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Erasmus + Teacher Training Course Title:

Learning through Engagement for Greater Outcomes in STEM Education

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For and on behalf of:

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Course Overview: This proposed course is intended for an audience of Elementary and Middle School Educators. The overall aims of the course are to:

- Introduce participants to the concept, design and delivery of a STEM focused curriculum, the principles behind it and its practical application within the classroom.
- Provide basic training with the use of various media to facilitate the learning experience for end learner considering the above with particular reference to STEM education.
- Provide participants with the opportunity to further familiarise themselves with project and outcomes-based learning practices.
- Facilitate the implementation of a learning outcomes approach within project-based approach through the stages of planning, delivery, assessment and feedback.

- Increase awareness amongst the participants of the Digital Competence Framework for Citizens (DigComp 2.0), its function, significance and relevance in the local context.
- Align the above with the local curriculum of the participants.

The course will take place over 20 lessons (1 lesson = 45 minutes) focusing on various areas of the teaching profession including classroom management, alternate approaches, digital literacy and the Learning Outcomes Framework within the context of STEM Education.

The sessions will be carried out in a workshop format through a heavily participant centered approach. This will provide the participants with the hands-on experience to fully understand the benefits of implementing the content and making use of media available.

Materials provided: Each participant will receive a pack including all relevant materials to be used through the 10 sessions including:

- Course schedule and description of desired outcomes
- Worksheets
- Notes
- Lesson plan samples
- Assessment sheets
- Guides and instructions related to the various Lego Education products
- Learning outcomes checklist
- Digital Competences checklist
- Reflection documents

Materials Required:

Every participant is requested to bring along with them:

- Laptop pc or tablet
- Writing materials

Agenda:

Day 1 – Session 1

The building blocks of learning – The power of imagination, open-ended learning and an introduction to the 4 C's of the 21st Century – Collaboration, Communication, Critical Thinking and Creativity

Day 1 – Session 2

STEM – Educate to innovate – Introduction to problem solving and the other 4 C's – Connect, Construct, Contemplate, Continue.

Day 2

STEM – Educate to innovate – STEM for Elementary Learners – Discovering the basics of physics through engineering and technology

Day 3

STEM – Educate to innovate – STEM for Middle School Learners – Biology through robotics

Day 4

STEM – Educate to innovate – STEM for Middle school Learners (cont.) – Mathematics and Coding

Day 5

Consolidation, Presentations and assessment

Abstract:

STEM is a curriculum based on the idea of educating students in four specific disciplines — science, technology, engineering and mathematics — in an interdisciplinary and applied approach. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications. STEM develops a set of thinking, reasoning, teamwork, investigative, and creative skills that students can use in all areas of their lives. STEM isn't a standalone class—it's a way to intentionally incorporate different subjects across an existing curriculum.

The sessions aim at providing educators with hands-on experience demonstrating the above concept through various media. During the workshop, participants will be introduced to the materials, the related curriculum items, how to design, engineer and code with LEGO Education kits using the software included whilst incorporating the four disciplines of STEM into one well-rounded and engaging learning experience.

We will also focus on setting-up and assigning projects. Participants will engage in Hands-on instruction and training in a practical lesson, which they can later organise and run in their own classroom. Focus will be placed on learning how to fully engage their pupils in computing and science. The sessions will end with a stage on reflection the sharing of ideas related to the content and classroom management issues that they may wish to discuss.

Training Objectives: This course aims at:

- Introducing the participants to the concept of STEM
- Developing interest in implementing STEM learning activities
- Developing expanded value for and commitment to implementing STEM learning activities and pathways
- Familiarise participants with the appropriate, effective and efficient use of Lego Education materials

Learning Outcomes: By the end of the session the participants will be able to:

- Describe STEM Education
- Create a STEM lesson plan
- Select appropriate material for a STEM Lesson

- Use Lego Education WeDo 2.0 kits and software in an effective and efficient way to focus on getting their learners:
 - To develop interest in pursuing STEM learning activities.
 - To develop capacities to productively engage in STEM learning activities.
 - To develop expanded value for and commitment to pursuing STEM learning activities and pathways
 - Empowered to become innovators and technologically proficient problem solvers
 - To increase their 21st century skills and STEM literacy
 - To enrich their understanding of STEM education and its importance in building capacity to prepare them for work and life in the 21st century

Targeted Digital Competences (DigComp 2.0)

By the end of the session the participants will be able to:

- To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.
- To be aware of the environmental impact of digital technologies and their use.
- To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).
- To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them.
- To use digital tools and technologies to create knowledge and to innovate processes
- Organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.
- Share data, information and digital content with others through appropriate digital technologies.
- Use digital tools and technologies for collaborative processes, and for co-construction and co-creation of resources and knowledge.
- Create and edit digital content in different formats, to express oneself through digital means.
- To be able to support others with their digital competence development.

Mode of Delivery: Workshops

Mode of Assessment: Participants will deliver a short presentation or lesson segment at the end of the course. Effectiveness will be monitored through documented and graded observation.

Materials and resources used: PowerPoint Presentation, Lego Education WeDo 2.0 kit and software, tablets

Consolidation, Presentations and Assessment:

During this session, participants will have the opportunity to share their views on what they have learnt and present their own ideas of how they will be implementing their newly acquired knowledge and skills into practice in their own classrooms.

Apart from the collaborative aspect of this session, the main motive of the session is the assessment of the learning outcomes stipulated for this course. Assessment will take 3 forms:

- Self-assessment and reflection
- Peer assessment and feedback
- Trainer-led assessment and feedback

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Apart from establishing whether the desired outcomes were achieved, formative assessment will be carried out throughout the course and during the final session in order to identify any further training requirements or needs in light of the stipulated and related learning outcomes (Ref: LOF) and targeted digital competencies (Ref: DigComp 2.0)