University of Maribor

FRAMEWORK PROGRAMME OF EARLY STAGE RESEARCHER TRAINING[1]

1. BASIC DATA

Mentor's name and surname	**izr. prof. dr. Andrej FLOGIE**	Mentor's register number at ARIS (SICRIS):	**37112**
Mentor's e-mail:	andrej.flogie@um.si	Mentor's tel. no.:	031 396 577
Research programme (RP) leader's name and surname:	prof. dr. Boris ABERŠEK	RP leader's register number at ARIS (SICRIS):	04433
Title of research programme:	Digital restructuring of deficit occupations for Society 5.0 (Industry 4.0)	RP's Register number at ARIS (SICRIS):	P5-0433
Research organisation (RO) of University of Maribor, where training shall be conducted:	UM FNM	RO Register number at ARIS (SICRIS):	0552-2547
Research field according to ARIS classification:	5.0.1	Research field according to EURAXESS classification	Educational Science

2. DEFINITION OF RESEARCH PROBLEM AND GOALS OF DOCTORAL RESEARCH[2]

Starting point of research task of the early stage researcher and its position in the research programme, where the mentor is included, work hypothesis, research goals and foreseen result with emphasis on an original contribution to science:

Social changes and changes in education are increasingly driven by the development of digital technologies, particularly artificial intelligence, generative artificial intelligence, social media, and social robots, which significantly reshape how we work, communicate, learn, and engage in social interaction. These technologies no longer function merely as supportive tools but are becoming active agents in social processes, influencing decision-making, knowledge construction, social dynamics, and the perception of reality. In this context, we speak of a transition toward Society 5.0, in which technological development

[1] *Term early stage researcher (ESR) is written in male form and used as neutral for women and men.*

[2] *Research and study programme of training have to harmonise with contents of the research programme, where the mentor is a member.*

is increasingly intertwined with human and social systems. A particular challenge arises from the impact of these technologies on education, which plays a key role in shaping future generations of young people and in fostering their critical relationship with technology. Artificial intelligence, social media, and social robots are transforming traditional relationships among teachers, learners, and knowledge, while simultaneously raising questions about learner autonomy, the responsible use of technology, ethics, the reliability of information, and the development of digital competencies. The core research challenge, therefore, lies not merely in how technology can be used in education, but rather in understanding how these technologies systematically influence educational processes and society at large, and what kinds of adaptations educational systems require to maintain their social role. In the first phase of the training, the candidate will focus on investigating the fundamental technological and theoretical foundations of contemporary digital society, with particular emphasis on the impact of artificial intelligence, generative artificial intelligence, social media, and social robots on society and education. The candidate will analyse the technological characteristics of these systems, their capabilities and limitations, and the mechanisms by which they influence cognitive, social, and educational processes. Special attention will be devoted to examining how these technologies transform learning environments, pedagogical approaches, and the role of educational institutions. Within this framework, the candidate will investigate contemporary pedagogical models and concepts, particularly in STEAM education, models of technology integration in teaching (e.g., SAMR, TPACK), and frameworks such as DigComp 3.0 and the Framework for 21st Century Competences. The research will explore the extent to which these models are sufficient for understanding and addressing the impacts of modern technologies, and where the need emerges for their further development or for the creation of new conceptual frameworks. An important part of the first phase will also focus on analysing the broader societal effects of digital technologies, including changes in learning and thinking, the influence of social media on attention, motivation, and knowledge construction, and the role of social robots and intelligent systems in educational settings. The substantive focus will be on the STEAM domain. In addition, the candidate will examine the ethical, psychological, and social aspects of the use of these technologies, as well as their potential impact on well-being, stress, and participants' perceived self-efficacy in the educational process.

In the second phase of the training, the research will focus on mechanisms by which the educational system can respond to rapidly developing technologies and their societal effects. The candidate will explore various systemic approaches to the meaningful integration of artificial intelligence, social media, and other contemporary technologies into education, conceptualising education as one of the key societal regulators of technological change. Among these mechanisms, permanent professional development of teachers will be examined in more detail as one illustrative example, representing an important—but not the only—lever for adapting the educational system. The research will investigate how innovative professional development models can contribute to the development of critical technological understanding, responsible use of artificial intelligence, and the strengthening of digital and civic competencies. Furthermore, the candidate will analyse additional mechanisms, such as curricular changes, the development of new learning environments, the integration of interdisciplinary content,

and the formulation of guidelines for the ethical and pedagogically sound use of artificial intelligence in schools.

The empirical part of the research will provide insights into how these mechanisms are reflected in practice and what impact they have on teachers and learners. Particular attention will be given to examining whether the thoughtful integration of contemporary technologies can foster the development of critical thinking, higher-order cognitive processes, and digital competences in STEAM fields, while simultaneously mitigating the negative effects of technology, such as cognitive overload, stress, or superficial learning. The original contribution of the research will lie in a comprehensive analysis of the impact of contemporary digital technologies on education and society, as well as in the development of scientifically grounded mechanisms through which educational systems can respond to these changes. The research will contribute new insights into the role of artificial intelligence, social media, and social robots in education, and into how education, as a societal system, can actively shape responsible, critical, and sustainable use of technology within the context of Society 5.0.

3. STUDY PROGRAMME

Foreseen study programme, to which early stage researcher shall be enrolled in academic year 2026/2027:

Technical Education

4. DESCRIPTION OF WORK AND TASKS

The planned scope of work and tasks to be carried out by the candidate in order to achieve the stated research objectives follows directly from the definition of the doctoral research and includes the following:
- a systematic review and analysis of existing models of education and continuous professional development of teachers in the European and broader international context, with an emphasis on digitally supported models and contemporary learning environments;
- an in-depth analysis of technological developments associated with Industry 4.0 and Industry 5.0 that are relevant to education, including artificial intelligence, generative artificial intelligence, social media, social robots, and intelligent learning systems, as well as an analysis of emerging trends (e.g., the Gartner Hype Cycle);
- a detailed investigation of the technological concepts underlying modern AI systems, particularly large language models (LLMs), including their architectures, training approaches, limitations, biases, risks, and their impact on knowledge construction;
- an analysis of the operational mechanisms of social media, including recommendation algorithms, the dynamics of information and misinformation diffusion, and their effects on learning, attention, and motivation;
- An exploration of the concepts of social robots and intelligent agents, from the perspective of basic robotics, human–computer interaction, and their potential role in educational settings;
- an analysis of the impact of contemporary digital technologies on education and other societal subsystems, with a comparative perspective on successful models of digital transformation;

- a critical evaluation of pedagogical and technological models for integrating technology into teaching (e.g., STEAM, SAMR, TPACK, DigComp 3.0, and frameworks of 21st-century competences) with regard to their suitability in the context of modern technologies;
- the design, development, and empirical testing of an innovative model for educational system responses to technological change, in which continuous professional development of teachers will be considered as one of the possible mechanisms;
- the development and validation of research instruments and methodology (quantitative and qualitative approaches) for examining the impact of technologies on teachers, learners, and educational processes;
- an analysis of the effects of implemented mechanisms on the development of critical thinking, higher-order cognitive processes, and digital competences, particularly within STEAM domains;
- The preparation, presentation, and publication of scientific research results at international scientific conferences and in reputable scientific journals, as well as active participation in the dissemination of results within the professional community and the wider public.

5. REQUESTED LEVEL OF EDUCATION

VII/2

6. REQUESTED FIELD OF EDUCATION

natural science-mathematical, technical, medical, biotechnical, social science

7. KLASIUS SRV

Seventh level: Second-level higher education and similar education/second-level higher education and similar education

8. KLASIUS P

4 - SCIENCE, MATHEMATICS AND COMPUTER SCIENCE
1 - EDUCATIONAL SCIENCES AND TEACHER EDUCATION
5 - ENGINEERING, PRODUCTION TECHNOLOGIES AND CONSTRUCTION

9. REQUESTED KNOWLEDGE

Basic knowledge of the use of tools for managing texts and data, knowledge and understanding of fundamental innovative approaches to teaching and learning and the tools that support this (digital wheel...), knowledge of basic theoretical premises that support child-oriented pedagogy, knowledge of how the school system works and teacher training, knowledge of the field of digital competences (DigCompEdu, DigComp 3.0...), knowledge of using tools for statistical data processing (Jamovi, SPSS...)

10. REQUESTED SPECIAL REQUIREMENTS

Kliknite ali tapnite tukaj, če želite vnesti besedilo.

11. REQUESTED LANGUAGES

Slovenian / English

12. REQUESTED WORK EXPERIENCE

Kliknite ali tapnite tukaj, če želite vnesti besedilo.

13. FORESEEN POSTDOCTORAL TRAINING

Kliknite ali tapnite tukaj, če želite vnesti besedilo.

Mentor's signature:

Digitally signed by Andrej Flogie
Date: 2026.02.02 09:58:26 +01'00'

Research programme leader's signature:

Boris Aberšek Digitally signed by Boris Aberšek
Date: 2026.02.02 11:46:06 +01'00'

Name and surname of Dean or authorised person[3]:
prof. dr. Iztok BANIČ, dekan

Signature of dean or authorised person:

IZTOK BANIČ
Izdajatelj: RekonoSign RSA
Datum: 05.02.2026 10:48

Place and date:

Kliknite ali tapnite tukaj, če želite vnesti besedilo.

Kliknite ali tapnite tukaj, če želite vnesti datum.

Stamp:

[3] The training program is signed by the dean of the member where the ESR's employment and training will take place.