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Personalization of Lifelong Learning in School Educational Platform

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Introduction

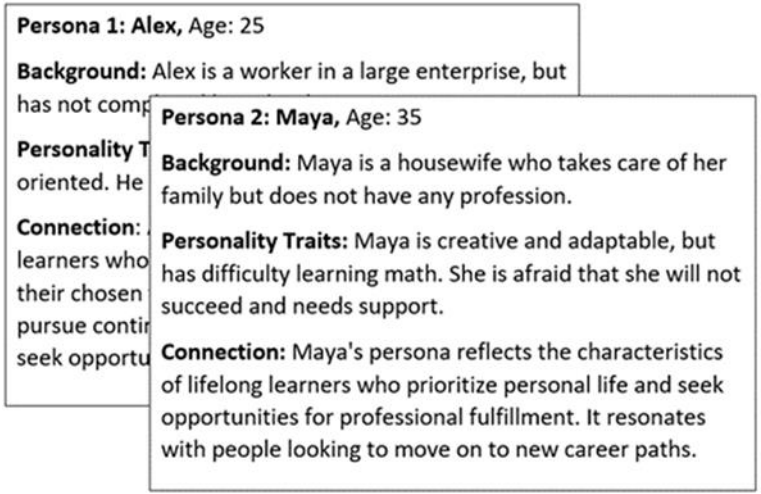
- Need for New Educational Platforms:
  - Digital age requires contextual and personalized educational services.
  - COVID-19 pandemic accelerated the development of online educational platforms.
- Challenges:
  - Integration of didactics, methodology, pedagogy, and psychology in e-learning systems.
  - Need for collaboration with educational experts.

Motivation and Related Works

- Cyber-Physical Systems (CPS):
  - Integration of computational processes with physical environment dynamics.
  - CPSS: Fusion of physical space, cyberspace, and social space.
- BLISS Platform:
  - Adaptation of ViPS architecture for school education.
  - Supports personalized lifelong learning.
- Existing Technologies (Microsoft Teams, Google Classroom, etc.) offer low personalization despite online presence.

Motivation and Related Works

- Modern education evolves through various stages, considering both the development of digital technologies and the level of personalization of learning resources and the educational process:
  - Classical Education
  - Distance Learning via Online Platforms
  - Computer-Based Training
  - E-Learning.
- For personalization we can use the Personas
- In BLISS the assistance of chatGPT can be used, which, as a result of a request made by the teacher's Personal Assistant, returns a proposal with generated Personas



Personalized Learning Process in BLISS

- Steps for Personalized Lifelong Learning:
  1. Topic Presentation: Identify interests.
  2. Portfolio Creation: Collect knowledge and competencies.
  3. Persona Creation: Match profiles to typical characteristics.
  4. Curriculum Development: Generate personalized study programs.
  5. Learning Process: Conducted with personal assistant (PA).
  6. Knowledge Assessment: Conduct tests and update portfolio.
  7. System Evaluation and Improvement: Self-learning intelligent agents enhance personalization.

Personalized Learning Process in BLISS

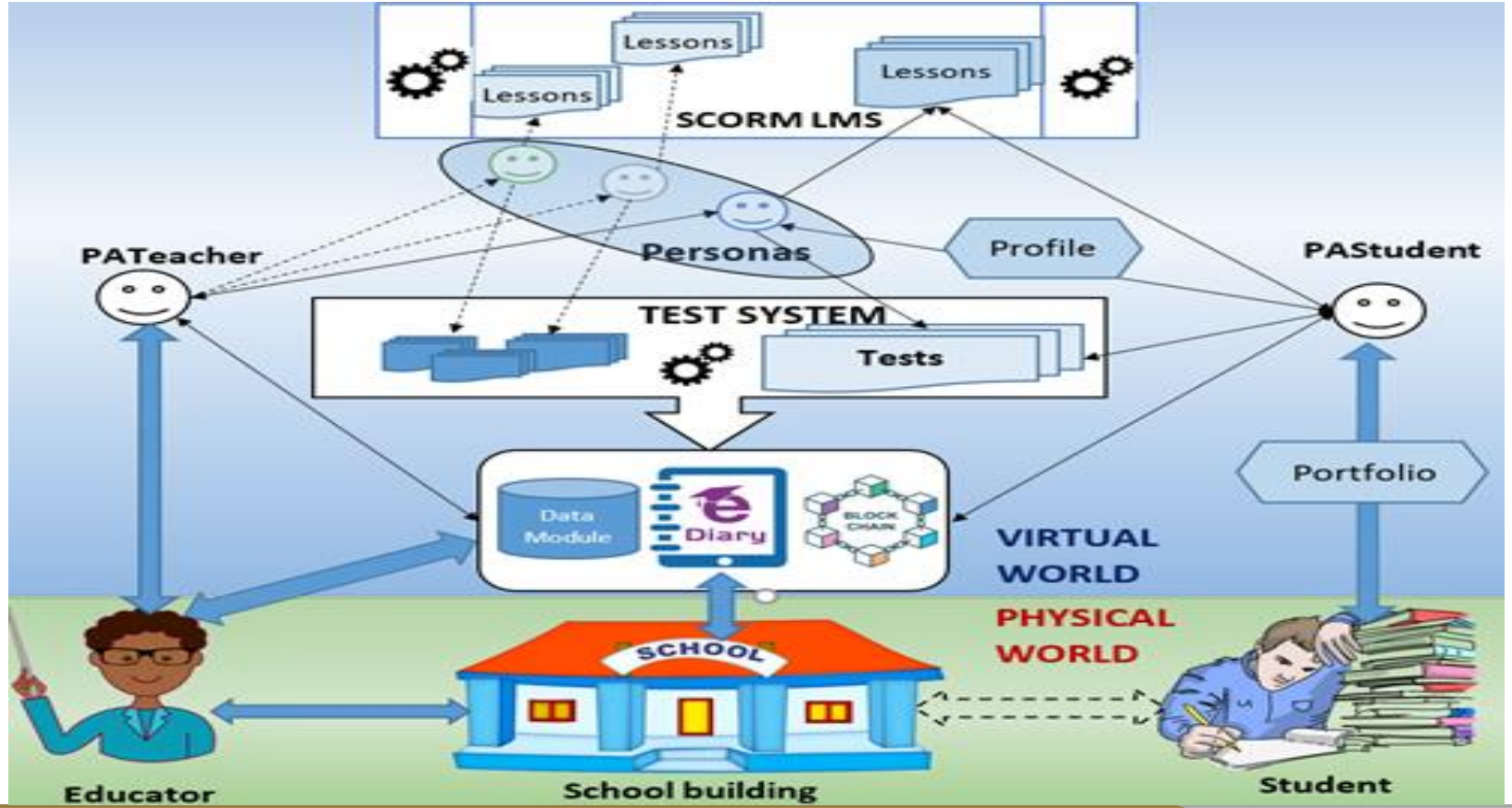
- To develop training resources we use the specification of the SCORM 2004 standard.
- Testing is performed using the QTI 2.0 specification.
- The self-learning of the agents for the implementation of Step 7 can be use Deep reinforcement learning (DRL) algorithm.
- The customization of learning materials, services, learning process, and student assessments is facilitated through personal assistants (PAs).
- A Test system is designed to evaluate knowledge and competencies, with the results being recorded in an Electronic Diary built on block-chain technologies.

Example Scenario

- Scenario Description
  - Adult student with motor/visual difficulties returns to complete a degree.
  - Personal assistant (PAStudent) creates a profile and matches with a Persona.
  - Learning process through SCORM LMS Engine.
  - Knowledge assessment through tests.
  - Final assessment recorded in e-Diary.

- Process Flow:
  - Initial Assessment: Determine knowledge and goals.
  - PAStudent Interaction: Facilitates learning and testing.
  - Teacher's Role: Analyze results, adapt curriculum.
  - Final Assessment: Conduct exams, update e-Diary, issue certificates.

Interaction in BLISS to realize personalized LLL



Technical Implementation

- Cyber-Physical Social Platform:
  - Intelligent components and assistants interact in real-time.
  - Use of IoT and intelligent agents for dynamic adaptation.
  - Use block chain technologies for e-Diary implementation
- Scenario Modeling:
  - Use of Calculus of Context-Aware Ambient (CCA) for pre-development modeling.
  - Visual CCA Editor for scenario visualization and validation.
- Machine Learning Integration:
  - Deep reinforcement learning (DRL) for agent self-learning.
  - Adaptive educational resources and personalized learning pathways.

CCA modelling

$$P_{PAStu} \equiv \begin{pmatrix} Personas ::< Profile_i, FindPersona >. \\ Personas :: (Persona_i).0| \\ LMS ::< Persona_i, NeedLessons >. \\ LMS :: (Persona_i, SetSuitanleLessons).0| \\ TestSys ::< Persona_i, NeedTests >. \\ TestSys :: (Persona_i, SetASuitableTests).0| \\ eDiary :: (Persona_i, TrainingResults).0 \end{pmatrix}$$

$$P_{Personas} \equiv \begin{pmatrix} PAStu :: (Profile_i, FindPersona). \\ PAStu ::< Persona_i > .0 \end{pmatrix}$$

$$P_{LMS} \equiv \begin{pmatrix} PAStu :: (Persona_i, NeedLessons). \\ PAStu ::< Persona_i, SetSuitableLessons > .0 \end{pmatrix}$$

$$P_{TestSys} \equiv \begin{pmatrix} PAStu :: (Persona\_i, NeedTests). \\ PAStu ::< Persona_i, SetSuitableTests > .0| \\ PATeach ::< Persona_i, TestResults > .0| \end{pmatrix}$$

Results and Discussion

- Implementation:
  - BLISS platform deployed in the experimental school in Brezovo since 2017.
  - Continuous adaptation and improvement with new technologies.
- Benefits:
  - High level of personalization and adaptability.
  - Enhanced learning experience through intelligent personal assistants.
- Challenges:
  - Synchronization and integration of components.
  - Development of self-learning models for intelligent agents.

Conclusion

- **Summary:**
  - BLISS provides a robust platform for personalized lifelong learning.
  - Effective integration of cyber-physical and social elements.
  - Continuous improvement through self-learning intelligent agents.
- **Future Work:**
  - Further development of machine learning models.
  - Enhanced synchronization of platform components.

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Thank you for your attention!

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