



AI4ED

**TOWARDS AN AI DRIVEN EDUCATIONAL PROCESS
INTEGRATING MODERN CAREERS IN THE EDUCATIONAL
SYSTEM**

Deliverable

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Glossary

AI	Artificial Intelligence
CTML	Cognitive Theory of Multimedia Learning
IAA	Interactive Audiovisual Activity
SDT	Self-Determination Theory

EXECUTIVE SUMMARY / ABSTRACT

Abstract	A toolkit is presented which includes the key aspects for the use and transfer of the programmes developed in this project.
Keywords	AI, active learning, tutoring, dropout

I First tool: What do we mean by IA in education? Positioning ourselves to design

I.1 AI in Education.

- Academic research into the application of AI in education has been ongoing for more than 30 years. It combines linguistics, psychology, sociology, and anthropology to support the development of educational applications of AI and other AI tools that are flexible, inclusive, personalised, engaging and effective to support formal education and lifelong learning.
- Current concerns regarding the usefulness and uses of AI in education relate to its cultural transfer, adaptation to different linguistic and social contexts, and the needs of educational inclusiveness.
- Educational research in this field seeks to promote the development of key, transversal and future-oriented competences, to develop a learning culture and dynamics, learning to learn skills and a sense of initiative, to promote learning possibilities and scientific, technical and social competences that respond to the new challenges of society in the short, medium and long term.

I.2 Possibilities of use (good practices).

- Active Learning: Problem-based and project-based learning at its core. Focused on collaborative learning.
- Personalised Tutoring: Personalised academic tutoring and teaching follow-up for each and every student, adapted to individual learning needs, different rates of learning and particular characteristics.
- Dropout Prevention: Early detection of indicators leading to dropout in order to be able to preventively target them. Adaptation of tutoring to these more sensitive cases that require more specialised or intensive intervention.

I.3 Future lines

- Immersive learning
- Predictive Analysis
- Adaptive learning
- Improved accessibility
- Automated administration

Partner's contributions (here it could be included information about KPI and Training programme)

Partner	Contribution

2 Second tool: What is our ethical framework? Raising awareness to protect

2.1 The legal framework that limits the use of AI

- The rapid development of AI has presented both significant opportunities and complex challenges, demanding a comprehensive regulatory and ethical response from stakeholders worldwide.
- There is a first legislative reference framework developed by institutions such as the European Commission and UNESCO.
- Governments, International organizations, Industry companies... are also contributing with their initiatives.

2.2 Ethics of AI application in Education

- The scientific community has raised concerns about the ethical aspects of IA in education for a responsible use in teaching and learning.
- Ethical guidelines on the use of AI in teaching and learning stress the importance of human rights, fairness, and transparency.
- It is necessary to include ethics, career planning, and technical learning in education for middle school students, in preparation for a future where AI holds significant sway

2.3 Transparency in the application of AI in Education

- Transparency and accountability need to be ensured when deploying AI technologies in educational settings.
- The DigComp framework offers a comprehensive overview of digital competencies to offer transparency in the application of AI in Education.
- Transparency should involve making all those involved in the educational process aware of how AI works, helping to make informed decisions about AI implementation.

2.4 Data protection in evaluation processes

- Ethical guidelines on the use of AI and data in evaluation processes stress the importance of human rights, fairness, and transparency.
- Data privacy and security measures should be robustly implemented: No personal data should be exposed.

Partner's contributions (related to ethics and use cases, transparency, use and storage of data):

Partner	Contribution

3 Third tool: What is the theoretical framework of our design

The theoretical framework for the development of the AI-based educational tools has been built on 4 current theories of psychology and pedagogy. In turn, these 4 theories are based on 3 classical macro-theories of our field of knowledge.

3.1 Macro-theories framework

1. Behaviourism is particularly nourished by effective evaluation based on pedagogical feedback, as can be seen today in any computer application with loyalty strategies, or to prevent abandonment, or even in AI research based on machine learning by reinforcement.
2. Cognitivism made it possible to focus on the internal processes of learners, their thinking and the mental processing of information. It later allowed the development of theories that developed key phenomena for learning, such as working memory or mental imagery, and allowed the specific approach of computationism and connectionism to be applied to AI.
3. Constructivism brought the view of the learner as the active protagonist of his or her learning, as a behavioural, mental or practical engagement. Directed attention, intention and motivation towards learning become highly relevant. This theory establishes a direct link between how learners learn and how they can and should be taught. The most important aspect of producing learning: understanding the actual starting point of each student/learner in order to create rich and challenging situations accordingly. Today, this can be optimised with dynamic AI systems that tailor teaching to prior knowledge and learning speeds, mistakes made, etc.

3.2 Theoretical models proposed for AI-based educational tools

1. Cognitive Theory of Multimedia Learning (CTML) to support effective learning and pedagogical approach to support effective teaching. CTML is a theoretical framework that explains how students/trainees learn from multimedia presentations that include both words and visuals.
2. Self-Determination Theory (SDT) is a broad theory in human psychology that focuses on motivation, development, and well-being. It centres on the concept of autonomy, which involves the ability to regulate one's own behaviour within a social context of influence.
3. Educational Gamification involves incorporating elements of video game design into non-recreational contexts. This theory aims to change students' behaviour towards learning by using actions that influence their motivation in an engaging way. It is proposed the mechanical-dynamic-aesthetic model to design technological environments or programs.
4. Interactive Audiovisual Activity (IAA) design principles that explain what and how videogames allow learning.

Partner's contributions (user's cases design vs theoretical models):

Partner	Contribution

4 Fourth tool: Designing resources to enable learning with AI

4.1 Indicators and criteria for the construction of the tool

- Individual competences (use of digital media, achieve learning objectives, watching videos...)
- Individual progress (average mark, percentage of the competences acquired in real time compared to the target competences, attendance to the sessions, percentage of completed assignments...)
- Topic relevance (number of students in course meetings, lectures attendance, students's status of enrolment, number of years since last official course...=

Partner's contributions:

Partner	Contribution

5 Fith tool: Designing resources for better tutoring with AI

5.1 Indicators and criteria for the construction of the tool

- Individual competences (Knowledge of the subject, use of digital media, participation, timeline of work...)
- Individual progress (average mark, percentage of the competences acquired, percentage of completed assignments...)
- Topic relevance (feedback and evaluations, popularity of the content, interest in the topic, percentage of the students that pass each subject...)

5.2 Personalised tutoring processes

Partner's contributions (related to the interaction between students and teachers through the programme/course):

Partner		Contribution

6 Sixth tool: Designing resources to prevent dropout with AI

6.1 Indicators and criteria for the construction of the tool

- Diagnostic evaluation (previous courses, number of years since last official course, student’s interests...)
- Individual progress (gap in student competencies from initial to target level)
- Topic relevance (popularity, interest in the topic)
- AT – Enrolment (student’s personal data)

6.2 Preventing dropout

- Definition of signals of danger
- Proof of dropout
- First steps
- Further actions

Partner’s contributions (selection of actions that can be taken in order to prevent drop out):

Partner	Contribution

7 Seventh tool: Process of implementation and evaluation of the tools

7.1 Phases of implementation

- Context analysis: exploration of needs, target groups and resources
- Adapted design of the educational tool
- Pre-evaluation of the tool: feasibility analysis and, if possible, pilot implementation
- Implementation and collection of evidence/data during the course of the implementation process

7.2 Data collection for the evaluation

7.3 Data analysis

Partner's contributions:

Partner	Contribution

8 Technical support and FAQs

Partner's contributions:

Partner	Contribution