submitted and approved in M12, remains a 'live' document, regularly updated in collaboration with the Ethics Manager and guided by the external Ethics Advisory Board. These updates aim to ensure that the project maintains high standards in ethical and legal compliance, aligning with its commitment to RRI principles. Two meetings and one event were attended to monitor ethical and legal issues, ensuring proactive responses to emerging concerns.

Achievements and Results

- Update of D1.6
- RRI activities performed (RRI-training workshop, 2nd round of RRI surveys, an informal report on the RRI survey results)
- Two (2) meetings to monitor ethical and legal issues
- Participation in two (2) external events regarding AI, ethics and legal compliance.
- Ongoing monitoring of pilot process and documentation in collaboration with the Ethics Manager

[2] https://doi.org/10.5281/zenodo.14448586
[3] https://doi.org/10.5281/zenodo.14502549
[4] https://augmentor-project.eu/augmentor-hosts-ethics-seminar-to-navigate-the-eu-ai-act/

1.2.2 Work Package 2 (UDE, M1-M12)

WP2 ended in M12.

1.2.3 Work Package 3 (UPATRAS, M1-M30)

Year 2 overall progress:

The objectives of WP3 were to finalize tasks T3.2 and T3.3. The work focused on the development of the augMENTOR pedagogical framework and the reference learner profile. T3.2 proposed a novel pedagogical framework that integrates emerging technologies, particularly AI, into education, leveraging Activity Theory and extending the TPACK model to TETPACK. This framework bridges theoretical foundations with practical classroom applications and aligns with other project elements, such as the Learner Model and data integration tasks. Meanwhile, T3.3 focused on modeling dynamic learner profiles, combining pedagogical theories with data-driven methods to capture key learner characteristics across various contexts. Both tasks contributed to the overall alignment and integration of the project's objectives, with final deliverables D3.1 and D3.3 being submitted.

Submitted deliverables:

- D3.1 - The augMENTOR Pedagogical Framework (submitted on time, M18)
- D3.3 - The augMENTOR Learner Profile (submitted on time, M18)

T3.1 Emerging Technologies in Education and Training: A state-of-the-art review (UPATRAS, M1-M12)

Task was concluded in M12.

T3.2 The augMENTOR Pedagogical Framework (UPATRAS, M4-M24)

The findings from T3.1 (concluded in M12) highlighted a critical gap in existing literature — a lack of a pedagogical framework that fully addresses the needs of the augMENTOR project. Current models and approaches are only partially implemented, prompting the need for an innovative framework tailored to educational settings integrating emerging technologies, particularly artificial intelligence. In response, T3.2 proposes a novel pedagogical framework rooted in Activity Theory, emphasizing both theoretical foundations (macro level) and practical classroom implementation (micro level). By refining and extending models like ADDIE (Analyze, Design, Develop, Implement, and Evaluate), this framework enriches the traditional teaching triangle and integrates technology seamlessly into pedagogical design.

A key innovation of the augMENTOR framework is its extension of TPACK (Technological Pedagogical Content Knowledge) to TETPACK, incorporating Emerging Technologies (ET) like AI into teacher expertise. At the classroom level, the framework introduces a data-driven approach — Technology-Augmented Educational Scenarios and e-Activities — to bridge theoretical concepts and hands-on applications. Moreover, this framework ensures alignment across project tasks, linking user requirements (D2.1), the proposed learner model (T3.3), the advancements in critical thinking, creativity (WP4), and 21st century competencies assessment (T4.3). It further informs WP5 tasks, about data and educational resource integration (T5.1), while contributing to the cross-validation efforts of the project in WP6. This interconnected approach ensures that the framework serves as both a conceptual foundation and a practical tool for realizing the augMENTOR solution. The work done in T3.2 , as well as the work done in T3.1, is presented in D3.1

Achievements and Results

- Delivery of the interim version of the augMENTOR pedagogical framework

T3.3 Development of a Reference Learner Profile (UDE, M7-M18)

Task T3.3, focuses on the development of a reference learner profile to model learners' knowledge, cognitive traits, behaviors, actions, and competencies across diverse educational contexts. This task employs a combined top-down and bottom-up approach, integrating pedagogical theories with data-driven research to model key skills such as mastery, affect, collaboration, and social interactions. Serving as a bridge between WP3 and WP5, this reference learner profile provides a dynamic framework to adapt to various contexts and learner needs. The evaluation and cross-validation of this model, using quantitative methods, will be reported in WP5 and WP6 deliverables. T3.3 is reported in D3.3, which updates the project's alignment strategy outlined in D2.1 and D2.2, offering essential input for deliverable D5.2.

Achievements and Results

- Delivery of a reference learner profile

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T3.4 Evidence-based Refinement of the augMENTOR Pedagogical Framework (UPATRAS, M19-M30)

This task focuses on enhancing the augMENTOR framework using insights gathered from its implementation in educational settings. This involves reviewing the current framework, collecting evidence from pilot programs and stakeholder feedback, and assessing its effectiveness in achieving its goals. The refinement process integrates research findings, adjusts components like PeDeMET and TESA, and develops practical tools such as templates and case studies. Validation through testing and final documentation ensures the framework remains practical, user-friendly, and aligned with diverse educational needs. The final report of T 3.4 will include a detailed report, supporting resources, and recommendations, adhering to a structured timeline to guarantee quality and relevance. As a preliminary work the augMENTOR PF is under review based on UPATRAS Pilot. For the next steps we are going to study the other three pilots as well, and collect data from the educators and the pilot representatives who have actually used the PF to design their courses.

Achievements and Results

- Validation of the augMENTOR pedagogical framework has commenced

1.2.4 Work Package 4 (UCA, M1-M30)

Year 2 overall progress:

The work done during the second year focused on ensuring pilots have been fully equipped so as to introduce activities in their courses that foster the development of the 4Cs (Critical thinking, Communication, Collaboration, and Creativity). Introducing effective rubrics for the assessment of the 4Cs was also a major focus of our work. Several workshops and reviews were done to ensure the proper introduction and assessment of the 4Cs and that courses will generate meaningful data for the augMENTOR solution. Our team submitted two deliverables, D4.1 (submitted in M18) which presents the first version of our methodology to introduce creative pedagogy in the augMENTOR solution as well as the state-of-the-art literature review that was done in T4.1. The second deliverable D4.3 includes the data collection procedure of early pilot results.

Submitted deliverables:

- D4.1 - Creative Pedagogy in the augMENTOR solution Interim (delivered on time, M18)

- D4.3 - Methods and tools for the enhancement and assessment of 21st century competencies (delivered on time, M24)

T4.1 Fostering creativity, critical thinking and design thinking: A state-of-the-art review (UCA, M1-M12)

This task was concluded in M12. The state-of-the-art review was presented in deliverable D4.1.

T4.2 Integration of Creative Pedagogy in the augMENTOR Solution (UCA, M4-M30)

During the second year of the project we worked alongside WP3 to ensure the alignment with the pedagogical framework and the meaningful integration of creative pedagogy in the augMENTOR solution through the pilots learning courses. Several steps have been taken and significant advancements achieved with regards to integrating activities in the pilots courses that facilitate the development of 21st century skills. The WP4 team has worked alongside pilot and technical partners reviewing the courses and their presentation in the Learning Management Systems. From these insights, the WP4 team was able to develop component descriptions, allowing the pilots to develop data collection methods and generate scores for each of the 4Cs components. This data will be collected and used by the augMENTOR solution to evaluate the development of 21st century skills. The WP4 team created a number of resources for our pilot partners including a series of one-sheets offering practical pedagogical strategies for both the inclusion and assessment of the 4Cs in their coursework. These materials were further elaborated in T7.4 for the needs of the first stakeholders' workshop as well as in T7.2 to be included in the second policy brief. The work done until M18 was presented in D4.1 focusing mainly on creative pedagogies to support the augMENTOR project.

Achievements and Results

- Delivery of guidelines and strategies for the integration of the 4Cs in the learning courses
- Review of pilot courses to ensure proper activities collection of meaningful data
- Definition of the methodology for the assessment of the 4Cs in the context of the pilots
- Submission of deliverable D4.1

T4.3 Methods and tools for the assessment of 21st century competencies (UCA, M7-M24)

The WP4 team has made substantial progress in advancing T4.3 and supporting the assessment and integration of the 4Cs. An initial draft outlining current best practices for assessing the 4Cs has been developed, alongside rubrics designed to facilitate their implementation and

assessment. These rubrics were integrated and supported through dedicated workshops with the pilots. Pilot rubrics were collected and incorporated into deliverable D4.3. Efforts to refine the assessment framework are ongoing, with work on an early draft of D4.2 scheduled to begin in early 2025.

To address the need from pilot partners for guidance on assessing the 4Cs, pilot partners were invited to attend meetings to answer any questions and provide further support if necessary. The WP4 group has also moved forward with the EARLI conference submission in conjunction with the UPATRAS and UDE.

In year 2, WP4 organised three workshops for pilot partners to discuss the assessment of the 4Cs within the educational courses. Additional guidelines were designed to further disseminate these strategies to general audiences. The team has also made significant strides in dissemination and collaborative initiatives as well as in participating in the organization of training events under T7.4.

Achievements and Results

- Finalization of the methods and tools for the assessment of 21st century competencies
- Submission of D4.3
- Delivery of workshop to support pilots
- EARLI conference submission

T4.4 Recommendations on the Exploitation of Emerging Technologies to enhance Design Thinking and Creativity (UCA, M19-M30)

The work in this task began based on the review of existing literature on fostering creativity, critical thinking, and design thinking, emphasizing their relevance to emerging technologies done in T4.1. We started out by identifying best practices and gaps in current methodologies to align with the state-of-the-art findings. Through workshops the team also identified key aspects and worked on collecting information about how to update current pedagogical practices to introduce emerging technologies based on a research seminar of the 4Cs. In addition, in collaboration with T7.2 based on our findings so far a first short set of recommendations were added in the D7.5 deliverable.

Achievements and Results

- Identification of the existing AI-supported technologies for creative use of AI

- Work with pre-service teachers on the use of AI educational tools for supporting creative pedagogies (Inspé, Licence Science de l'Education, Université Côte d'Azur)
- Presentation at the workshop in Nice (DAAD workshop in November 2024) with the collaboration of WP2 and WP3
- Organisation of a workshop with a computer science research on emerging technologies for AI education (December 2024)
- Presentation in the Université Sorbonne event on AIED organised by the Ministry of Education in France (MENJS)

1.2.5 Work Package 5 (UNIGR, M7-M33)

Year 2 overall progress:

In Year 2, significant progress was made across tasks, leading to the achievement of Milestone 6: the Operational Prototype of the AI-boosted Platform[5] and the release of the beta version of the augMENTOR solution[6]. In this beta version functionalities and access is available to educators who are in position to make queries, receive feedback and recommendations. Educators can edit the recommendations (to secure the human-in-the-loop ethical dimension) and dispatch them digitally to their learners. In T5.1, Knowledge Graphs (KG) and ontologies for Moodle and TryHackMe platforms were designed and deployed, ensuring data collection, integration, and enrichment to support machine learning pipelines. In T5.2 Machine learning (ML) pipelines for learner profiling were finalized, integrating new features such as rubrics for the assessment of the 4Cs and difficulty levels, while testing and validation continued with pilot datasets. T5.3 developed explainable AI (XAI) features to analyze competencies such as creativity and critical thinking. T5.4 established a framework for policymakers, enabling data-driven decision-making using graph-based insights, with user requirements translated into technical specifications and functionalities under development.

Deliverables submitted

- D5.1 - Data Mapping, Fusion and Orchestration Toolbox (delivered on time, M20)

T5.1 Data and Educational Resources Mapping, Fusion and Orchestration (UNIGR, M7-M20)

In Year 2, T5.1 was completed, with outcomes reported in D5.1. Between M13-M20, knowledge graphs and ontologies were delivered for the LMSs used by the pilots (Moodle for UPAT, IASIS,

[5] https://github.com/novelcore/EU_augMENTOR
[6] https://augmentor-app.eu-dev.novelcore.org/

EASD and TryHackMe for KTU), through a detailed process involving data collection, pre-processing, analysis, enrichment, and integration.
Data was initially collected and preprocessed to ensure quality and consistency with project goals. Ontology design followed, defining entities, nodes, and relationships. Cleaned data was then mapped and integrated into KGs based on platform-specific ontologies. These KGs provide structured information for ML models, enabling user feedback, recommendations, and insights via the augMENTOR platform, supporting tasks T5.2, T5.3, T5.4, and D5.2 - The AI-boosted augMENTOR platform. The design process included an extensive literature review and a detailed step-by-step methodology to ensure robust outcomes.

Achievements and Results

- Submission of D5.1 and finalisation of collection of pre-pilot phase datasets
- Design and implementation of two KGs and two ontologies for the needs of the task

T5.2 ML pipelines for Knowledge Discovery (MSX, M7-M24)

Within Year 2 of the project, the respective technical partners have initiated and moved forward the processing of information received from pilot partners LMSs, focusing on the development of ML pipelines for augMENTOR profiles. These pipelines have been finalized, and new approaches for incorporating additional data, such as rubrics and difficulty levels from WP3 outcomes have been explored. Progress has been made in component deployment, with testing conducted using dummy and synthetic data, contributing to the achievement of milestone 6, which marks the operational prototype of the solution. Notable advancements include the deployment of new profiling features based on IASIS datasets and an enhancement in learner competency data integration. For TryHackMe a new feature has been deployed by integrating data on specific competencies of the learners and of the users' learning rooms. Activities for updating the knowledge bases with engagement metrics are underway. The evaluation and validation of the pipelines continue as new datasets from the pilots are being received, along with the deployment of engagement metrics in specific use cases.

Achievements and Results

- Milestone 6 Operational Prototype of the AI-boosted Platform is achieved
- ML pipelines for augMENTOR profiles delivered

- Examine approaches for including additional data (such as rubrics, level of difficulty) in the augMENTOR solution
- Experimentation with GPT models for text generation
- Retrieve questionnaires from Moodle
- Validation and testing of the ML pipelines results

T5.3 Explanation Generator and Reporting Engine (UNIGR, M13-M30)

For T5.3, a state-of-the-art analysis led to the design and deployment of components tested with dummy and synthetic data. New use cases for TryHackMe were developed, and XAI pipelines were enhanced to include explanation features for critical thinking and creativity (2Cs). New use cases for Moodle were also developed for learner profiling using pre-pilot data from IASIS. This work contributed to the completion of milestone 6, marking the completion of the operational prototype of the AI-boosted platform.

Additionally, work on User Interfaces and User eXperience (UI/UX) design included creating screens and user journeys for educators, learners, and policymakers based on pilot partner feedback. These were validated in three workshops with fifty (50) participants. After refinements and finalization the team proceeded with the implementation. A preliminary demo of the augMENTOR solution was presented in September (M21) at a dissemination event in Greece, with the beta version released in December (M24) during the 4th plenary meeting.

Achievements and Results

- Milestone 6: Operational Prototype of the AI-boosted Platform
- State-of-the-art analysis was conducted
- Use case scenarios for KTU and IASIS based on pre-pilot phase data collection
- Implementation UI/UX and UI first release available

T5.4 Knowledge Graph based Decision and Policy Making (NVCR, M13-M33)

A methodological approach has been established, alongside an initial outline of functionalities aimed at policy makers as end-users. The scope for policy makers includes the ability to formulate policies, assess both current and future performance, and provide recommendations based on the analysis of relevant graph-represented data, which aids in informed decision-making. The research methodology involves identifying key information through descriptive statistics, visualizing this information using graphs, and facilitating discussion and feedback presented in text form. User requirements for this component have been

gathered and translated into technical specifications, leading to the development of final features.

Achievements and Results

- Completed a state-of-the-art analysis
- Established a methodological approach and outlined functionalities for policy makers.
- Gather user requirements and translate them into technical specifications
- Designed functionalities tailored to meet policy-making user requirements and in progress of work is the deployment of those features and use cases

T5.5 Development of Innovative Work Methodologies (KT, M25-M33)

T5.5 activities commence after the end of this reporting period in M25.

1.2.6 Work Package 6 (CSI, M13-M36)

Year 2 overall progress:

WP6 officially kicked off in M19 as planned, starting with the delivery of the demonstration plan and evaluation framework for pilot implementation. This plan outlines tools, activities, and timelines, integrating both quantitative and qualitative methods to measure KPIs. Ethical considerations and cross-WP collaboration ensure effective execution. Pilots have begun implementation according to schedule, with all legal and ethical guidelines followed, supported by the Ethics manager. Pilots carried out several preparatory tasks before the WP6 kick-off. Even though they were done in collaboration with other WPs (mainly WP3 and WP4), they are reported under tasks T6.2 to T6.5 for a better overview of pilot's work. These activities are aligned with the project's strategy (D2.1, D2.2) and include:

Activity 3: Pilot course descriptions (D2.1)

Activity 7: Collaborative design of courses (D2.1)

Activity 11: Pre-pilot beta testing (D2.1)

Activity 13: Course refinement and pilot outline (D2.1)

Activity 16: Course adjustments based on LMS affordances (D2.2)

Submitted deliverables

- D6.1 - The augMENTOR Evaluation Framework (delivered on time, M18)

T6.1 The augMENTOR Demonstration Plan and Evaluation Framework (KT, M13-M18)

The augMENTOR Demonstration Plan and Evaluation Framework were developed to guide the pilot phase, ensuring smooth implementation across diverse educational environments. The Demonstration Plan outlined tools, activities, and timelines for effective execution, data collection, and post-pilot reporting. T6.1 also developed the Evaluation Framework, using quantitative and qualitative methods to measure Key Performance Indicators (KPIs) related to pilot implementation. The outcomes adhered to ethical considerations and promoted cross-WP collaboration, providing a structured approach for pilot execution, monitoring, and evaluation.

Achievements and Results

- Created a comprehensive Demonstration Plan and Evaluation Framework
- Ensured alignment and integration of activities with other WPs
- Established tools, methodologies, and timelines for preparation, rollout, and reporting
- Designed robust tools and guidelines for both quantitative and qualitative data collection to assess pilot performance and achievement of KPIs
- Addressed ethical considerations to ensure responsible pilot implementation and data collection
- Supported scalability and adaptability of the solution across varied educational settings, cultural contexts, and technological environments
- Delivered structured content for D6.1, providing a foundation for effective pilot testing and evaluation

T6.2 Pilot #1: Emerging technologies in Adult Education and Life-Long Learning settings

Achievements and Results (IASIS, M19-M33)

IASIS developed its online course in collaboration with WP3 and WP4 partners and experts, following the augMENTOR pedagogical framework and ensuring 4Cs development is properly introduced through course activities. The course was uploaded to Moodle, creating a technology-augmented educational experience (following a preliminary version of the TESA model) and was completed before the pre-pilot phase in November 2023 (M11). Consent forms were collected, and strong interest led to multiple attendance groups. Two online seminars for educators covered Moodle tools and course activities. Based on pre-pilot feedback, IASIS updated its course, refining exercises for clarity and adding a 4Cs rubric in October 2024 (M22). The pilot phase began with sixteen (16) trainers and one hundred and ninety three (193) learners, with Modules 3 and 4 planned for January to May 2025 (M25-M29).

Funded by the European Union

Achievements and Results:

- Update and simplification of the course to make it more user-friendly for both teachers and learners.
- Development of teachers' skills in using online tools in their work with learners
- Development of learners' skills in using online tools in their real work environments
- Enhancement of learners' knowledge regarding online Learning
- Development of learners' creative skills in completing the tasks within the course
- Development of learners' skills in communication and collaboration with their colleagues or beneficiaries
- Empowerment of trainers in problem solving skills based on real-work scenarios
- Recruitment and participation of humanitarian professionals in asynchronous training aimed to record and detect training gaps that affect their work with vulnerable groups

T6.3 Pilot #2: Innovative Training Programmes for Pre-service Teachers (UPATRAS, M19-M33)

The "Information and Communication Technologies in Education" course was redesigned to develop 21st century skills and enhance the digital competence of pre-service teachers at the University of Patras. This mandatory course now integrates the TPACK framework, the educational scenario template, and the 4Cs assessment strategy to align with augMENTOR's goals. Delivered via Moodle during the spring semester of 2023/2024 academic year, the course engaged approximately two hundred (200) students, with data collected on platform usage, student feedback, and course evaluations (pre-pilot phase). Prior to its launch, consent forms were obtained from both instructors and learners. The participants showed significant enthusiasm and interest in the course, leading to the formation of multiple attendance groups to accommodate the high demand.

From M19 and on, our work focuses on analyzing the findings of the pre-pilot to refine the course, ensuring it meets pedagogical objectives and prepares educators for modern teaching challenges. Adjustments are underway for the pilot's official launch in February 2025, following significant interest and initial feedback.

Achievements and Results

- Development of technology-driven educational skills for educators and learners
- Cultivation of 21st century teaching competencies (including creativity in lesson design and collaborative teaching strategies, strengthened critical thinking and communication skills in pedagogy).

- Alignment with learner needs and curriculum goals
- Creation of assessment rubrics for 21st century skills
- Enhancing digital pedagogy through practical application
- Supporting Broader Educational Initiatives (preparing educators to utilize AI and digital platforms, advancing the integration of technology into teaching practices.

T6.4 Pilot #3: STEAM-based Programs for Environmental Education in a Network of Eco-schools (EASD, M19-M33)

EASD developed the *Carbon Footprint* course in collaboration with experienced teachers from Serbia's Eco-Schools network, and WP3 WP4 partners, ensuring alignment with augMENTOR's pedagogical framework and integrating 4Cs activities and assessment rubrics. After design and review, the course was uploaded to Moodle and introduced as an extracurricular activity for the 2023/2024 school year meant to be implemented as part of the pre-pilot phase. Three (3) Eco-Schools participated in this preparatory phase (pre-pilot), aiming to test the course, and collect preliminary data. Participating educators were supported by two (2) online teacher training workshops organised by our team (14/12/2023 and 22/1/2024).

Since July 2024 (M19) and T6.4's official launch, based on pre-pilot feedback, the course was simplified, tasks were clarified, and the 4Cs assessment was revised. Recruitment for the pilot phase began in late 2024 (September - October 2024), with twenty seven (27) Eco-Schools enrolling. The pilot phase officially started in November 2024. While schools began at different times, all are expected to complete the course by the end of the 2024/2025 school year. Consent forms from parents, learners and educators were collected for both the pre-pilot and the pilot phase.

Achievements and Results

- Updated and simplified course for pilot implementation
- Development of teachers' and students' skills to use online tools and LMS in their work with students
- Development of student's knowledge about climate change
- Development of student's creativity skills during implementation of task under the course
- The course Carbon footprint and future augMENTOR solution support the work of the national platform for artificial intelligence of the Republic of Serbia and contribute to

the goals of the Strategy for the Development of Artificial Intelligence in the Republic of Serbia

T6.5 Pilot #4: Leapfrogging Industry 4.0 technologies for Civic Society watchdogs and EU Civilian Missions (KTU, M19-M33)

KTU designed an eight-week cybersecurity course, initially tested during the pre-pilot phase on the TryHackMe platform. Based on pre-pilot feedback, the course was adapted for learners without an IT background. After an unexpected change in TryHackMe (see Annex 1), KTU updated the course structure, moving some activities to Moodle. The final course includes six (6) weeks of activities on Moodle and two (2) weeks of activities on TryHackMe.

In July 2024 (M19), KTU launched a recruitment campaign, attracting one hundred and seventy nine (179) applicants and selecting forty two (42) learners. Following course updates, thirty two (32) of the forty two (42) original enrollees successfully completed the course. In the fifth week, learners were invited to join TryHackMe, with nine (9) ultimately enrolling and actively participating. The pilot provided valuable insights for improving cybersecurity education, focusing on flexibility and accessibility. The team is now preparing for a second pilot round.

Achievements and Results

- Successful recruitment campaign (179 applicants)
- Effective course adaptation based on pre-pilot feedback and successful content restructuring following TryHackMe's unexpected update leading to increased completion rate:
    - Out of 42 enrolled students, 32 successfully completed the six-week Moodle course, achieving a strong retention rate
    - TryHackMe enrollment and engagement: Of the 11 students who applied, 9 enrolled and actively participated in the two-week TryHackMe course
- Impactful Pilot run: Demonstrated the feasibility of adapting cybersecurity training for non-IT learners, paving the way for future improvements in similar programs

T6.6 Cross-pilot Validation and Assessment (CSI, M25-M36)

T6.6 activities commence after the end of this reporting period in M25.

1.2.7 Work Package 7 (SCICO, M1-M36)

Year 2 overall progress:

During the second year of the project significant work has been done in WP7 to promote the project, its activities and achievements, to continue the established collaboration with augMENTOR's sister projects and to monitor dissemination and communication activities. Our team has also set in motion its plan for monthly hand-over of the project's social media lead while a series of workshops (under T7.4) and dissemination events have taken place. Additionally, the project team has launched an ongoing podcast series featuring internal interviews with key contributors, offering insights into the project's progress, methodologies, and impact. Our team also kicked off T7.3 working on the strategies and guidelines based on Standardization, Conformity Assessment and Assurance protocols. Finally, under T7.5 a dedicated workshop was done with project partners to develop the main value proposition and key elements of alternative business models.

Submitted deliverables:

- D7.5 - Policy Brief Interim (submitted on time, M24)

T7.1 Communication and Dissemination Activities (SCICO, M1-M36)

During this period, two (2) new podcasts were released. One was done in collaboration with the e-Diploma sister project (March 2024) while the second one was an augMENTOR alone episode. Both podcasts were made available in the project's YouTube channel[7]. In addition, an online seminar was organised in collaboration with the project's Ethics manager on Ethics and the AI Act (an open invitation for participation was extended to all sister projects).

The project has been consistently posting activities on social media (with graphics added by the team), while paid ads were also added. Partners are taking turns on leading social media (changing every month) contributing three (3) posts each.

In addition, the website of the project was translated in 5 languages (Greek, French, German, Lithuanian and Serbian). The "Resources" tab was updated adding filters so that visitors can better group and search for the resources they are interested in.

Achievements and Results

- Website translation in five (5) languages and update of 'Resources' page

[7] https://www.youtube.com/@augMENTORproject

- Twenty three (23) dissemination activities (including presentations, talks and workshops)
- One hundred and seven (107) communication activities including monthly take over of social media
- Production of two (2) podcasts, one (1) in collaboration with the e-diploma sister project
- Delivery of one seminar on Ethics and AI-act co-organised with the Ethics manager
- Continuation of collaboration with sister projects
- One workshop delivered to in-service teachers with the collaboration of WP3, WP5 and WP7 partners
- Incorporation to a newly formed XR and AI cluster of projects including: CORTEX2, XR5.0, XR4ED, HECOF, MASTER, augMENTOR,Transmixr, SERMAS and XR2LEARN. Monthly meetings are taking place and common actions are being discussed.

The achievements and results mentioned below fall within the scope of the estimated KPIs for year 2 of the project:

Table 1. KPIs reached in Year 2

KPI	Year 1	Year 2	Year 1& Year 2	Total Target and % of target
Posters	1	0	1	4 (25%)
Logos	3	0	3	2 (150%)
Materials download	0	206	206	450 (46%)
Newsletters	1	2	3	6 (50%)
Subscribers to the newsletter mailing list	86	13	99	100 (99%)
Information Leaflets	1	0	1	1(100%)
Brochures	0	2	2	1(200%)
Website unique visitors	628	563	1191	550 (149%)
Partner participation in academic events/conferences	10	5	15	8 (188%)
Social media posts	101	107	208	200 (104%)
Followers on social media channels (aggregate)	396	228	624	450 (139%)
Research publications	5	3	8	15 (53%)
YouTube videos	2	2	4	3 (133%)
Views across video channels (YouTube, Vimeo)	440	522	962	150 (641%)
Workshops designed and executed by all partners	6	5	11	No total target

Funded by the European Union

T7.2 Impact Assessment Plan (CSI, M7-M36)

Partners are actively refining the project's impact assessment plan through collaboration, ensuring it adapts to evolving needs and stakeholder feedback. The changes made in the first draft plan, reflect insights gained from early project implementations and stakeholder feedback, ensuring the plan remains adaptive and targeted. A series of measurable indicators and evaluation metrics have been established, to systematically track the project's influence across various dimensions, including educational, technological, and policy-related outcomes. Findings from WP6 will further enhance the plan's relevance in real-world contexts. To increase the impact of the project, in alignment with activities performed under T7.1, targeted talks, presentations, and briefings have been conducted at European and international levels, positioning it as a leader in innovative education. Additionally, the second policy brief (D7.5) was delivered on time, focusing on recommendations based on augMENTGOR's pedagogical framework and creative pedagogy.

Achievements and Results

- Submission of D7.5
- Update of impact assessment plan
- Talk at Permanent Representation of Austria to the European Union on EU data spaces
- Briefing to the UN Cyber Hub with a participant list of 22, who create policy and training across the UN
- European Union ESDC Course on Strategic Planning for Civilian Missions
- Presenting augMENTOR in different networking events which aimed to inform both educators and national stakeholders in Cyprus

T7.3 Standardisation, Conformity Assessment and Assurance (UPAT, M13-M36)

Task T7.3 ensures the augMENTOR project aligns with educational technology standards for interoperability, scalability, and compliance. It focuses on standardization and conformity to integrate augMENTOR into diverse educational settings. The task addresses compliance with SCORM (Sharable Content Object Reference Model) and xAPI (Experience API), enabling interoperability of learning content and tracking across platforms, including Moodle. The approach includes (i) analyzing standard specifications to ensure compliance, (ii) testing interoperability with SCORM- and xAPI-compliant LMS platforms, and (iii) validating learner profiles for compatibility with both legacy and modern LMS. Engagement with independent

standardization bodies and synergies with related projects (i-MASTER, e-DIPLOMA, ExtenDT2, and Empower) will also support certification and validation.

Achievements and Results

- Efforts to establish specific communication channels with the broader community and to create protocols tailored to the given requirements for connecting with the community.
- General research has been conducted and we are in the process to make a first draft

T7.4 augMENTOR Workshops and Training Events (ACP, M19-M36)

The work in this task commenced in M19. Our work so far has focused on mapping a plan of activities and workshops based on partners' expertise and communication channels. A stakeholders workshop has already been designed and delivered (as planned), focusing on the 21st century skills and their development with the support of emerging technologies like AI. Materials originally designed in WP4 to facilitate the pilots for introducing 21st century skills in their courses were tailored to form an information package for the needs of this workshop which were also made available in the website[8]. This workshop was led by ACP and UCA.
In addition, three (3) training events have taken place in collaboration with WP6 to provide the required knowledge to interact with the pilots. It should be mentioned that according to the Description of Action, our team was expected to deliver only one such event this year and two more in the last year of the project. It is our intention to deliver at least two (2) more training events as well as additional stakeholder workshops.

Achievements and Results

- Delivered one (1) workshop titled "Designing Education and Training in the Age of AI: Transversal Competencies and the 4Cs – Critical Thinking, Creativity, Collaboration, Communication" to educational stakeholders gathering information as well as to enhance their involvement and awareness of the project (20 attendees, also linked to "Participants in stakeholder workshops" KPI total target: 20)
- Delivered three (3) training events to provide the training and guidance required knowledge to interact with the pilots (KPI for the second year: 1 event)

[8] https://augmentor-project.eu/wp-content/uploads/2024/12/Tips-for-Assessing-the-4Cs.pdf

T7.5 Exploitation Plan and Bridge-to-Market (UNI, M1-M36)

The team has been monitoring AIED trends and global technological developments to assess the commercialization potential of the augMENTOR solution. Business modeling workshops were held to engage partners in strategic planning. The first workshop, at the 3rd plenary meeting in Kaunas (June 2024), included PESTEL and SWOT analyses to evaluate the project's internal and external environments. A second workshop, at the 4th plenary meeting in Waterford (December 2024), advanced the business model, focusing on KER bundle specifications, IPRs, commercialization paths, and market trends.

The augMENTOR solution, based on current work, can be marketed as a "plug and play" product to enhance existing LMSs with AIED features. Commercial partners will lead its rollout, while research and academic partners will promote the solution within their communities and support further R&D to extend the framework across diverse sectors.

Achievements and Results

- Monitoring of KER bundles developments and connection to the market and their sustainability
- Two business modelling workshops conducted
- Initial findings through partners' input and overall discussion at SWOT and PESTEL methodologies.

1.2.8 Work Package 8 (UNI, M1-M36)

Year 2 overall progress:

Between M12 and M24, the team focused on preparing documentation for the pilots and the release of the augMENTOR solution, making significant progress on ethics and GDPR compliance. All ethics documents for the pilot phase, including consent forms, DPO Opinions, DPIA, and RoPA, were finalized. A privacy policy for the augMENTOR solution was also delivered. The external EAB reviewed and approved these documents, and their report (D8.7, M24) was submitted. All recommendations made by the EAB and presented in D8.7 (chapter 7) are addressed by the team.

To promote ethical innovation, the team, led by the Ethics Manager, organized a seminar on the EU AI Act under RRI activities, with sister projects invited. Participants submitted questions in advance for the speaker to address.

Finally, it should be noted that the GDPR expert of the EAB, stepped down from his duties to the EAB due to personal reasons. The project team notified the Project Officer, who

subsequently informed us that we could proceed with the three remaining board members, in line with the advice and recommendation of our EAB. The three (3) members of the EAB will be co-sharing the additional duties. In case a GDPR issue arises the consortium may also seek advice from an additional GDPR expert.

Submitted deliverables:

- D8.7 - OEI-Requirement No.8 (delivered on time, M24)

Achievements and results

- Confirmed physical Server Location (TryHackMe) and GDPR compliance (KTU's DPO)
- Ethics approval of Pilot #2 (UPATRAS) ethics documentation by the Ethics Committee of UPATRAS for the pre-Pilot phase
- Finalizing all ethics related documents for the Pilot phase including:
    - Update informed consent forms for minors with disabilities (EASD/parents-legal guardians), the DPO Opinion from EASD and the RoPA
    - The ethics-related documents have been updated to include the following: 1) Informed consent forms for learners (IASIS-UPATRAS-EASD-KTU). 2) Updates to the DPIA, DPO Opinions, and RoPA, incorporating learners as direct users of the augMENTOR solution. 3) Additional information regarding audio-video recording for Pilot #1 and Pilot #2. 3)The inclusion of interviews, questionnaires, and focus groups that may occur after the pilot phase, with additional consent required for participation
- Delivery of the privacy policy for the augMENTOR solution
- Review of all ethics related documents by the EAB for the second year
- Submission of the EAB's report, D8.7 OEI-Requirement No.8 (M24)
- Delivery of an Ethics seminar-workshop (under RRI activities, available here[9])

1.3 Impact

1.3.1 Scientific impact

The project has made significant progress with regards to its scientific impact delivering

a. the augMENTOR pedagogical framework (presented in D3.1)
b. The creative pedagogy to support the augMENTOR solution (presented in D4.1)

[9] https://augmentor-project.eu/augmentor-hosts-ethics-seminar-to-navigate-the-eu-ai-act/

c. Methods and tools for the enhancement and assessment of 21st century competencies (presented in D4.3)
d. The augMENTOR Learner Profiles (presented in D3.3)

The augMENTOR framework introduces a novel pedagogical approach grounded in Activity Theory, bridging theoretical foundations (macro level) with practical classroom applications (micro level). It extends the TPACK model to TETPACK (Technological Emerging Technologies Pedagogical Content Knowledge), integrating Emerging Technologies (ET) like AI, to equip teachers with the competencies needed for advanced technology use in education.
In creative pedagogy and 21st century skills, augMENTOR adopts a participatory assessment approach for a nuanced evaluation of learners' growth and supports educators in refining teaching strategies (D4.1, D4.3). Lastly, the reference learner profile (D3.3) provides a conceptual blueprint for the learner model developed within the project.

Our work so far has also resulted in a number of publications in addition to the five (5) presented during the first year of the project:

a. Chounta et al. (2024) presents a Systematic Literature Review (SLR) on the state-of-the-art in Artificial Intelligence in Education (AIED), providing a detailed analysis of methodological approaches, research contexts, and technological trends in the field over the past five years.
b. Lavidas et al. (2024) present recent research that highlights the transformative potential of Artificial Intelligence (AI) applications in higher education, while fostering critical discussions within the international educational community regarding their role and adoption. The insights and findings of these papers align with and reinforce the scientific goals of the augMENTOR project by emphasizing the need for more comprehensive, evidence-based approaches to AI integration in diverse educational contexts and underscore the importance of user-centric design and implementation.
c. Livieris et al. (2024) introduce a reference architecture that incorporates advanced instructional design functionalities, enriched and augmented by emerging technologies such as Artificial Intelligence (AI) and Machine Learning (ML).

1.3.2 Economic impact

The economic impact augMENTOR seeks to contribute to the EU education ecosystem remains as presented in the project's interim report. Several steps have been taken towards these goals. During the second year, our team focused on delivering the first release of the

augMENTOR solution for the demonstration purposes within the project's pilot users. Following the business modelling workshops conducted in year 2, the major development was that apart from utilising adequately market landscape and trends analysis and business modelling tools (such as PESTEL, SWOT and business model Canvas), there was a consensus among the consortium on specific issues, including the IPR discourse of the project's exploitable outcomes. A common understanding has been achieved concerning the market perspectives, dynamics, opportunities and positioning of the bundled KERs of the project, as well as the role that each partner is willing to undertake after the completion of the project based on the consortium agreement terms, expertise and nature of the organisation.

1.3.3 Societal impact

The societal impact of augMENTOR focuses on enhancing digital literacy and 21st-century skills for students and educators through advanced technologies and a robust pedagogical framework. The augMENTOR pedagogical framework, with its interim version already available, supports student-centered learning, fostering engagement, personalized pathways, and improved teaching methods. By prioritizing skill development over content delivery, augMENTOR equips learners with essential skills like collaboration, creativity, and problem-solving. The first version of our AI-driven solution that has been released, leverages learning analytics and a recommendation engine to address educational disparities and tailor content inclusively. Guided by the Assessment List for Trustworthy AI, the project emphasizes fairness, diversity, and well-being. Through ongoing outreach and collaboration with sister projects (including a podcast series), augMENTOR promotes awareness of technology's transformative role in education via events, website updates, and social media engagement.

1.4 Update of the plan for exploitation and dissemination of results

In the project's second year, the focus on innovation and commercialization has solidified among partners, aiming to deliver a validated, pilot-tested, plug-and-play prototype compatible with major Learning Management Systems (LMS) post-completion. This will involve showcasing intelligent features to user communities of the four pilot partners and developing a comprehensive commercialization and innovation management plan.

Key objectives include advancing the Technology Readiness Level (TRL), expanding demonstration audiences, performing standardization efforts, and establishing synergies with major LMS providers to ensure compatibility and explore collaborations for financial sustainability.

Post-project plans focus on emphasising large-scale demonstrations to validate technological compliance, scalability, customer acceptance, and competitiveness in the AIED and learning analytics markets. A final report under Task 7.5 will present a business plan framework, detailing the commercial pathway for the augMENTOR solution. Commercial partners will lead market efforts, while research and academic partners will act as ambassadors, providing consulting support and enhancing the pedagogical framework across diverse educational sectors and regions in Europe.

2 Follow-up of recommendations and comments from previous review(s) (if applicable)

Comments and recommendations from the reviewers related to D1.2 have been addressed in Annex 2 per work package as recommended by the reviewers.

3 Open science

The consortium has selected suitable open science practices as a core component of the project methodology. This approach facilitates prompt and transparent dissemination of research results, aligning with Horizon Europe's Open Access guidelines.

The DMP (D1.3, D1.4) serves as a living document that outlines the project's data management policy, detailing the lifecycle of collected data per FAIR principles. It specifies the methodology for data sharing, curation, and storage while identifying data types and metadata. It ensures ethical and legal compliance, with a publishable version expected by project completion (M36). Datasets that will be uploaded to open access repositories will be deposited in a searchable resource (the cloud web storage service of the project) and will be accessible via dedicated Application Programming Interfaces (APIs). The project adheres to EU data legislation and GDPR, with legal and ethical protocols defined in related deliverables. Project achievements are already shared in high-impact journals, with the dissemination plan emphasizing open access publishing. The three primary sources for sharing open data are a) Zenodo[10], b) GitHub[11], and c) the project's website[12] "Resources" section.

[10] https://zenodo.org/

[11] https://github.com/

[12] https://augmentor-project.eu/

4 Deviations from Annex 1 and Annex 2

4.1 Tasks/objectives

Deviations presented in the 2nd amendment

An amendment requested in December 2023 and enacted in February 2024 allowed the consortium to collectively cover the costs of the external Ethics Advisory Board (EAB) and Ethics Manager. A budget transfer enabled the coordinator to pay ethics experts on behalf of the consortium. Justification details are included in the amendment documents and will be part of the project's second Periodic Report.

Deviations in Task/Objective beyond the 2nd amendment:

In November 2024, GDPR expert Mr. Ntouvas stepped down from the EAB due to personal reasons. The Project Officer was informed and confirmed that the team may proceed with the remaining three (3) members, who will share the additional duties. For GDPR issues, the consortium may seek advice from an external expert if needed.

Regarding R1, the team deviated from the original Pilot 4 plan (sections T1.3 and T6.4, Annex 1). Despite changes in the LMS, TryHackMe will still be used, with learners following a modified learning path. In parallel the parts of the original course that the learners do not engage with through TryHackMe will be made available to them through a new Moodle course. To address R2, KTU will expand its call for the second bootcamp to include KTU students interested in civilian security and defense policy missions.

4.2 Use of resources

Budget transfers and analysis included in the 2nd amendment

Analysis of costs:

a) EAB costs: The EAB consisted at the time of four experts (one of them acting as chair of the board). The EAB commenced to perform its part of the work on 01.02.2023 and will have completed it at the latest 31.12.2025.

Payments are as follows:

- Chair of the Ethics board (expertise - XR ethics in education): 6,000.00€
- Expert #1 (expertise - Pedagogical and AI ethics): 3,000.00€
- Expert #2 (expertise - Pedagogical and ethics of school-based research): 3,000.00€
- Expert #3 (expertise - Law and GDPR compliance expert): 3,000.00€

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Total costs: 15,000.00€

b) Ethics manager - Total costs: 45,000.00€

Budget transfers (Total amount transferred: 60,000.00 €):

- UNI: 4,327.44€ - amount moved from A. Personnel costs (corresponding to 0.70PMs in WP7)
- UNIGR: 5,282.49€ - amount moved from A. Personnel costs (corresponding to 0.85PMs in WP1)
- IASIS: 1,980.26€ - amount moved from C.1 Travel and subsistence
- CSI: 3,858.00€ - amount moved from C.1 Travel and subsistence
- UDE: 7,494.77€ - amount moved from C.1 Travel and subsistence (6,000.00€) and from C.3 Other goods, works and services (1,494.00€)
- SCICO: 2,822.01€ - amount moved from C.1 Travel and subsistence
- KT: 3,804.04€ - amount moved from C.1 Travel and subsistence
- UPATRAS: 8,019.51€ - amount moved from A. Personnel costs (equal to 1.78PMs in WP3)
- NVCR: 4,384.09€ - amount moved from C.3 Other goods, works and services
- EASD: 2,962.30€ - amount moved from A. Personnel costs (corresponding to 0.78PMs in WP6)
- UCA: 7,305.92€ - amount moved from A. Personnel costs (corresponding to 1.49PMs in WP4)
- KTU: 3,021.65€ - amount moved from A. Personnel costs (corresponding to 1.21PMs in WP7)
- ACP: 4,737.52€ - amount moved from C.1 Travel and subsistence (2,500.00€) and from C.3 Other goods, works and services (2,237.52€)
- MSX: 0.00€ - N/A

Other deviations

The 3,000.00€ originally allocated to cover the costs of the 4th member of the EAB, remains at the disposal of the consortium after the expert's withdrawal. As the EAB has advised that in case a GDPR issue arises the consortium may also seek advice from an additional GDPR expert, this amount shall be reserved in case the project team has to cover additional costs related to the EAB and consulting with another law/GDPR expert. In the case that this amount is not used to cover the aforementioned potential need, it will be used by the project team to organize a final making policy event.

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References

[1] Chounta, IA., Limbu, B., van der Heyden, L. (2024). Exploring the Methodological Contexts and Constraints of Research in Artificial Intelligence in Education. In: Sifaleras, A., Lin, F. (eds) Generative Intelligence and Intelligent Tutoring Systems. ITS 2024. Lecture Notes in Computer Science, vol 14798. Springer, Cham. https://doi.org/10.1007/978-3-031-63028-6_13

[2] Lavidas, K., Voulgari, I., Papadakis, S., Athanassopoulos, S., Anastasiou, A., Filippidi, A., Komis, V., Karacapilidis, N. (2024). Determinants of Humanities and Social Sciences Students' Intentions to Use Artificial Intelligence Applications for Academic Purposes. Information, 15, 314. https://doi.org/10.3390/info15060314

[3] Livieris, I.E. *et al.* (2024). Building a Reference Architecture for Integrating Emerging Technologies in Instructional Design. In: Uskov, V.L., Howlett, R.J., Jain, L.C. (eds) Smart Education and e-Learning 2024. SEEL 2024. Smart Innovation, Systems and Technologies, vol 399. Springer, Singapore. https://doi.org/10.1007/978-981-97-4954-6_2

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Annex 1 - R1 explanation and mitigation measure

Our project has four (4) pilots. To perform their activities, three (3) of the pilots use Moodle as their Learning Management System (LMS) and Pilot #4 (led by KTU) is using the TryHackMe platform as they need virtual machines to perform the activities of its pilot.

However, recently we had an unforeseen development, which considerably affected Pilot #4. During an update in their system, TryHackMe's registration process introduced a mandatory questionnaire for new users, which cannot be bypassed, and once completed, users are automatically directed to TryHackMe's pre-created learning paths instead of the KTU-customized learning path. This means that even paying customers, like KTU, who have purchased licenses aiming to use this platform to train their learners/students on specific subjects, cannot control which learning rooms users are guided to. In consequence, KTU learners cannot follow the course designed for them by the KTU team, based on specific learning rooms, instead, they are forced to follow a different set of learning rooms.

As TryHackMe is not part of our project (it is only the pre-existing LMS KTU had chosen to use to cover their needs) we could not have foreseen or controlled such an issue. Ever since that update, in an effort to solve this problem, the KTU team reached out repeatedly to the TryHackMe customer support service but unfortunately, they got no response.

This issue was a problem for the project and particularly Pilot #4. The main problem is that this issue occurred, at a point during the project's lifetime, that there is little we could do (meaning only a couple of months before starting this pilot).

Thus, our project team had to make a decision about how to bypass this problem without jeopardizing the pilot or losing important findings of the project. There were a lot of things we took into consideration and lots of aspects to weigh, and we finally concluded with the best possible solution for our project.

The mitigation measure decided is that despite this unforeseen change on this specific LMS we will still use TryHackMe to test the solution even if that means that learners will have to follow a different learning path compared to the one originally designed. In parallel the parts of the original course that the learners do not engage with through TryHackMe will be made available to them through a new Moodle course.

One might argue that since we have Moodle at our disposal it would be much easier to simply move the entire course to Moodle. However, KTU still needs virtual machines for their activities, which Moodle does not have. Also, as it is explained below, this would also come with a number of negative implications.

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Our decision was taken based on two points; a) considering the work done by partners already and the degree to which we have time to change things and b) what is the best of the project and what solution minimizes the impact of the situation on the project. Our rationale is presented below:

Considering time and effort allocation: By the time we got the news for this update, most of the work had already been done. The major activities already performed were:

- A separate ontology was developed for the augMENTOR solution for organizing the educational content and resources from TryHackMe
- The augMENTOR solution Machine Learning pipelines had already been developed and customized for TryHackMe
- KTU had already run their pre-pilot phase to test the course and collect data (to train the models)
- KTU had already designed and completed the entire course based on the TryHackMe approach (adapting the learning part ad hoc)

At that stage, with all this work already in place and the pilot about to begin, changing LMS was practically impossible. The augMENTOR solution is based on Machine Learning, which means that the models used need to be pre-trained and a dedicated ontology needs to be in place. Re-doing all this work is not possible as there was neither enough time and remaining effort nor the possibility to collect new data to train the model anew. This is also why the parts of the KTU course redeveloped in Moodle cannot be used at this stage. It requires a significant amount of time and effort to do this. Even though Moodle is used by the other pilots, the setup of the KTU course follows a different format which means that we would have to redo the needed configuration and retrain the model. In addition to that, the technical partners had by then already spent the effort allocated to these tasks following the DoA.

Another issue is that to perform the pilot, KTU also already purchased 80 Educational Plan Licenses for pilot activities in the TryHackMe platform. Skipping TryHackMe would make this cost obsolete.

Minimizing the impact on the project: Most importantly, switching the last pilot to Moodle entirely, strips us of the opportunity to demonstrate augMENTOR's diversity and how it can be deployed with different types of LMSs (flexible ones which is the case of Moodle and non-flexible ones which is the case of TryHackMe).

In fact, not using TryHackMe at all, would force us to lose two major outputs of our project:

1. The first output has to do with the adaptability. As mentioned above, TryHackMe is a non-flexible LMS (by non-flexible here we refer to LMSs, which have limited flexibility as

far as data availability is concerned). Thus, TryHackMe gives us the opportunity to showcase how augMENTOR can have customized instances that offer valuable input to users even in the case of non-flexible LMSs.

2. The second output has to do with personalized learning. TryHackMe had a non-linear learning approach based on which a learner could freely select which learning rooms to visit and develop their own learning path as they proceed with their learning. This approach gave us the opportunity to investigate how augMENTOR can offer support in making personalized learning paths. It enabled us to develop a dedicated feature for the augMENTOR solution so that it offers targeted recommendations to users about what learning rooms to select based on their needs. Thus, through this feature, we could demonstrate that the augMENTOR solution can support personalized learning to a high degree and guide users to design fully customizable learning paths. Even though the last unpredicted change in the TryHackMe approach is now making it difficult for us to demonstrate and evaluate the impact of this feature, we believe it is still valuable, as it can be used in the future with other similar platforms that use such a learning approach. Thanks to the pre-pilot phase even with the restriction now enforced in TryHackMe we can still demonstrate augMENTOR's feature about personalized learning paths, by making use of the data collected in the pre-pilot phase.

So, based on the reasons I listed above, we decided that KTU learners will follow the basic steps of their original course in Moodle, but they will still be asked to enroll in TryHackMe, interact with any of the learning rooms indicated by the system and use augMENTOR in conjunction with TryHackMe. It should be noted that augMENTOR is receiving input data from all the rooms in TryHackMe so it can still be used by the learners regardless of the rooms with which they interact.

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Annex 2 - Actions following reviewers' comments and recommendations related to D1.2

WP1 - Project Management

Reviewers comment	Response
(From D1.1) The names of the people responsible for the management roles need to be added to make that part of the document useful (see Fig.2).	The names of the people responsible for the management roles were already mentioned in Annex 1 of D1.1. This Annex was updated to reflect replacements to beneficiaries' representatives and people in other roles that happened during the second year, namely: **Beneficiary Representatives** IASIS - Chara Spyropoulou SCICO - Maria Vlastara KT - Epameinondas Koutavelis ACP - Nathan Coyle **Other roles changes** Exploitation coordinator - Maria Vlastara (SCICO) WP7 Leader - Maria Vlastara (SCICO) Ethics Manager - Georgia Livieri (UNI) Pilot #4 Leader - Chara Spyropoulou (IASIS)
Dates (e.g. of progress report etc.) should also be added beyond M24 (for the partnership to avoid confusion).	Dates for all deliverables were already available in Annex 3 of D1.1. This information is also available to all partners through the project's monitoring tool.
The new risks identified in the reporting period need to be listed in the new version of the periodic report (D1.2).	The process of monitoring risks included in D1.1 is still followed by project partners as is. The project team uses the Risk Register as its main tool to record and monitor risks. It is

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Risk monitoring – clarification on the process, and the Risk registry tool, and its use, frequency thereof, and availability to partners; additionally, the risk mentioned in 'Critical Risks' above needs added to the risk registry, as well as reported on in D1.2.	accessible by all partners and it is reviewed during consortium meetings as well as during dedicated WP meetings, WP leaders' meetings and general assembly meetings if needed. During the second year 13 additional risks (R30 - R43) were added to the risk register including risks from EC reviewers report, D1.3, D1.6, D2.1 and D7.1). Additionally as mentioned in D1.4 "In case risks are identified within the Data Management operations of the project, then NVCR is responsible to report and register the risk either as a new risk identified to the risk registry repository (managed under "T1.3 Risk Management and Quality Assurance" or as an Open Point that is to be reported in the "List of Open Points" registry file." The risk register is available here[13].
The risks are identified, without clarity in who is monitoring them, what is the process/frequency etc. and how are these connected with the other sets of risks identified by the project. This has been established to be via the Risk Registry, a useful tool which needs to be reported on in D1.2.	
Different work packages have identified separate risks. E.g. deliverable D1.3, D1.6, D2.1, D7.1 identify risks. It is crucial that all of these are added to the risk registry, and monitored centrally, as well as within the relevant work packages. This is done, as per discussion during the meeting, via the risk registry; an open process is to be introduced, with direct reporting to the Commission. This is an important tool and should be indeed implemented. The overall processing of risks, mitigation strategies, monitoring, updating, at the project level and work package level, and the frequency, needs to be reported in D1.2 Progress Report (M24).	

[13] https://drive.google.com/drive/folders/1DCpAf5xMy_EnduED_qyz_YZ-sVfEUUGY?usp=sharing

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WP2 - Requirements Elicitation and Conceptual Framework Specification

Reviewers comment	Response
(From D2.1) Finally, for WP2, all functionality is available only in M33 (Fig 25) – which is too late to evaluate any impact and revise any issues. This high risk needs to be added in the risk registry, and an appropriate mitigation strategy needs defined. This risk needs also to be presented, with its mitigation strategy, in D1.2.	The risk is added in the risk register (R41). This matter was also addressed by elaborating the evaluation plan in D2.2 (activity 17 of alignment strategy, p. 65) which foresaw the issue and proposed an iterative design and evaluation to address this. Mitigation strategy: To address potential user and technical needs that we were not able to capture at the early stages of the project but may have raised during the pre-pilot testing, a refined version of the operational architecture and a follow-up evaluation will be delivered under Activity 17 and reported in D5.1 "Data Mapping, Fusion and Orchestration Toolbox" and D5.2 "The AI-boosted augMENTOR platform".
(From D2.1) The alignment 'strategy' is more an alignment methodology. What are the high level goals behind this? What are the strategic, long term benefits? The risk identified in 'Critical risks' needs to explain how this is dealt with, in D1.2.	The alignment strategy was set in place to achieve Milestone 3 (Alignment of the Pedagogical and Technical dimensions of the AUGMENTOR solution) and not to mitigate a risk that was identified (no related risks were identified). It was designed to ensure that the technical and the pedagogical partners collaborate harmoniously. It included a set of cross-WP actions and steps to be taken from the beginning of the project until the operational prototype is delivered. The high-level goal was to enable the team to fully prepare for the pilot phase, and to collect preliminary data to train the machine learning models to ensure that the augMENTOR solution provides meaningful input since the operational prototype stage.

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Overall, from the deliverable (D2.2), it is unclear to what extent the operational and interoperability specifications and reference architecture in this deliverable is a) usable as-is by the implementation partners; b) delivers what the pilots expect; c) delivers what the user studies have extracted; d) delivers what the literature review has identified as gaps; e) delivers what was promised in the proposal (pedagogical approach+21st century skills – 4C, critical thinking, knowledge graphs + learners)? This was addressed to some extent at the meeting. However, D1.2 Progress report should specifically answer these questions.	UDE and NVCR are working together to address this point. UDE and NVCR jointly went through the user requirements, the reference architecture and the specifications to establish the meeting points and the points of mismatch. This point will be addressed D5.2. Additionally, UDE will add a step in the follow-up evaluation of the RA (as planned in D2.2) to ensure the appropriate matching between user requirements and system's specifications. This will also be presented in D5.2.

WP4 - Critical Thinking and Creativity

Reviewers comment	Response
(From D7.4) This deliverable mentions the augMENTOR's revolutionary pedagogical framework, Collaborative learning, as well as "In augMENTOR, we choose to focus on the 4Cs. The concept of the "Four Cs" - Collaboration, Communication, Critical Thinking, and Creativity", which conform to the DoA, but all seem to be less represented in the pilots and the work so far in WP2. This is a real risk to the project, which needs added to the risk registry and reported on in D1.2 Progress report, as mentioned in 'Critical risks' above.	This comment is addressed in D6.1 section 2.1. Elements related to monitoring the degree to which the concept of the 4Cs are adopted by the pilots are also included in the Pedagogical framework evaluation. This Risk is added in the Risk register (R43).

There is a strong risk that the pedagogical 4C approach, personalisation/adaptation are not integrated well in the technological solution. This risk needs acknowledged, and mitigation strategies need put in place for it, as well as it needs added to the risk registry.	This risk has been added to the risk register (R34). WP4's component descriptions has enabled pilots to develop data collection methods that generate scores for each of the 4Cs components, allowing for their integration into the LMS and consequently the augMENTOR solution.

WP6 - Use Case Deployment, Operation, Validation and Assessment

Reviewers comment	Response
D7.7 deliverable correctly repeats from the DoA that "Creative Pedagogy focuses on educational practices that enhance creative development through three interrelated elements, namely (i) creative teaching, (ii) teaching for creativity, and (iii) creative learning." – however: where are these embedded in the current project, pilots, implementation plan? Same question for "(i) improved sense making" and "(ii) improved evidence-based thinking". These shortfalls were discussed at the meeting, and they result in the additional risk, as mentioned in 'Critical risks', needing reporting in D1.2.	The elements mentioned in this comment have been embedded in the implementation plan. Section 2.1 in D6.1 presents how these were included in the pilots courses design. In addition, dedicated workshops (mentioned in T4.2 and T4.4 report above) and pilot courses reviews have taken place to ensure these elements are embedded in pilot courses. Dedicated resources[14] to support pilots on this task were also designed in WP4. Finally, elements related to monitoring the degree to which the concept of the 4Cs are adopted by the pilots are also included in the Pedagogical framework evaluation. This Risk is added in the Risk register (R42).

[14] https://augmentor-project.eu/wp-content/uploads/2024/12/Tips-for-Assessing-the-4Cs.pdf

WP7 - Communication, Dissemination and Exploitation

Reviewers comment	Response
All materials presented at conferences, workshops, webinars, etc., should be incorporated into deliverables or periodic reports with links to these resources. Additionally, all research outputs, e.g. presentations, papers, posters, etc. need to be archived in repositories like Zenodo, accompanied by provided PIDs for open access. This information should go into the revised D7.1 and updated information in the following D1.2	All public project materials (including research outputs uploaded in Zenodo) are added in the project's website under a dedicated section named Resources[15]. A set of categories is also added to facilitate visitors in finding what they are searching for.
D7.1 secretion 3.3. – discussed connection to networks, sister projects – as which they are, concretely, was missing; some ideas were presented, and during the meeting 4 projects were mentioned, as well as a podcast series. This information should go into the revised report.	augMENTOR's sister projects are: a) i-MASTER, b) e-DIPLOMA, c) Exten.D.T.2 and d) Empower. This information along with accompanying details are presented in D7.1 section 3.3.3, page 39. The podcast series is reported under task T7.1 in the present report.
However, the difference between dissemination and exploitation needs to be clarified in the D1.2 progress report (M24) and D7.8 (M36).	In augMENTOR, dissemination actions are ongoing since the very early steps of the project and are related to all project activities. Dissemination focuses on sharing project results, knowledge, and outcomes with a wide audience to raise awareness and ensure visibility, often targeting stakeholders, the public, and

[15] https://augmentor-project.eu/resources/

	relevant communities. Our dissemination plan is presented in D7.1. Dissemination activities are ongoing under T7.1. Exploitation, on the other hand, involves using and applying the project's results to create value, such as integrating them into products, services, policies, or further research, ensuring long-term impact and sustainability beyond the project's duration. augMENTOR's exploitation plan is presented in D7.7 and focuses on all the aspects of the commercialization of the augMENTOR exploitable assets and addresses the challenges emerging from the synergetic role of open science and commercialization, also taking into account the legal, business and research aspects of the proposed solution. Exploitation activities are ongoing under T7.5 and will be further reported in D7.8 - Exploitation and Bridge-to-Market Activities Final Report.
The augMENTOR tool suite is to be taken by a yet unknown entity for commercialisation. Discussing this at the meeting, it was stated that there will be a business modelling workshop (M18-M24, at a project meeting). The outcomes of this, in terms of commercialisation plans, should be reported in D1.2. Progress report.	This comment is addressed in the section reporting T7.5 activities in the present report.