

**LINQ
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**Participatory model for
identifying and measuring
teachers' competences for open
and Inquiry-based learning in
STEM: field experience**

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Overview

-  **The policy context for adopting competence-based learning** ▶▶
-  **The competence-based learning in Inquiry-based learning (IBL)** ▶▶
-  **The methodology and design of participatory field experience** ▶▶
-  **Description of the participatory field experiment** ▶▶
-  **Discussion and Future Work** ▶▶

The raising need for IBL and CBE

- Adapt **Teacher Training** - acquire skills for designing, practising and improving the quality of IBL & open learning experiences.
- Adopt **Competency-based education (CBE)** - developing teachers' skills, attitudes and dispositions for IBL & apply measurable assessment

The competence-based learning in European and national context

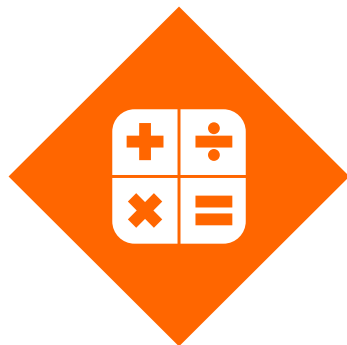
- **European reference framework for key competences** for policymakers, education and training providers, social partners and learners
- Promote competence development through innovative learning approaches, assessment methods and support for educational staff
- National context - Bulgaria develop, deploy and integrate the key competence framework for lifelong learning

The competence-based learning in IBL

Knowledge & understanding



Skills



Disposition, beliefs & attitudes



ELITE Outcomes



- Knowledge on subject matter
- Knowledge on inclusive education
- ICT in education Innovative teaching methods
- Evaluation and assessment methodologies

- Academic and pedagogical skills
- Communication skills
- Team working skills
- Collaborative skills (work with stakeholders)
- Administrative skills
- Research skills

- Commitment to promote learning to all learners
- Positive attitudes to the needed change
- Flexibility
- Ongoing learning & professional improvement, including study and research

Defined within ELITE as the main three key dimensions of (STEM) teachers' competences in the key Bulgarian policy documents

Methodology and design of the participatory field experience

Preparatory phase



(1) Analysis of regulatory framework & policy documents

Define requirements for STEM teacher competences for IBL



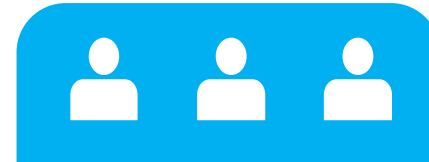
(2) Stakeholders' ranked, evaluated and validated competences

Field Experiment



(3) **Define IBL teachers' competence framework**

(4) **Set criteria for competence measurement & assessment**



(5) **Assign competences to e-learning activities and artefacts**

(6) **Design Moodle competence-based course for teacher raining**

Next stage



(7) **Validate and measure acquired competences via Moodle CBE teacher training course**

Description of the participatory field experiment

01

Workshop with 18 Participants

Experienced STEM teachers, STEM teachers' trainers and researchers

02

Initial Instructions elite

Initial instructions & handouts with a preliminary set of competences

03

Split into 3 Subgroups

The participants split into three subgroups – for defining:

- Subject-related competences
- IBL orchestration competences
- Methodology-related competences

04

Group Work, Interviews, and Observations

- Determine the key dimensions of the IBL competence framework
- Define different criteria for competence assessment & measurement

IBL competence framework

(three groups of competences)

1
group

**Methodological
competences**

1. Proficiency in General pedagogical methodologies
2. Proficiency in IBL
3. Proficiency in methodologies for evaluating IBL
4. Integration of ICT and Online-Based Environments in IBL

sub-competencies

2
group

Orchestration

1. Organizational skills
2. Communication skills
3. Leadership
4. Analytical thinking

sub-competencies

3
group

**Learning content
competences**

1. Extended STEM expertise
2. "Methodology of education for.." in STEM
3. Developmental psychology and inclusive STEM education
4. Conducting research (pedagogical experiment) in the field of STEM
5. Design & development of research materials
6. Self-analysis, self-control and self-assessment
7. Communication in the professional community
8. Professional development and self-criticism

sub-competencies

Competence-based blended learning course

- E-learning platform Moodle
- Create a competence framework
- Create a course
- Relation between the course and the competence framework
- Course structure - materials and activities
- Relations between activities and appropriate competences

Example of an activity and its relation to defined competences

Activity

D1: Define an IBL problem in STEM

Define a problem that:

- Requires the application of knowledge and skills in a particular STEM discipline
- Is interdisciplinary
- Is motivating for the learners

Related competences/ sub-competences

1
group

1.1.1 Extended pedagogical knowledge

1.1.2 Transferable Skills

1.1.4 Positive attitude for development of pedagogical knowledge and skills

2.1.3 Planning, management and coordination of learning activities

2.1.6 Creativity in assignment development

2
group

2.1.7 Interdisciplinary Approach in Learning Subjects and Activities

2.2.3 Collaboration and communication with colleagues and parents

2.3.3 Psychology

3
group

3.1 Extended STEM expertise

3.2 "Methodology of education for.." in STEM

3.4 Developmental psychology and Inclusive education in STEM

3.8 Communication in the Professional Community

Discussion & Future work

- The proposed framework – flexible and allows further adjustments and modifications
- After pilot completion, the authors will be able to further precise:
 - How easy and convenient is it for the trainees to understand, reflect and monitor their own development of specific competencies
 - How reliable are the results and how they relate to the participants' self-assessment or their employers' competency assessment methods and tools
 - Whether such a method will be able to validate the achievements of the teachers, obtained through informal learning – such as participation in professional communities, conferences, self-study, experience and experiments within their own classroom

Conclusion

- **Process** of teachers' competence development – **convergent**, starting from the normative documents and ending up with specific pedagogical experience, documented as artefacts and evidence within the e-learning platform
- The proposed **competence framework** is **adjustable**, **flexible** and **adaptable**
- Through **CBE e-course** – better visibility and clear evidence for **competence mastering**

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To be continued...

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