

## Application

Programme	Erasmus+
Action Type	KA220-SCH - Cooperation partnerships in school education
Call	2022
Round	Round 1

## Context

Field	School Education			
Project Title	EDUBOT - DEVELOPING KEY COMPETENCIES THROUGH BLENDED-LEARNING METHODOLOGY BASED ON AI-SUPPORTED CHATBOT TECHNOLOGY			
Project Acronym	EDUBOT			
Project Start Date (dd/mm/yyyy)	Project total Duration (Months)	Project End Date (dd/mm/yyyy)	National Agency of the Applicant Organisation	Language used to fill in the form
01/09/2022	24	31/08/2024	HU01 - Tempus Public Foundation	English

For further details about the available Erasmus+ National Agencies, please consult the following page: [List of National Agencies](#).

Project lump sum	400000
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## Applicant organisation

OID	Legal name	Country	Region	City	Website
	Interregió Fórum Egyesület	Hungary	Budapest	Budapest	<a href="http://www.interregioforum.hu">http://www.interregioforum.hu</a>

## Partner organisations

OID	Legal name	Country	Region	City	Website
	Fundatia Regionet Centru de Dezvoltare Regionala	Romania	Centru	Lazarea, jud. Harghita	<a href="http://www.regionet.ro">www.regionet.ro</a>
	JUDETUL HARGHITA	Romania	Centru	MIERCUREA CIUC	<a href="http://www.judetulharghita.ro">www.judetulharghita.ro</a>
	Instytut ADN spółka z ograniczoną odpowiedzialnością sp. k.	Poland	Mazowieckie	WARSZAWA	<a href="http://www.akademiamddp.pl">www.akademiamddp.pl</a>

TANDEM n.o.

Slovakia

Nitriansky kraj

Komárno

[www.tandemno.sk](http://www.tandemno.sk)**JUDETUL HARGHITA (E10177863 - RO)****Partner organisation details**

Legal name	JUDETUL HARGHITA
Country	Romania
Region	Centru
City	MIERCUREA CIUC
Website	<a href="http://www.judetulharghita.ro">www.judetulharghita.ro</a>

**Profile**

Type of Organisation	Local Public body
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## Background and experience

Please briefly present the organisation (e.g. its type, scope of work, areas of activity and if applicable, approximate number of paid/unpaid staff, learners).

### ABOUT THE ORGANIZATION

Harghita County Council is the local public administration of Harghita County with one President - elected directly by the citizens for a mandate of 4 years - and 30 County Councillors, including the two Vice-Presidents of the county council. In brief, the following activities and responsibilities belong to the action sphere of the county council and of its subordinated institutions:

- Responsibilities related to the county level infrastructure and public acquisitions, preservation of cultural patrimony and historical monuments, assistance in urbanism and construction certification;
- Investments and economic development, international, EU funded and structural projects' management;
- Development and implementation of county-level programmes on several fields of interest: culture, youth, religion, schools, civil society, social assistance, health, agriculture, rural development, tourism, mountain rescue and mountain area development, library, arts and registrar;
- County-level events organization and protocol, relation with mass-media, human resources, international relations and coordination of the local public authorities of the county.

Harghita County Council has established a working group for task fulfilment regarding the County Council's national or international projects in the field of tourism, health, child protection, economic and social development, culture, sports, education, digital education, environment and other areas where the County Council has competence. The institution regularly hires 5-10 young learners for a 6 months internship programme, these youngsters can learn from work experience at a public institution. The County Council is in charge of managing the Child Protection Service in the county, currently responsible for the protection of over 1,200 children.

Harghita County Council has established a Digital Education Working Group in 2021, with the participation of the Council's employees, delegates of educational institutions, professional bodies and external consultants. The Digital Education Strategy of Harghita county was developed by the working group in October 2021. The Strategy foresees a strong implication of the County Council in the development of the digital education ecosystem of the county, from the physical infrastructure to the application of adequate digital methodologies, software solutions, development of digital contents and providing regular training to teachers. Among other actions based on the DE Strategy, the County council in June-August 2021 has funded an experimental project offering digital education support to young adults with fewer opportunities to prepare for the baccalaureate exam, thus offering them equal chances to access higher education. The project was successful, so the County Council is now working together with local authorities and educational institutions to enlarge it. To sum it up, offering equal opportunities to children and young people with fewer opportunities and promoting the digitalisation of education are considered priorities to the County Council, so it is eager to take part in innovative projects in the field. Our main strength is the significant project experience and the large network of educational institutions, decision making bodies diverse levels of the educational establishment, as well as our robust management capacity due to the high number of transnational and national projects we have successfully implemented over the years.

The number of paid staff is 207.

What are the activities and experience of the organisation in the areas relevant for this project? What are the skills and/or expertise of key persons involved in this project?

### EXPERIENCES

The youth-related issues and their assistance are priorities in our county. We have implemented several EU projects:

- Youth in Harghita 2020 Conference – Project Identification number RO-51-E4-20R-R1, Youth In Action EU program, 2012 . The aim of the project was to prepare the “Youth in Harghita 2020” Strategy for Harghita County.
- Young graduates and the Social Sector: developing new job opportunities - PROGRESS program, between 2013-2014. The objective of the project is to identify opportunities and new job skills needs for young graduates in the social sector. The lead partner of the project was Fondazione CUOA – University Centre for Business Administration, Vicenza, Veneto region, Italy. Harghita County Council was involved as a partner.
- E-COOL - Entrepreneurial and Intrapreneurial Mindset in Young People through the Dynamisation of Competences, Teaching Methodologies, and Entrepreneurial Ecosystem - in the framework of the Interreg Europe Programme, between 2018 – 2023. This project aimed at identifying and exchange – through a quadruple helix approach - good practices for creating friendlier entrepreneurial ecosystems and actions to boost entrepreneurship in young people's mindsets. Lead partner: Official Chamber of Commerce, Industry, and Shipping of Seville.
- Youth&SPA - Activating and involving the YOUTH in shaping the future of rural SPA towns – an Erasmus+ KA3 project, Support for policy reform. The main aim of Youth&SPA was to launch a transnational and intergenerational dialogue among young people and decision-makers to identify good practices, formulate Youth Strategy, and recommendations to make attractive small spa towns in rural regions for young people. The lead partner was the Municipality of Hévíz, Hungary.
- TalentMagnet - Improved Institutional Capacities and New Multilevel Governance for Talent Attraction and Retention in the Danube Region, in the framework of the Danube Transnational Programme, Priority 4, SO 4.1 Improve institutional capacities to tackle major societal challenges, in the period of 2020-2022.
- In 2021 HCC received a grant as a partner in the 7SMART Steps - „Seven SMART Steps to Adapt Digitally Supported Differentiated Learning Methodology to Increase Problem-Solving and Text Comprehension Competencies” project within

the Erasmus+ KA2. The main aim of the project is to support the use of the innovative “SMART e-Maths” methodology in differentiated learning processes.

- HCC is a partner in an Erasmus+, KA105 project (2021-2022), entitled Sustainable Rural Cyclotourism - Development of rural areas through youth entrepreneurship in Cycle-tourism. This project will allow participants to improve their skills and abilities in the field of sustainable tourism in rural areas.

-EDU2030: Youth in Transition project within the Erasmus+ programme, KA220-YOU - Cooperation partnerships in youth. The project wants to contribute to the localization of the 2030 Agenda with a bottom-up and sociocratic method of participation.

As described in the previous section, we operate a large network of professional educational institutions, youth organizations, schools, universities and NGOs.



Action Type	As Applicant		As Partner or Consortium Member	
	Number of project applications	Number of granted projects	Number of project applications	Number of granted projects
Partnerships for Digital Education Readiness (KA226)	0	0	1	1
Newcomer organisation	No			
Less experienced organisation	Yes			

## Relevance of the project

### Priorities and Topics

Please select the most relevant priority according to the objectives of your project.

HORIZONTAL: Addressing digital transformation through development of digital readiness, resilience and capacity

If relevant, please select up to two additional priorities according to the objectives of your project.

SCHOOL EDUCATION : Tackling learning disadvantage, early school leaving and low proficiency in basic skills

SCHOOL EDUCATION: Promoting interest and excellence in science, technology, engineering, and mathematics (STEM) and the STEAM approach

How does the project address the selected priorities ?

The project aims at developing an innovative blended learning methodology along with the necessary e-learning support system and digital content pools to support differentiated instruction in STEM. Thus, the project will contribute to increasing the capacity and readiness of institutions to manage an effective shift towards digital education. The project's aim is to support the purposeful use of digital technologies in education, assessment and engagement. It will contribute to the development of digital pedagogy and expertise in the use of digital tools for teachers, especially the tools supporting differentiated instruction to be developed in the frame of the project. The project will definitely offer a way to innovative use of digital education content since it will demonstrate how digital content can be developed and used to support adaptive learning processes. The project will also contribute to the development of the digital skills and competencies of teachers and students.

The project promotes the STEM approach to education by the development and promotion of effective and innovative digitally supported pedagogies and assessment methods. Moreover, the methodology to be developed in the project applies an interdisciplinary approach, as the main idea behind is to develop a digital education process that leads to the identification and filling of competence gaps in an inter-disciplinary approach. The project also gives an example of developing partnerships between schools, businesses, research institutions and wider society. The results of the project can also contribute to the development of national STEM strategies.

The project is first of all designed for institutions working with disadvantaged groups. It aims at making success possible for all learners, particularly those with fewer opportunities. The methodology to be developed will constitute an effective tool in monitoring and early intervention for learners with difficulties. The adaptive learning paths we offer to students represent a more learner-centred approach. The project applies a holistic approach to teaching and learning and collaboration among all actors within schools, as it will help identify those competence gaps that have to be filled by inter-disciplinary cooperation (e.g. if someone cannot solve a math problem because she does not understand the text of the task.) The project is also focusing on improving transitions between different stages of education by improving evaluation and personalized learning that can be useful in the preparation of students for exams.

Please select up to three topics addressed by your project

Creating new, innovative or joint curricula or courses

New learning and teaching methods and approaches

Key competences development

## Project description

Please describe the motivation for your project and explain why it should be funded.

As classic methodologies in frontal education are constantly challenged, the need for differentiation is growing. Especially - but not only- in the instruction of STEM subjects it is difficult to keep a class of students on a learning track that is challenging, but not frustrating for all students. While DIFFERENTIATED INSTRUCTION is widely present in European education, much has to be done in the field. One important limitation that stands in the way of wider use is that differentiated instruction requires from teachers not only methodological preparation and enthusiasm but also a significant investment of extra time and energies. A possible solution to that problem could be DIGITALISATION. The introduction of edtech solutions and related methodologies that support differentiated instruction should lead to reducing workload and increasing the effectiveness of instruction. Effective solutions in digitally supported differentiated instruction would be most important to apply in schools and special institutions working with students with fewer opportunities, to prevent failure in the development of basic competencies and to assure equal chances in accessing higher education all require differentiation.

However, most teachers introducing differentiated instruction have little- or no digital support at hand to make their work easier and more effective.

Most free e-learning platforms do not give detailed feedback on the performance of students, and even if they do, they do not support the development of adaptive learning materials, so they are not suitable to support differentiated instruction. To offer such support, we need a free e-learning environment that makes it possible for any teacher TO DEVELOP HER OWN ADAPTIVE LEARNING MATERIAL, using the existing learning elements or creating new ones. Moreover, the teacher must get accurate feedback on her students' learning activities, effectively assisting her to identify their personal development needs and competence gaps, and suggesting clusters of students that need personal tutoring to close gaps- and most probably an inter-disciplinary approach will be needed, as text comprehension is a must. Finally, a clear methodology should be put at her disposition to relate digital- and personal learning activities clearly describing how to create attractive and informative digital content and how to use personal, or small-group tutoring to address personal development needs and to fill competence gaps.

We are proposing to develop such a methodology along with the necessary e-learning support system, based on the existing resources of the Partners and innovative solutions to be developed in the frame of the project.

As all developed project results will be put at the disposition of a large number of stakeholders, funding this project will contribute to the empowerment of the professional community looking for solutions in the field of digitally supported differentiated instruction across the EU.

What are the objectives you would like to achieve and concrete results you would like to produce? How are these objectives linked to the priorities you have selected ?

We would like to empower schools and special educational institutions working with students with fewer opportunities to run more effective development programs reducing the number of students who leave the school system because of failure to meet basic school examination criteria and increase the number of talented students to successfully step into the higher levels of the education.

OVERALL OBJECTIVE of the project is to create an effective blended methodology to support the development of basic competencies to reduce learning disadvantage and low proficiency in basic skills among students with fewer opportunities. The methodology will focus on 6-8th grade students of primary schools and problem-solving competencies in STEM, and related and text comprehension competence. However, the basic logic of the methodology and the support system will be adaptable in other age groups and other learning fields as well.

CONCRETE OBJECTIVES of the project:

- Using chatbot technology to create a more interactive digital learning environment leading to better mapping of the students' competence gaps, providing the teachers with more accurate data about where to intervene;
- Developing an effective blended learning methodology to fill the identified competence gaps with digital tools and personal tutoring of smaller groups of students;
- Developing experimental STEM digital materials to support the blended learning methodology;
- Testing the developed tools in pilot sessions and summarizing the results;
- Creating adaptation toolset to make the developed resources available for schools and special institutions working with students with fewer opportunities, who can then create their own digital materials and use the developed blended learning methodology to reduce learning disadvantage;
- Disseminate project results at a wide scale and attract the attention of decision-makers to the developed methodology.

What makes your proposal innovative?

Teachers applying differentiated instruction in STEM need constant feedback on the levels of development of students and their competence gaps, so that they can effectively address them. Deep learning AI solutions should be able to provide such assistance if we can figure out how to make cooperation between teachers and AI effective.

Gari Kasparov, the first chess world champion defeated by artificial intelligence, has been organizing chess championships for people and AIs ever since his famous defeat suffered from IBM's Deep Blue. In a TED presentation, he summarized his learnings: the most effective chess players are not people, nor AIs, but TEAMS formed of humans and AIs. Experience shows that in the field of adaptive/differentiated learning the solution is similar: what we need is blended learning methodologies combining the data-based knowledge of AIs with human sensitivity and ingenuity. No matter how well



constructed the e-learning material is, it will never succeed without the permanent assistance of human teachers, who can personally intervene to fill competence gaps and to help students over difficult challenges. No matter how well prepared a teacher is, she can never really excel in our times without the support of digital data, collected and organized by AI. Cooperation between human teachers and their AI assistants should lead to a more effective teaching methodology. The creation of a methodology relying on an AI-powered chatbot Assistant supporting the teacher constitutes the core innovation of the present proposal. The EDUBOT Assistant will provide support in creating personalized, adaptive learning paths for each student, mapping competencies and identifying competence gaps, using online helping questions and explanations to fill those gaps, and suggesting small groups of students who need personal tutoring on similar fields and levels.

How is this project complementary to other initiatives already carried out by the participating organisations?

The partners submitting the present proposal have long been working on projects tackling issues like early school leaving and equal chances to access higher-level education, including the development and implementation of innovative digital solutions designed to answer challenges of learning disadvantage, and low proficiency in basic skills: [www.smartemaths.eu](http://www.smartemaths.eu), <https://sevensmartsteps.hu/>, etc..

In the frame of these projects, we have developed methodologies able to support -among other forms of education - differentiated instruction as well. We have gathered vast experience in developing digital content and using that content to support the learning processes of students with fewer opportunities. The e-learning system created in the frame of the projects above is functional, and hosts over one hundred learning groups and several thousand users. The use of the system is free of charge.

Besides its many positive aspects, one obvious weakness of the very simple AI solution applied in the projects above is that it does not SPEAK to students, nor does it UNDERSTAND their answers. The other weak point of the applied e-learning solutions was the low effectiveness of the BLENDED LEARNING methodology, resulting from the weak quality of data processing, rooted again in the fact that the AI behind is not a deep learning algorithm, so it does not “evolve” by feeding on the data it is using.

The existing solutions of the partners create a good starting point for the proposed innovation both technically and methodically. We do not have to construct new e-learning support systems, we just have to combine chatbot technology with the existing solutions and build in the deep learning AI into the existing algorithms. Then, we can create the corresponding digital content and develop the blended learning methodology. We believe this is enough of a challenge in itself.

How is your proposal suitable for creating synergies between different fields of education, training, youth and sport or how does it have a strong potential impact on one or more of those fields?

STEM is an ideal field for the development of the proposed blended learning methodology.

However, later on, this methodology can then be applied in diverse other fields.

Digitally supported differentiated instruction is one of the key winner solutions to be applied in youth training. The partners themselves had the chance to offer preparatory blended learning courses in Romania to young people (NEET group) who have left the school system but wanted to pass the closing exam (baccalaureat, the final examination at the end of the 12th grade). The results showed that those taking part in the course were more than twice as successful at the exam than the average (64,3% passed the exam as opposed to 31,5% overall succession rate in the county).

We believe that a chatbot-supported methodology could lead to even better results in the field of youth programmes too, supporting preparation for various exams.

Another territory where the methodology to be developed can be successfully used in adult education. Getting a job, or even getting promoted within an organization requires training, and the more adaptive the training methodology is, the more successful it will be.

Many companies struggle with the problem that the workforce prepared in VET institutions needs some further training to meet the requirements of the job. The methodology we develop will allow HR departments to work (on their own, or together with VET institutions) on the development of well-targeted training, adapting to the personal needs of the trainees, filling competence- and skill gaps as necessary.

The partners themselves are planning to further move in these directions in the future.

How does the proposal bring added value at European level through results that would not be attained by activities carried out in a single country?

As the demand for digitally supported differentiated instruction methodology in STEM and beyond reaches across national borders, such a methodology should be created in international cooperation to incorporate the experiences of diverse learning environments and to create tools that can be easily adapted across the EU. If developed in a single country, the adaptivity of the project results would be certainly more restricted, as the differences between educational systems and cultural backgrounds could not be taken into consideration in the development process.

The international nature of the partnership will bring into the project diverse experiences of different educational systems. This will result in a holistic approach, leading to the creation of project products that can be widely used in diverse fields of education across Europe.

As the use of AI and chatbot technology in education is very rare in Europe (almost no records of working solutions), the project results will be definitely valuable at the European level. All developed support systems will be multi-language (national languages+ English). All results will be free and available online across Europe for all interested stakeholders to



create their own adaptive learning content and to set up EDUBOT supported learning courses in diverse fields of education. The project's ambition is to set up an easily adaptable best practice model that can also serve as a source of inspiration for school leaders and even higher level professional decision-makers when designing new perspectives to the European education system.

## Needs analysis

What needs do you want to address by implementing your project?

Take the example of an average school, working with classes of 20-30 students (K5-8). Educators are supposed to offer special help to some students to bring them to basic levels required to continue their school carrier, while other students should be assisted to enter higher-level education (above K6 or K8: high-schools and high-reputation VET institutions). Accessing higher education often requires passing exams requiring very different skills and competencies than those required to complete basic education levels. In more fortunate classes many students will take part in special preparation training financed by their families to enter high schools, which will further increase the advantage gap between them and fellow students with fewer opportunities. To close this gap, teachers of students with fewer opportunities should apply differentiated approaches in their classes/special preparation groups, and they need effective methodologies to support them. However, using effective differentiated teaching methods in off-line education of disadvantaged student groups of 15+ members is an almost impossible mission, and the most problematic are often the STEM subjects. Digitalisation should come to the rescue, offering an assistant to take over part of the job.

If differentiated instruction is operational, and even digitally supported (e.g. by smart e-maths solutions of the partners), the next sensitive issue is how to identify competence gaps, how to find out exactly WHY a student struggles with solving a certain task? How to decide if she lacks the math skills, needs an explanation of the logic of problem-solving, or did not even get to start solving the problem as she does not understand functionally the text of the task? An assistant finding out the answers would serve good.

What the assistant should also do is to group the students of the class/after school session in smaller groups struggling with the same challenges, so that these can be addressed by the teacher. Meanwhile, the assistant should keep the rest of the class busy working at their respective levels.

Finally, it would be nice if the Assistant would also keep a record of all student activities, and use it to create a competence map of each student, showing their strengths and weaknesses from certain pre-defined perspectives.

From a student point of view, it is a refreshing experience to learn STEM in a digital learning path adapting to your personal needs, presenting challenging tasks and avoiding boredom, but also protecting you from the frustration of constant failure. If the learning path is adjusted by an Assistant who can even communicate at some level, all the better.

Both teachers and students need such an assistant.

What are the target groups of the project?

The project has multiple target groups.

1. Most important target group is formed of teachers, first of all (but not exclusively) math and science teachers willing to apply differentiated instruction in their work. The project will directly target 20 teachers who will be involved in the pilot study actions, while a larger group of 40 teachers and professional stakeholders will be involved in peer learning activities. The secondary target group, 200 teachers, will be reached by dissemination actions.

2. Second target group of the project are the students, first of all, those with fewer opportunities, who are threatened by early school leaving due to the lack of successes in learning, or who are deprived of equal chances because they have no financial means to take part in out-of-school private programmes to prepare them entering higher-level education. As a direct target group, 300 students, most of them with fewer opportunities, will be involved in piloting the prepared methodology, contents and support system.

3. Third target group is that of the institutions interested in introducing differentiated instruction and an emphasis on STEM, as well as institutions specialized in offering assistance to students with fewer opportunities (e.g. "tanoda" in Hungary, or Child Protection Service in Romania). We will directly involve 10 institutions in the piloting activities of the project, and we will reach 40 more with dissemination actions.

The indirect target group of the project is formed by the larger community of STEM and other teachers interested in digitalisation and differentiated instruction, professionals preparing students for diverse exams or assisting them to achieve the basic results in schools to prevent early school leaving.

Partners will bring the target groups to the project through their existing network, online discussion groups and ASPs.

How did you identify the needs of your partnership and those of your target groups?

The needs of the partnership have been identified in the frame of the QA process of the Seven SMART Steps project - a project that supported the adaptation of SMART e-Maths methodology in 18+ institutions, by 24 teachers. After analysing the adaptation process the partners concluded that the e-learning support system would become a lot more effective if improved by the implication of an AI able to recognize basic texts and classify user behaviour, allowing us to create a blended learning methodology that can be much more focused on the personal learning needs of the students. We have also concluded that the involvement of a somewhat "independent" partner in charge of quality assurance could bring an added value to the project by presenting perspectives the partnership deeply involved in several projects may miss.

The qualitative and quantitative studies conducted among target groups (teachers, institutions and students) involved in previous projects (Seven SMART steps and EFOP 524 - Segítünk a tanulásban) led us to similar conclusions. In the school year of 2020-2021 InterRegio Forum monitored the performance of 240 primary school students (6-8 graders) in remote

communities of South-West and South-East Hungary in the frame of the mentioned ESA supported project. Half of the group was taking part in an adaptive e-learning programme preventing early school leaving, while the control group was not assisted in that way, although all students were taking part at after-school programmes. The monitoring results demonstrated that the actively supported group showed a considerable increase of basic competences (maths and text comprehension), while the control group's competence level stagnated or even decreased (in the case of 8th graders). A deeper analysis revealed that the effectiveness of the e-learning course decreased as the complexity of the aborded subjects increased, despite of the in-built explanation texts, videos and helping questions.

#### How will this project address these needs?

When directly asked, 82% of all teachers (34) involved in the two projects above answered that text recognition software would improve the motivation of students, and 100% considered that an algorithm analyzing student behaviour would help to focus their work in the differentiated instruction.

The project will address these needs by developing a new methodology based on an improved e-learning support environment.

We believe that chatbot technology, combined with the existing e-learning support system has the potential to open a new perspective in digitally supported differentiated instruction.

This will imply the development of more complex digital contents - for example, more explanations and helping questions have to be prepared to address the learning needs of different student groups, leading to more personalized learning paths, and to more accurate information provided to supervising teachers/mentors. As a result, the whole blended learning methodology will be much more focused on the supporting of adaptive learning processes, and this it will finally lead us to a better understanding of student needs and to the creation of a a more efficient differentiated instruction blended learning methodology.

The involvement of a newcomer QA partner should bring new perspectives into the project and it will help creating adaptation tools easier to use in diverse environments even outside the territory of school education (e.g. life long education, business education, etc.).

## Partnership and cooperation arrangements

### Partnership composition

Organisation ID	Legal name	Country	City	Organisation type	Newcomer
	Interregió Fórum Egyesület	Hungary	Budapest	Non-governmental organisation/association	No
	Fundatia Regionet Centru de Dezvoltare Regionala	Romania	Lazarea, jud. Harghita	Foundation	No
	JUDETUL HARGHITA	Romania	MIERCUREA CIUC	Local Public body	No
	Instytut ADN spółka z ograniczoną odpowiedzialnością sp. k.	Poland	WARSZAWA	Small and medium sized enterprise	Yes
	TANDEM n.o.	Slovakia	Komárno	Non-governmental organisation/association	No

## Cooperation arrangements

How did you form your partnership? How does the mix of participating organisations complement each other and what will be the added value of their collaboration in the framework of the project? If applicable, please list and describe the associated partners involved in the project.

Three partners (InterRegio, Harghita CC and RegioNet) have been working together in the Seven SMART Steps project, so they form a stable core for the partnership.

InterRegio is an expert organization in the development and implementation of e-learning support tools and differentiated instruction methodologies relying on digital data.

RegioNet has deep competencies in supporting adaptation processes, supervising the implementation of blended learning methodologies and coordinating pilot learning sessions, collecting data and providing valuable feedback.

Harghita CC is a territorial administrative body with a strong interest in education, focusing especially on the needs of students with fewer opportunities, as the CC is in charge of the children under public protection (more than 1,300) in Harghita County. The HRCC has high competencies in disseminating project results and bringing them to the tables of decision-makers at the regional, national, and even EU levels (the CC President, Mr Csaba Borboly is the rapporteur of the EU's Council of Regions). Harghita CC will be in charge of coordinating dissemination and visibility activities.

Tandem is an NGO with vast experience in tutoring, blended learning projects and digital content development. In the frame of an Interreg project, Tandem and InterRegio worked together in the development of blended learning materials in 2021 (in the frame of the START-UP+ SKHU project) and the successful project opened the door to further cooperation.

Institut ADN is a newcomer organization connected through e-Twinning, with vast experience in diverse fields of education and specifically in quality assurance of innovative educational methodologies and products. ADN is also a resource of networks linking the partnership to the world of lifelong learning and adult education, where the results of the present project can be also used in the future.

We will involve at least 10 schools and special institutions working with students with fewer opportunities. We expect to have more partners from Hungary and Romania and less from Poland, respectively Slovakia, as our previous projects have gained popularity in the first two countries, while our solutions are not known in Poland, but we will have ASPs involved from all countries. We have already received 12 ASP declarations. Some of them have been uploaded as annexes, but ECAs didn't let us upload them all. We have decided not to determine the concrete number of participating ASPs right now, as the pilot education sessions will be organized in the second half of the project, and we want to keep flexibility in involving as many institutions as possible, trying also to achieve an even distribution of ASPs between participating countries.

Most ASP-s are from remote regions, working with students with fewer opportunities. Some have already worked together with the Partners, others are newcomers. Priority will be given to ASP-s working with students with fewer opportunities.

What is the task allocation and how does it reflect the commitment and active contribution of all participating organisations (including the associated partners, if applicable) ?

InterRegio as a leader organization will be responsible for coordinating PM and overseeing the whole implementation process. With several successful Erasmus+ KA2 (and many other) projects InterRegio is fully fit for the task. InterRegio is also responsible for the development of the e-learning support systems (WP3) and for providing key expertise in the development and implementation of differentiated instruction methodologies relying on digital data.

RegioNet will be in charge of coordinating pilot learning activities (in WP2) and will support the content digitalization process (in WP4), testing and lecturing.

Harghita CC will be in charge of coordinating networking, dissemination and visibility activities and assuring the impact of the project and all products (WP 2-4).

Tandem will coordinate the methodology- and content development (WP2) and the analogue content development including the creation of personal tutoring instruction panels (WP4).

ADN will be responsible for quality assurance of project products and processes (WP 1-4).

Pilot sessions will be organized by local partners in each country (by RegioNet in RO).

All partners will be involved in all WPs. The requirements toward the e-learning support system will be defined in cooperation involving all Partners (+ ASP-s, and a larger number of professionals to be reached online in discussion groups and offline at Peer Learning Activities). The digital STEM Content Pools (WP4) will be developed in each country apart, by the local partner (in RO RegioNet).

Local PLAs and dissemination actions will be also organized by local partners. The final closing conference will be organized by Harghita CC in Romania.

Six transnational meetings will be organized for the partner organizations. The first and the last one will be personal meetings organized in Hungary by InterRegio, respectively Romania by Harghita CC. The 4 interim TMs will be virtual meetings, all organized by InterRegio.

The schools and special institutions involved as ASP-s will play a role in defining requirements toward the e-learning system, digital materials and adaptation tools, and most importantly in offering ground to the pilot sessions. Teachers implementing the pilot sessions and providing feedback on the learnings of it will be contracted and paid by the Partners in the frame of the project (20 teachers, to be selected from the staff of the ASPs, obviously with the consent of the ASPs). This solution has been applied in previous projects by the Partners and proved to work smoothly. In the pilot sessions, STEM Content Pools to be prepared in WP4 will be used, but teachers will be encouraged to take an active part in the local- and international discussion groups set up in the frame of the project to support the development processes of the project

results, and to use EDUBOT Tool to develop their own contents.

Describe the mechanism for coordination and communication between the participating organisations (including the associated partners, if applicable)

A detailed project implementation plan (PIP) will be prepared at the beginning of the project. PIP will describe in detail the role of each partner with the exact description of the activities to be performed and the results to be achieved by each, determining quality and quantity requirements, deadlines and budget for each action.

All communication and cooperation between Partners will be organized on the basis of principles of open communication, sharing of all information, trusted and reliable partnership.

An on-line document pool will be set up and made accessible for all partners. Project results - both interim- and final ones - will be also uploaded to a shared platform, accessible by all partners.

A Project Management Board (PMB) and a Project Implementation Board (PIB) will be set up to coordinate strategic level decision making, respectively day-to-day project implementation. Permanent discussion groups (on Skype, WhatsApp or similar platforms) will be set up for PMB and PIB to instantly discuss upcoming issues. Regular online meetings of PIB will be organized on a monthly basis, or even more frequently if necessary. These meetings should be focused and effective. Further permanent discussion groups will be set up to share specific information in specific fields of action: system development (WP3), digital content development (WP4), technical and methodological support to pilot sessions (WP2), methodology development (WP2), networking, dissemination and visibility issues (WP1), etc. with the participation of the professional staff in charge from all involved partners. Each group will be led by a moderator appointed by PMB. Group discussions will be initiated by moderators whenever needed. Whenever needed, intervention from PIB or PMB will be required by group moderators and provided by the responsible Board.

During project implementation, 2 personal and 4 online TMs will be organized. The budget and timing of the of TMs are included/described in WP1.

Between the TMs, online communication and the flow of information will be constant between the Partners.

InterRegio will file monthly status reports on the project implementation process to the partnership and will require information from partners if needed to complete the status report.

ADN will provide QA feedback on the project implementation processes prior to each TM, including suggestions to improve processes. QA suggestions will be discussed and eventually approved at TMs.

Associated Partners will be included in the communication processes at the necessary level, informing them about important issues and involving them in decision-making processes whenever necessary, without actually overwhelming them with superfluous information.

## Project design and implementation

### Work package n°1 'Project Management'

How will the progress, quality and achievement of project activities be monitored? Please give information about the involved staff, as well as the timing and frequency of the monitoring activities.

The PM (provided by InterRegio) will coordinate monitoring supported by Valorization Manager (VM, provided by Harghita CC) and Quality Manager (provided by ADN). QM will be responsible for the establishment and control of the project quality procedures, and is in charge of implementing and monitoring these. QM reports to the PM. The QM will have a track record of experience in quality management in EU projects. All partners will provide experts to act as peer reviewers at least once. We have set 4 levels of quality monitoring and evaluation, they are the following:

- **COORDINATION QUALITY ASSURANCE (QM):** monitoring of the quality processes for coordination as defined in the Quality Assurance Plan. The implementation of the Plan will be supervised by the QM. The QM will collect and analyze partners' inputs and will develop executive quality reports on a yearly basis. Monitoring will be ongoing throughout the project. Items to be evaluated: quality of the consortium and cooperation; project management and leadership; project and its content; perceived support.
- **RESULTS QUALITY ASSURANCE (by involved experts)** – WPs are subject to a peer-review process, so as to guarantee their quality. For each WP at least 2 peer reviewers will be assigned, who will focus on the quality and coherence of the content, and indicate the main corrections using a standard template. QM reviews the output for consistency with the project description and adherence to templates. The quality of the e-learning system and content pools will have additional quality control through the pilot testing and validation. The design of the pilot test will take into account a specific set of performance indicators and establish a threshold level.
- **IMPACT ASSESSMENT** - To ensure that the project generates the expected impacts, a specific impact assessment approach will be implemented. The QM is responsible and defining the approach and tools to be used and related performance indicators and their thresholds. The impact assessment is a combination of qualitative and quantitative analysis and will use the indicators to check against the realisation of objectives. Quantitative data will be recollected from the outreach/awareness activities, surveys and communication/dissemination efforts, qualitative data are obtained from dialogues/interviews. A full-fledged impact evaluation will be realised and will take place by the end of the project.
- **DISSEMINATION QUALITY ASSURANCE:** quality, reach and extent of the dissemination and communication activities. The VM, in cooperation with the QM, evaluates the quality of the dissemination activities and external level (implies direct interaction with target public (e.g. events)). The VM collects all indicators every 6 months. A set of thresholds will be established for each indicator (internal & external). In case of a result under the threshold, the VM/PM will decide, in consensus with the rest of the consortium any corrective action is needed



### How will you ensure proper budget control and time management in your project?

The management structures and processes will maintain strict control of regular achievements of objectives, time management and budget control at 2 levels: Operational, where tasks will be performed, and Strategic, where the main project decisions will be taken.

#### STRATEGIC LEVEL:

There will be a **MANAGEMENT COMMITTEE (MC)** created – it includes 1 representative per partner, chaired by the Project Manager (PM).

Its responsibilities are the following:

- Evaluate the technical progress & decide about the strategy and schedule of the project;
- Evaluate partners' contributions;
- Solve conflicts on issues concerning strategies, objectives, resources & exploitation;
- Monitor exploitation & dissemination actions;
- Analyse the possible risks and signalling delays if any;
- The Management Committee will hold online meetings monthly, and meet face-to-face only if necessary.

#### OPERATIONAL LEVEL:

The main responsibility on the Operational level goes to the LB of the project. The LB will delegate 1 **PROJECT MANAGER (PM)** who coordinates the overall running of the project; it is the nexus point and liaison between steering and operational levels.

The PM's responsibilities are the following:

- Overall administrative and budgetary management & coordination;
- Elaborate progress report;
- Execute & oversee general project policies;
- Trace & correct deviations to the work plan, through the follow-up of identified critical paths;
- Follow up expenses & track deviations, ensuring that all are accurately recorded in the cost baseline & resources match work realized;
- Organise & prepare the MC online meetings.

There will be 3 more stakeholders involved in budget control and time management. They are:

- the **WP LEADERS (WPL)**: Each WP is led by 1 partner, who is responsible for its coordination. In this coordination, the WP Leader is responsible for the monitoring of the technical progress, including giving guidelines regarding specific technical related tasks & timing. WPL is reporting to the PM, and they follow the time schedule, plan for upcoming actions, send reminders for deadlines & report any deviation.
- the **VALORISATION MANAGER**: is responsible for the coordination of the dissemination and communication activities, exploitation efforts and develops and implements an effective communication strategy. VM belongs to the LB. Valorisation will be an agenda item at MC meetings. VM Duties include: Coordinate dissemination & exploitation issues and build the projects sustainability case; Propose and explore new ways to capitalise outputs; & frame the exploitation strategy to Erasmus+.
- the **QUALITY MANAGER**: responsible for quality assurance of management, quality evaluation of WPs and impact evaluation. QM is delegated by ADN.

On an operational level, PM and WPLs are responsible for control concerning the achievement of objectives, budget & resources and time, QM and VM are in charge of quality control and performance concerning the dissemination.

### What are your plans for handling risks for project implementation (e.g. delays, budget, conflicts, etc.)?

An important part of the project implementation including handling risks will be the regular meetings of the partners and constant communication.

A Project Management Board will be set up at the beginning of the project, as well as a Project Implementation Board. PMB will be responsible for strategic decisions, dealing with budgetary issues and handling conflicts between partners. PIB will be responsible for the day-to-day implementation of the project. PMB and PIB will set up further Implementation Groups to deal with specific tasks (implementation of each WP).

Transnational Meetings will be held regularly, altogether 6.

TM1 - Launching project, September 2022

TM2 - Launching development of EDUBOT App and Tool in WP3, January 2023

TM3 - Launching development of digital Content Pools in WP4, June 2023

TM4 - Assessing EDUBOT App and Tool and Content Pools, launching pilot education sessions, December 2023

TM5 - Assessing Pilot sessions and Draft Methodology, launching intensive dissemination, April 2024

TM6 - Project closing, assuring sustainability, August 2024

The project will operate within certain administrative procedures, which will be defined at a very early stage and that will cover management reporting structures, document standards, collaborative specification and development, reviewing, documents configuration, control change and quality assurance.

The project Manager (InterRegio) and The Quality Manager (QM) (provided by ADN) will be responsible for handling risks. QM is responsible for setting success indicators and measuring the evolution of the project according to these, and reporting any significant deviation to the MC, (Risk, Mitigation and Contingency management).

Risk Management Manual is also included as part of the Partnership Agreements outlining the key areas of risk that may adversely impact the project.

All digital data will be handled in accordance with applicable GDPR regulations.

Since it is one of our goals is to overcome the geographical and social obstacles that students, parents, teachers/caretakers are facing and trying to close the skill gap between the European countries with digitalization and with the help of ICT tools in STEM, we find it crucial to make all developments of the project available without any limitations. To achieve this, we have a protocol when it comes to accessibility and inclusivity.

1. All of our products should be reachable, with open access and with creative commons licences (BY, SA, NC, ND licences exactly).
2. When the project starts an overall strategy of inclusiveness and integration will be developed by the project partners. This strategy should include the following points:
  - Genders - making sure there is gender equality measures incorporated in every activity, developed product, event and public communication content (it is extremely important since STEM is often connected to boys/men),
  - People/children with disabilities - making sure that the activities, events and products conducted by the project partners take into account different physical and especially mental (learning) disabilities and challenges amongst our end users,
  - People/children of different cultures, nationalities or ethnicities and differences between them will have to be accounted for in every aspect of the project. The project should react on their needs in learning when it comes to the final products. As the majority of ASPs in HU, RO and SK operate in rural communities with a large Roma population, some of them being specifically designed to the needs of Roma children. E.g. Egyházasharaszti School is almost exclusively attended by Roma (Beás) children, and we will create digital materials in their language too. This will be probably the first digital STEM in Beás language. Ötlefta Tanoda, MIOK and Mindszentgodisa Tanoda are also specialized in working with Roma children. A considerable percentage of the children in all other ASPs also belong to Roma- or other minorities.
  - People/children of different ages should also be included and involved in the project, especially in the dissemination phase. We find it critical that products are not only distributed in school environments, but also parents, caretakers, etc. are involved in its distribution, use, and they can also give feedback on it.
  - People/children with disadvantaged backgrounds - Yet, the most important is, that the project itself will work with topics that can counter early school leaving and drop out, and we especially want to involve those children (and their teachers) who are in the need of quality education to thrive. The project will have a high emphasis on this segment, taking into consideration - during the development - those special learning needs that are to be achieved and presented so this group of participants not only can join but achieve significant results.

How does the project incorporate the use of digital tools and learning methods to complement the physical activities and to improve cooperation between partner organisations?

the whole project is about inventing and implementing digital tools and learning methods.

As for digital tools complementing physical activities and cooperation, project implementation and cooperation between partners will heavily depend on the effective use of digital tools for planning, task management, communication as well as technical output production.

The relevant information and data will be shared regularly with all the partners during the whole project duration. In order to ensure efficient project management and collaboration process, the project has foreseen a fast, reliable and user optimized communication/cooperation infrastructure:

- (1) regular online meetings which will be organised once a month to update and coordinate the work of all the partners.
- (2) 2 offline meetings (TMs)
- (3) adequate use of telephone, e-mail, and other electronic communication, most importantly online discussion groups in each important subject
- (4) collaborative online project management tools (most probably Trello, maybe Asana) will be used to coordinate project implementation, to keep track of tasks and responsibilities.

Furthermore, we think that it is essential for the coordinator will involve each person within the project combining general participation with specificity, trying to avoid individualism and scattered achievements, towards professionalism and a strong mutuality. To achieve that, it is very important to ensure real-time communication flow within the consortium using the tools mentioned above. The rationale behind this is to keep all partners informed about the activities' planning and project's progress in real-time. This aids tremendously efficiency, maximum transparency and increases the cooperation synergies. Additionally, a specific communication procedure will be established by the Coordinator that needs to be strictly followed by all partners. This will include:

- Agendas for every meeting (face-to-face and/or Online meetings), outlining the subjects to be discussed.
- Minutes will be taken during the meetings which will then be uploaded to a shared cloud folder for future reference.

The whole communication between the LP and the Partners will be closely monitored by the Quality Manager who will be responsible for the internal evaluation of the project.

Analysing Trello data will help in providing quality assessment and solving any unexpected conflicts. The involvement and support by the partner representatives in the different outcomes will be monitored by the Coordinator and the output leaders. Action will be taken in case of no response from partner representative(s) so that no gaps arise.

As the products are focusing on the development of online tools and e-materials, digital communication and digital tools are essential in this project both on the product and on the management level

How does the project incorporate green practices in different project phases?

The sustainable practices of the project partners will be guided by the sustainability guidelines which will be co-created by the project partners at the beginning of the project.

Travel - as stated already in the project application, the project partners will cooperate day-to-day on a digital basis, using various platforms and tools to work together on the project activities. Meetings of the project partners will mostly take place digitally, except for 2 partner meetings. This also shall cut on the emissions of CO<sub>2</sub> produced by the long-distance project travel activities and thus ensure the green impact of the project. Travel costs in relation to the project budget and thus also the emissions of CO<sub>2</sub> will be cut. When travelling, we will prefer low-carbon emission solutions: trains and public transport as opposed to flights and private cars.

We will pay special attention to optimizing software products so that they require the minimum possible CPU usage and internet traffic, thus minimalizing the CO<sub>2</sub> emission of digital activities. It is less known to the wider public, but just like bitcoin-mining, other digital activities can have a serious environmental impact through indirect CO<sub>2</sub> emission. A simple Google search is estimated to generate as much carbon emission as starting a diesel car. Therefore, optimization targeting low use of CPU and internet flow affects not only software efficiency and customer satisfaction, but the reduction of CO<sub>2</sub> emission as well.

Vendor/contractor selection for events and activities in support of the project will be done according to sustainability guidelines established in the beginning of the project. The project partners in general will support mainly sustainable and local vendors and distributors.

The content of the project will also support green practices and sustainable development, as the products are digital and totally paper-free. Contents of the product, connecting to STEM/STEAM as well as the pedagogical methodological guidelines prepared will also highlight the importance of sustainability when adequate.

Grant amount allocated to the work package n° 1 'Project Management' (whole number with no decimals).  
 64 498,00 €

### Other work packages

Please note that it is recommended to split your projects in a maximum of 5 work packages, including the one on project management.

In this section, please do not add the work package project management already included in the previous section.

Work package id	Title	Number of activities	Grant (EUR)
2	DEVELOPMENT OF THE BLENDED LEARNING METHODOLOGY	21	118 900,00
3	DEVELOPMENT OF THE E-LEARNING SUPPORT SYSTEM	7	120 990,00
4	DEVELOPMENT OF EXPERIMENTAL STEM DIGITAL CONTNET	10	95 612,00
<b>Total</b>			<b>335 502,00</b>

### Work package n°2 - DEVELOPMENT OF THE BLENDED LEARNING METHODOLOGY

What are the specific objectives of this work package and how do they contribute to the general objectives of the project?

In the frame of this work package, the blended learning methodology will be prepared. The Methodology will describe how to run blended learning courses in an adaptive way, assuring that each student meets challenging, but not frustrating tasks and receives personalized support and assistance in the learning process. The Methodology will give a full overview of all activities necessary to design, develop and implement a blended learning course using the EDUBOT assets, along with concrete examples and use cases. The scope of the Methodology is to guide the user (teachers, or other stakeholders) through the whole process: using EDUBOT to manage groups, create content and get reports, and combine digital- and personal learning sessions.

The Methodology is also a summary of all project results, and the main tool to support the adaptation of all project products developed in the frame of the project. As the Methodology is a multi-language (EN, HU, PL, RO, SK) adaptation tool, it will serve the large geographical impact of the project as well.

The main place of use of the Methodology will be in the project's website, where it should be displayed both as an e-book and as a set of methodological- and technical instructions, each describing a certain process of developing and implementing blended learning courses.

The Methodology should remain a dynamic tool created in a dynamic format so that it can evolve with time. In the sustainability period of the project, the Methodology should be kept up to date, incorporating new best practices, or changing, if technical conditions require so.

As the Methodology is giving a framework for all project results, therefore events with the scope of dissemination of the results are also part of this WP.

The WP will contribute to the project objectives by creating the Methodology, by assuring project impact and the adaptivity of the developed results in STEM education and beyond, in the participating countries, in the EU and beyond.

What will be the main results of this work package?



The Methodology should describe/show/demonstrate:

1. Territories of use of EDUBOT

- how does the EDUBOT methodology work?
- what are the typical educational situations when EDUBOT can be the most useful (e.g. preparation for exams, supporting differentiated instruction in a class, etc.)?
- what are the comparative advantages of EDUBOT vs. other methodologies?
- What does such a process look like in practice?

2. Combination of personalized digital learning paths and personal/small group tutoring

- how does the supporting e-learning management system (LMS) work?
- how is a personalized learning path designed by the AI?
- how does the AI collect data on student learning habits, how does the reporting system work and how students are clustered based on those data?
- how can personalized training be focused on the identified competence gaps?
- how does such a blended learning logic work in practice (how to organize learning sessions to efficiently combine digital- and personal learning)

3. Development of digital content

- how does the supporting content authoring tool (CAT) work?
- how to create high-value inter-active content?
- how to create multi-media supported explanations?
- how to structure helping questions/explanations addressing specific competence gaps?
- how to create course content that is able to serve personalized learning paths? How to structure content modules in levels building on each other and blocks related to each other?

4. Practical examples/best practices/use cases

5. List of existing, publicly shared digital content (content prepared in the frame of the project, and maybe more)

6. FAQ

The Methodology should form a coherent text if printed in a handbook format, but it should be richer in its online form, where video tutorials and inter-active DEMO materials can be just as an integral part of it as the text itself.

Dissemination events will result in personally addressing 140 stakeholders and attracting attention to project results.

What qualitative and quantitative indicators will you use to measure the level of the achievement of the work package objectives and the quality of the results?

The Methodology will appear in the form of an editable and printable book, but it will also appear in the form of a well-structured e-book including not only texts but videos, various links to interactive DEMO contents and other media files. The Methodology should address/describe at least 40 processes, and as a printed book it should contain at least 80 pages. It should be available in 5 languages (EN, HU, PL, RO, SK).

The Methodology achieves its goal if a professional (teacher, caretaker, social worker) can fully rely on it to set up her own blended learning course, without needing any previous or further training and instruction.

Therefore, the Methodology:

- should be built on the full understanding of the existing blended learning methodologies, the needs and requirements of the target groups;
- should explore the maximum of the possibilities offered by the supporting e-learning system;
- should incorporate the learnings of the pilot education sessions;
- should consist of a complete presentation of all assets developed in the frame of the project, so that future users can find all necessary information to use the methodology and the tools developed in the frame of the project;
- should be built on levels from the simple through the advanced to the complex level, so that beginners and advanced users can both use it;
- should work as a dynamic online toolset being searchable by keywords and tags;
- should have a user-friendly, clear design and a multiple-device, mobile-friendly presentation form meeting the needs of the target audience;
- should present the mechanism of the supporting e-learning systems in a user-friendly way;
- should suggest an interdisciplinary STEM approach when talking about the instruction of STEM subjects;
- should present its applicability beyond STEM and beyond school education.

Dissemination events should be attended by 140 persons (20 at each local event, 60 at the closing conference). Quality will be measured by questionnaires.

Please describe the tasks and responsibilities of each partner organisation in the work package.

The WP will be coordinated by Tandem, who will also be responsible for preparing an analysis of existing methodologies, summarizing the findings of the PLAs based on inputs from each partner, and creating the final version of the Methodology along with the project's website (as the Methodology will be the main asset to be presented on the site, the website is considered not only an important dissemination tool but also the base location of the Methodology).

Another important role will be played by RegioNet, who will organize the pilot session and summarize all its findings based on the summary provided by each partner and will prepare user guides to the e-learning support system as a part of the Methodology.

Harghita CC will have a special part in the WP, is responsible to develop a 5 pages White Paper (as a part of the Methodology) targeting regional, national and EU level decision-makers, formulating recommendations on how to incorporate the Methodology in regional, national and EU policy papers and other documents of the educational system.

Each partner will take part in the detailed preparation of requirements of the Methodology by organizing a local PLA and collecting inputs from the local professional community (in RO HR CC).

Each partner will organize a pilot education session in their respective countries (in RO RegioNet).

Each partner will translate the Methodology into the national languages (in RO HR CC).

In each country, a local dissemination event will be organized in the last quarter of the project by the respective local partner (HR CC in RO). A final conference will be organized by Harghita CC, the partner responsible for valorization and dissemination.

### **Activities - (2 - DEVELOPMENT OF THE BLENDED LEARNING METHODOLOGY)**

In the following sections, you are asked to provide details about each activity of the work package.

You are asked to provide information about each planned activity as a whole (e.g. its venue, duration, etc.), to define the activity's lead organisation, and optionally to list the other participating organisations. The lead organisation is typically the one organising the activity. The other participating organisations are all other project partners who will also take part in the particular activity. The estimated activity start and end dates can be changed during implementation.

## Description of the activities

Describe the content of the proposed activities.

- 2.1. Analysis - analysing existing blended learning/digital methodologies
- 2.2. PLAs - peer learning actions (PLAs) to involve target groups in the definition of requirements to be set up for the Methodology
- 2.3. Pilot test methodology - formulating a methodology for pilot testing, including meth of personal small-group tutoring;
- 2.4. Website and methodology structure - developing project website and structure of the Methodology;
- 2.5. Pilot educational sessions - pilot-testing the methodology, along with the e-learning system and the digital content with the participation of the associated partner institutions (ASPs). The pilot educational sessions will be coordinated by partners and will be organized in the venues of the ASPs.
- 2.6. Summarizing PLA and pilot results - collecting and analysing results of PLAs and pilot education sessions;
- 2.7. White paper - preparing recommendations for decision-makers on how to incorporate the developed methodology in school practice
- 2.8. QA of the prepared methodology
- 2.9. User Guide - preparing user guides for the e-learning system as part of the Methodology guideline (how to handle student groups, how to create new content, how to use the data resulting from digital learning processes), translating user guide to national languages.
- 2.10. Methodology - Preparing final blended learning methodology to support adaptation and translating it to national languages.
- 2.11. National dissemination events - Events targeting stakeholders at regional and national level in each country (4 events, 1 day each, HU, PL, RO, SK) with 20 participants to present the results and learnings of the project and to offer them to schools, diverse institutions and individual teachers for free use.
- 2.12. International conference - An international event with participants from all partner countries to present the results of the projects to the national- and European professional community opening the European perspectives of the use of project results.

Explain how this activity is going to help reach the WP objectives.

The WP2 -Development of the Methodology is prepared during the whole project implementation period, as the project starts with the preparation of the Methodology's first draft, and ends with the finalization of the Methodology.

The preparation of the methodology will begin by analyzing existing methodologies, identifying best practices at the beginning of the project implementation period.

The larger professional community will be involved in the shaping of the methodology, including the definition of requirements to be set up for the e-learning support system, in the frame of 4 PLAs (one in each country).

While the e-learning support system is under development, in WP2 the project website will be prepared (later to host the digital Methodological Guidelines enhanced with multimedia and interactive elements) and the methodology of the pilot education sessions will be determined. Once the e-learning support system is functional (WP3) and the digital contents are prepared (WP4), a pilot education session will be organized in each country to get a tangible experience on the use of the methodology and the support system.

Based on the results of the pilot sessions the Methodology will be revised and finalized, incorporating the technical user guide of the e-earning support system

National dissemination events will assure that the professional community of stakeholders in each participating country gets an insight into the project results and how they can use them in their everyday work.

The international conference will contribute to summarizing the learnings of the project and to assuring the European impact of the project by spreading information about project results at the national and European levels to stakeholders and to diverse levels of the decision-making in the educational ecosystem.

Describe the expected results of the activities.

1. Research paper with the results of the analysis of existing methodologies, also determining the subjects to be discussed in the PLAs;
2. 4 reports filed by the partners organizing the PLAs in the participating countries;
3. Draft of the Methodology describing the desired functions of the e-learning support system and the methodology to be applied during the pilot educational sessions 80 pages, English;
4. Multi-language website of the project prepared to host the Methodology and the other project results (EDUBOT App and Tool, digital Content Pools in local languages, English DEMO Pool);
5. 4 reports about the pilot educational sessions in the 4 countries, 15 pages each, in English and local language;
6. Summary of the pilot session reports with learnings of the international comparative analysis;
7. White paper targeting decision-makers at diverse levels of the educational system, 10 pages;
8. QA report on the Methodology and the preparation process, 10 pages;
9. Multi-language User guide of the prepared e-learning support system, 40 pages in each language;
10. Final version of the EDUBOT Blended Learning Methodology, incorporating the learnings of all previous results, to be placed on the project's website, in English and all 4 national languages, 90 pages each;

11. National-level dissemination events in each country, reaching 4 x 20 direct participants, local and national press and professional networks in the social media;
12. International conference reaching 60 direct participants, local, national and international press, policymakers at diverse levels, professional communities across Europe through social media networks.

#### Expected number and profile of participants.

The professional activities will be carried out by the professional implementation teams of the partners: 2 experts from Tandem and 2 from RegioNet, + 1 more from each of the other three partners.

The PLAs will be attended by members of the local professional communities: teachers, professionals working with disadvantaged children, school principals and other interested stakeholders, 10 in each country, 40 altogether. PLAs will be organized and moderated by the professional implementation team of the partner organizations.

There will be at least 8 educational institutions (schools and specialized institutions working with students with fewer opportunities) involved as ASPs, at least one from each country. During the project preparation phase, many institutions have already expressed their interest, and we have included some ASP declarations into the Annexes section (unfortunately, the system does not let us upload them all). However, as the previous projects of the partners are somewhat known and popular among schools especially in Hungary and Romania, while in Poland we've just started to build our network, we don't want to close the list of ASPs at this stage, as we hope to include more schools from Poland as well. We will decide during project implementation the final number of the ASPs to be included. The pilot education sessions will be led by 20 teachers. Teachers will be contacted by Partner organizations to lead the pilot sessions and to provide feedback. Teachers will work with groups of 15-20 students (6-8 graders), so a minimum number of 300 students will also be involved. Most of them (over 50%) will be students with fewer opportunities.

Women will represent min. 50% of the teachers and the professional staff, and 50% of the students involved.

Dissemination events will be attended by professional stakeholders (teachers, policymakers, social workers, institution leaders), altogether 140 persons, at least 50% women.

Please keep in mind that the Erasmus+ Programme is offering co-financing for your project. This means that the EU grant can only cover a part of the project costs, while the rest must be covered by the participating organisations either in form of additional funding, or in form of invested goods, services and work.

### Work package n°3 - DEVELOPMENT OF THE E-LEARNING SUPPORT SYSTEM

#### What are the specific objectives of this work package and how do they contribute to the general objectives of the project?

In the frame of the WP3 the supporting e-learning system will be developed based on the existing system used by the Partners.

The present system should be amended in order to better support the blended learning processes in differentiated instruction.

The main innovation in the upgrading process will be the application of AI-supported chatbot technology. This innovation will improve the system's performance in three main ways:

1. Text recognition will be possible in the interactive questions, so the answers provided by the students can be flexibly analyzed by the system. Instead of simply deciding whether the provided answer is 100% authentic with the answer desired by the content developer, the system can accept answers that are meant to be correct (e.g. answers with typing errors), or expressions with similar meaning can be accepted. This will open a way new perspective for open questions.
2. A certain level of communication will be possible between the student and the virtual assistant. The chatbot may be able to identify competence gaps in case a student cannot solve a certain task, and even can offer solutions to fill the gap (e.g. in the case of a complex math task, the chatbot can ask questions to decide whether the student lacks some math skills, or she did not find the logic of problem-solving, or she does not understand the text at all).
3. The AI may be able to use the data resulting from learning processes to shape the "learning profile" of the student, including a competence map and a learning preference map that will be enriched after every e-learning session the student takes part in. The AI can use the information of the learning profiles to suggest to the supervising teacher the formation of groups of students who should be tutored in a certain subject (e.g. those lacking a certain skill, or facing a certain competence gap).

The e-learning support system is the core the methodology will be built on.

#### What will be the main results of this work package?

The work package will have three concrete results visible for users:

1. EDUBOT Tool - Online tool accessible from the project's website, targeting teachers and all stakeholders willing to use EDUBOT methodology to support their differentiated instruction work. The EDUBOT Tool consists of a Learning Management System (LMS) and a content Authoring Tool (CAT), with an embedded AI handling personalized learning paths, building learning profiles and labelling contents. Teachers can use EDUBOT Tool to run AI-assisted courses, to get valuable feedback on learning activities and to develop new interactive content. The tool will be developed on the basis of InterRegio's existing free software.
2. EDUBOT App - A Learner's Application available on Android and iOS platforms and WebGL specifically designed for the project. The students will access the learning paths through this application. The App will be very easy to handle, designed to the needs of primary school students, running on a large diversity of devices (mobile phones, tablets, laptops, desktop computers).
3. EDUBOT Assistant - Powered by the same AI, the Assistant will be present as a chatbot both in the Tool and the App,

providing assistance to students (text recognition, simple conversation, choosing explanations and helping questions) and teachers (assisting group management, content development and reporting procedures).

All results will be free, multi-language software targeting a large audience.

To create the results, some other project results - working documents - will be created, namely a research paper (20 pages) on the existing experiences of using chatbots in education, the set of requirements identified with the involvement of all partners and a large number of stakeholders, and a system plan also describing the development tasks. These documents will not be available in multi-language versions (as they are only internal docs, not targeting the larger community of users).

What qualitative and quantitative indicators will you use to measure the level of the achievement of the work package objectives and the quality of the results?

The work package's objectives will be considered achieved if:

- The EDUBOT App is ready to use, freely downloadable from Play Store (Android) and App Store (iOS) and available as a WebGL link from the project's webpage, operational in all national languages + English, allowing students to: register to the system, log in to/out of the system, select language, browse learning groups, subscribe to-and quit learning groups, play linear- and adaptive learning paths assigned to the groups they are members of, browse contents, collect points in the learning process and access motivational frame-games if assigned, get notifications from teachers.
- The EDUBOT Tool is ready to use, as a link from the project's webpage, operational in all national languages + English, with improved LMS and CAT functions. Users can manage learning groups, set up learning paths, choose from various skins, assign linear- or adaptive learning paths to groups, use motivational frame-games if they want to, send push notifications to students, view/download reports on learning activities, create new interactive contents;
- The EDUBOT Assistant is operational, able to recognize simple text, correct minor mistakes (mistyping, etc.), conduct minimal conversations with students, assist teachers in using the EDUBOT Tool;
- The embedded AI works, analyses answers to open questions, creates personalized learning paths and constantly adapt them to the learners' needs, constantly builds a competence map for each learner and provides comprehensive data for teachers on learners, groups, contents, paths and learning processes;
- All developed software results can be accessed free of charge by all stakeholders.

Please describe the tasks and responsibilities of each partner organisation in the work package.

InterRegio is responsible for the coordination of this WP.

To form a good starting point, a desktop research will be conducted by ADN to collect the existing research results and possible best practices on the use of chatbot technology in education. Findings of the research will be used in the development process.

Concrete requirements towards the e-learning support system will be determined with the involvement of all partners and the larger professional community of interested stakeholders, based on the findings the PLAs (WP2) and transnational meetings. InterRegio will be responsible for the development of all elements of the EDUBOT Tool and App. The internal testing of the support system along with the preparation of the AI for the task will be jointly performed by InterRegio and RegioNet. All partners will take part in the finalization of the system, translating user interfaces into national languages (RegioNet in RO).

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### Activities - (3 - DEVELOPMENT OF THE E-LEARNING SUPPORT SYSTEM)

In the following sections, you are asked to provide details about each activity of the work package.

You are asked to provide information about each planned activity as a whole (e.g. its venue, duration, etc.), to define the activity's lead organisation, and optionally to list the other participating organisations. The lead organisation is typically the one organising the activity. The other participating organisations are all other project partners who will also take part in the particular activity. The estimated activity start and end dates can be changed during implementation.

#### Description of the activities

Describe the content of the proposed activities.

An analysis of the existing use cases of chatbot technology in e-learning will be desktop research focusing on the practical cases, especially on those (if they exist) involving differentiated education.

The setting up of the requirements is an activity relying on the PLAs organized in the frame of the WP1. The Partners will collect and summarize the inputs from the larger stakeholder community in digital documents and will decide on the final requirements in a virtual TM.

The system plan is a document describing the desired structure of the e-learning support system (EDUBOT Tool frontend, EDUBOT App, the LMS and CAS functions in the back-end, the AI running in the background). Each sub-system must be



described and interactions between the sub-systems clarified. Interactions must be optimized to reduce insufficient internet traffic and assure optimal system performance. The system plan also contains a development plan (what to do, when, how processes are built on each other).

Development activities mean the necessary programming activities that should lead to the creation of the support system. The diverse sub-systems of the desired e-learning environment must be programmed in different development environments (AI dev: Python, back-end: PHP, front-end: Angular, app: Unity, etc.) and require different programming skills.

Internal testing means the continuous technical- and UI/UX testing of the developed functions.

The creation of the multi-language version is basically a translation and testing activity.

Quality Assurance will go on according to QA standards of the project, providing feedback at the turning points of the WP.

#### Explain how this activity is going to help reach the WP objectives.

The findings of the research will be used in the development process of the system plan, and the

The requirements will determine the concrete goals of the development, clarifying the functions that will have to be built into the system.

The system plan is the essential base document of the development, no successful complex development can be completed without a good plan.

The development itself is essential to reach the WP objectives, as the objective is the creation of a special e-learning environment. The development is a complex activity in itself, with several processes: back-end, front-end, application and deep learning AI development built on each other. They will all lead to the creation of a complex and user-friendly support system reliably working on diverse devices enabling teachers to use EDUBOT methodology in diverse differentiated instruction sessions.

Internal testing is an indispensable procedure assuring the success of the development. Technical testing reveals bugs and errors, UI/UX testing assures that the developed software is user friendly. Testing goes parallel with the development, provides constant feedback and assures that the delivered solutions will work, and will work well.

The multi-language version is needed so that the support system can be used by a large number of stakeholders preferring national languages.

Quality Assurance is essential to the success of the development process and to the optimal functioning of the developed assets.

#### Describe the expected results of the activities.

The analysis will result in a research paper (20 pages).

The setting up of the requirements for the e-learning system will be a digital document summarizing the suggestions and opinions of the larger community of professional stakeholders involved in the project.

The System Plan will be a digital document describing the system's functions, the connection between diverse functions and sub-systems and a development plan (how to develop the planned software).

The development will lead to the creation of the EDUBOT e-learning support environment, formed of EDUBOT Tool, EDUBOT App, EDUBOT Assistant and the LMS- CAT - and AI processes running in the background. EDUBOT Tool is the digital solution teachers will use to manage their learning groups, linear- or adaptive learning paths, get reports and feedback from AI and develop digital content. EDUBOT App will be used by students to access digital learning materials through personalized learning paths. EDUBOT Assistant will support both teachers and students to make the learning process smoother and more efficient.

The internal testing procedure will result in a series of digital test documents prepared according to the development protocols. These are valuable only in the context of development.

The multi-language version will result in digital translation documents and again test documents, only valuable in the context of the development.

The QA activity will have QA reports as results.

The results visible and useful for the larger community of stakeholders will be the EDUBOT Tool and EDUBOT App, free software available in multiple languages.

#### Expected number and profile of participants.

All Partners will take part in the definition of the requirements with a professional person.

InterRegio will contribute 4 senior and 2 junior developers, supported by a designer and a technical tester. 6 persons will come from the existing crew of InterRegio, the development team sustaining the existing e-learning solutions. Two developers specialising in chatbot technology will join the team for the period of the development.

The development team will cover the following competencies: Deep learning AI, chatbot technology, programming PHP structures, managing Linux VPS server using Maria DB, developing Android, iOS and web GL application in Unity environment, handling Android Studio, creating web interface in Angular environment, programming JavaScript.

Besides software development competencies, the team will have to demonstrate considerable UI/UX competencies as well. (One CV is attached, László Grad-Gyenge, the leader of the team, as the ECAS system did not allow us to upload more documents).

RegioNet will contribute with 1 UI/UX tester, an experienced professional who knows well the e-learning system used by the partnership.

Translations will be provided by the professional team of the Partners.

Analysis and QA will be provided by ADN's professional team.

Please keep in mind that the Erasmus+ Programme is offering co-financing for your project. This means that the EU grant

can only cover a part of the project costs, while the rest must be covered by the participating organisations either in form of additional funding, or in form of invested goods, services and work.

## Work package n°4 - DEVELOPMENT OF EXPERIMENTAL STEM DIGITAL CONTENT

What are the specific objectives of this work package and how do they contribute to the general objectives of the project?

The objective of the WP is to create special STEM digital content pools in each participating country fulfilling the requirements of the EDUBOT methodology.

The "Content Pool" expression is adequate in this case because the digital content supporting the blended learning methodology forms a pool accessed by each learner on her own, AI-designed personal learning path. One content Pool will be created in each participating country (HU, PL, SK, RO), and the fifth one in English to have a DEMO version promoting adaptation across the EU.

The creation of the content pools is essential for the success of the project, as it will allow the pilot-testing of the developed Methodology (WP2) and supporting e-learning system (WP3). Contribution to project general objectives of the WP4 goes far beyond this, as the content development process itself will be an innovation to be described in the Methodology: how to create digital content pools suitable for EDUBOT purposes.

From a methodological point of view, Content Pools make a double contribution to the achievement of the educational objectives of the project during the pilot education sessions.

First, the digital contents built of interactive questions, text and multimedia explanations are able to teach skills and fill some competence gaps on their own. Second, the labels and tags associated with the different content elements help the AI shape the competence map of the students, and indicate the necessary intervention points to the supervising teachers.

The Content Pools' will serve as very important tools for assuring the sustainability and adaptability of project results. First, they can be used, copied and modified by stakeholders adapting EDUBOT methodology. Second, they serve as models for further content development. Third, the learnings of the content development process incorporated into the Methodology will support adaptation, helping interested stakeholders to create their own content.

What will be the main results of this work package?

The main results of the WP will be 4+1 digital STEM content pools for adaptive learning paths.

Content pools will be built in a modular structure so that teachers can later use the modules flexibly to create other content pools if they wish to. Modules are formed of related content blocks building on each other (e.g. to access content in the block "multiplication", first you have to complete "addition"). Within the blocks we create levels (e.g. the lowest level can contain addition tasks with 1 digit numbers, the next with 2 digit numbers, then multiple additions, etc., while on higher levels we will place more and more complex tasks with longer texts, requiring problem-solving logic and text comprehension competencies besides the math skills, and here comes the part that is interesting for the AI). The number of blocks and levels should be set up by the content development teams in the "content structure" document. At each level, several (3-10) tasks should be placed, so that students coming up-falling back to the same levels always meet new challenges. Tasks on a certain level should require the same skills and competencies to be solved. Helping questions and explanations should be related to each task so that the AI can offer support to the students failing to solve a certain task. Helping questions and explanations should be diversified, so that the AI has the choice to offer the one that suits best the learning habits of the user (e.g. experience shows that about 60-70% of the students prefer video explanations, but there is a 20-30% with a strong preference for written text). Explanations should be sequenced so that the AI can show the ones related to the identified competence gaps. All contents must be carefully labelled with tags referring to the competencies and skills required.

The contents to be used in the pilot education sessions should be prepared in the languages the ASPs use.

The English language content pool will serve demonstration purposes.

What qualitative and quantitative indicators will you use to measure the level of the achievement of the work package objectives and the quality of the results?

Quantitative indicators are based on the length of the planned pilot session and the nature of the content pools to be prepared. Content pools of adaptive learning paths must be considerably larger, than linear learning contents, as they should offer challenges to all users, while every user advances in her own rhythm. This means that all students using the materials should meet enough challenges, even if performing brilliantly (Well-performing students meet only 1 task at the lower levels of the content pool). Practice shows that students directed on adaptive learning paths will meet 25-40% of a certain content pool. In the EDUBOT project, we plan to organize 10 hours pilot sessions, so each content pool should be large enough to support 10 hours e-learning course. This implies that roughly 30 hours of digital material have to be prepared in each pool (altogether 120 hours of materials in the 4 pools, one in every participating country). The English-version pool will be smaller, as it will be a DEMO.

From a qualitative point of view, a content pool will fit project requirements if:

- it applies a holistic approach to STEM;
- it develops STEM skills along with problem-solving and text-comprehension competencies;
- contains interactive questions using diverse tasks-building wizards to assure diversity of the content (at least 10 types of wizards are used)
- uses interactive helping questions, paying again attention to diversity;
- uses both multimedia and text explanations;
- explanations are cut into short segments targeting specific competencies to allow AI to choose the most appropriate;
- all contents are labelled and tagged to give information for the AI when building learning paths.

The project's QA protocol will establish detailed quantitative and qualitative requirements towards the content pools.



Please describe the tasks and responsibilities of each partner organisation in the work package.

Partners will work together on the preparation of the WP. To assure the involvement of the larger professional community, a series of PLAs will be organized (one PLA in each country, in RO by HR CC). RegioNet will propose methodological guidelines for content development. At the end of the preparation phase, the Partners will decide on the subjects to be elaborated in each country, the development methodology to be applied, the concrete number of interactive, multimedia and text elements to be prepared and on the content pools' desired structure.

Each partner will be responsible for developing the Content Pool in their respective countries. In RO RegioNet will develop the local content pool, while Harghita CC will create the English language DEMO content pool. RegioNet will support technically the process of content development, as RegioNet has the largest experience in this field.

The prepared contents will be tested and lectured locally.

The learnings of the content development process will be collected and summarized and a short guideline about the use of the contents will be prepared by RegioNet, based on summary reports filed by all partners.

ADN will assure the quality assurance of the development process.

## Activities - (4 - DEVELOPMENT OF EXPERIMENTAL STEM DIGITAL CONTENT)

In the following sections, you are asked to provide details about each activity of the work package.

You are asked to provide information about each planned activity as a whole (e.g. its venue, duration, etc.), to define the activity's lead organisation, and optionally to list the other participating organisations. The lead organisation is typically the one organising the activity. The other participating organisations are all other project partners who will also take part in the particular activity. The estimated activity start and end dates can be changed during implementation.

### Description of the activities

Describe the content of the proposed activities.

4.1.1-5. PLAs will be organized by partners in each country at the partner organization's own office or in an external venue. PLAs will be moderated discussions, preceded by online preparatory work and followed by the creation of local online professional groups. The online professional groups will be kept informed and will be regularly consulted during the project implementation.

4.2. Setting up the development framework is an activity targeting the determination of all basic elements of the framework of the content development procedure: determination of the subjects aborded, the structure of the content pools and the methodology of developing content pools. While the subjects can be different country by country, the development methodology and the content pools' structure should be similar.

4.3. Development of the content pools is a complex process involving the thematic development of the subjects aborded, the selection of the STEM tasks that can "fit" into the e-learning system, creating several texts- and multimedia explanations and helping questions to support the competence development of learners, tagging and labelling content, building the structure, how the different level tasks are built on each other, previewing contents and modifying them on the request of lecturers if necessary.

4.4. Testing and lecturing mean technical and methodological testing, and professional lecturing of the contents, going somewhat parallel with the content development process itself. Testers and lecturers suggest modifications to the content developers.

4.5. Preparing a summary and guidelines is an activity to summarize the valuable experiences gained in the development process and important information regarding the developed content.

4.6. English DEMO version will be developed according to the same development framework, but it will be shorter, using the local language contents as examples.

4.7. Quality Assurance will follow the project's QA processes.

Explain how this activity is going to help reach the WP objectives.

The PLAs will assure the involvement of the larger community of stakeholders in the setting up of the requirements and structure of the digital content, and the determination of the subjects to be aborded. Learnings of the PLAs will be summarized in report documents, which will be later used in the framework development process.

The development framework will be a digital document that will assure a smooth content development process. The development framework will clearly describe development goals, content structure, development processes and rules, tagging and labelling procedures, and important hints for developers. It will also describe the STEM methodology to be applied, taking into account PISA methodology, a holistic, cross-curricular STEM approach, and an emphasis on the application of the acquired skills and competencies in real life.

The development of the content pools is an activity to create the main output of the WP. Content pools can be later used to support education processes, and they will also serve as models for further content to be developed by partners, or stakeholders adapting EDUBOT methodology.

Testing and lecturing are essential to creating high-level content.

Preparing a summary of the process and guidelines aims at supporting first of all the pilot education sessions. However, both this and the framework document will constitute important inputs to the final output of the WP2 (Methodology) as well,

as their findings can be very interesting in the adaptation of the developed methodology.

The English DEMO serves the large-scale adaptation of the Methodology, as many people who do not speak the local languages can get an insight into how the EDUBOT methodology works.

The Quality Assurance process will assure the high quality of the developed content pools and the related documents (framework document, summary document).

#### Describe the expected results of the activities.

The PLAs will result in four digital documents summarizing the common wisdom of the larger professional community regarding the planned

The development framework will be an internal document that will serve as the base document of the content development process, describing how to set up the structure of the contents pool, how to create content elements in diverse formats, how to apply a cross-curricular approach, how to tag and label contents. how the different level tasks are built on each other, defining how many tasks should be placed on certain levels, etc.

Content development will result in 4 content pools in local languages, each supporting a 10 hours adaptive e-learning course. This means the content of 30 hours linear playing time, around 120 separate learning tasks, each related to several helping questions, text - and multimedia explanations, altogether around 480 learning elements (interactive question, text, video). Testing and lecturing will result in internal test documents, based on which developers will correct/modify contents. Guidelines for pilot education and a summary of the learnings of the content development process is an internal digital document that will be used in the pilot education sessions and as an information source for the final EDUBOT methodology (WP2).

English DEMO will be an English language content pool serving the purposes of a 3 learning hours demonstrative adaptive course, respectively a 10-hour linear material, with an estimated 160 learning elements (interactive questions, text and video explanations).

Quality Assurance will result in a QA report on the WP.

#### Expected number and profile of participants.

PLAs will be organized in each country with the participation of teachers, professionals supporting students with fewer opportunities (e.g. social workers, professional caretaker parents of children living under state protection, digital content developers, leaders of educational institutions, professionals and decision-makers operating regional- and national levels of the educational system. In each country, 10 members of the professional community will take part, altogether 40 persons. The group of the participants of the PLAs can overlap with that of the first round of PLAs organized in WP2, but it does not have to be that same, as the aborded subject is also slightly different (general methodology and system requirements vs digital STEM content).

Framework, Summary and guidelines - each Partner's professional implementation team will contribute to the activities. RegioNet will lead the process with a professional content developer experienced (3+ years) in the development of digital content pools designed for adaptive learning.

Content pools, English DEMO: Partners will set up development teams of 2-4 content developers. A specific experiment in developing adaptive learning solutions is not required, as the development framework, and the continuous support offered by RegioNet will do the trick. Each team should encompass all necessary competencies: STEM, digital learning content development, use of multimedia, design. Some professionals unite all of these in one person, but more often development teams of professionals with different competencies will work together.

Testing and lecturing: In each country, a person or a team of 2 with the same competencies as above should perform testing and lecturing from STEM professional perspective and digital content perspective. This task should be performed by professionals not involved in the development process, ideally by a practising teacher and a lecturer.

Quality Assurance will be performed by the ADN team.

Please keep in mind that the Erasmus+ Programme is offering co-financing for your project. This means that the EU grant can only cover a part of the project costs, while the rest must be covered by the participating organisations either in form of additional funding, or in form of invested goods, services and work.

## Budget Summary

This section provides a summary of the estimated project budget. The table is automatically completed taking into account the described work packages and their estimated cost.

Budget Items	Allocated amount (EUR)
Work package n°1 'Project Management'	64 498,00
Work package n°2 - DEVELOPMENT OF THE BLENDED LEARNING METHODOLOGY	118 900,00
Work package n°3 - DEVELOPMENT OF THE E-LEARNING SUPPORT SYSTEM	120 990,00
Work package n°4 - DEVELOPMENT OF EXPERIMENTAL STEM DIGITAL CONTNET	95 612,00
<b>Total</b>	<b>400 000,00</b>

METHODOLOGY

SYSTEM

CONTNET

## Impact

How are you going to assess if the project objectives have been achieved?

We will try to make our result measurable, since impact evaluation is an explicit part of the work in the project, and within the quality assurance a specific activity will be dedicated to it. The impact will be monitored on a continuous basis. EDUBOT foresees 3 levels of impact measurement:

### IMPACT ON TARGET GROUPS/PARTICIPANTS

Short-term effects can be measured on the subject, and long-term effects can only be estimated in this case.

Specific indicators of measurement to be used for the testing and evaluation as well as for dissemination have been described under the relevant sections. These indicators provide insight into the impact that the project potentially has on the participants and their daily work (testing indicators) and the perceived interest of the project, its results and activities (dissemination indicators).

So, as a short summary, we can tell the following about the measurement of the impacts:

- Students get access to the pilot session with an input test and leave with an output test. Comparison of these two tests can measure at least the knowledge-based difference.
- Valuable information can be also found about the development of the competencies by analysing the development of personal competence maps.
- The questionnaires to be used in the testing will include a set of questions on the perception and potential impact of the online Learning Tool on the target public.
- We ask for a review of the pilot session teachers' experiences.

### IMPACT ON PARTICIPATING ORGANISATIONS

QA manager will measure impact on partner organizations. A questionnaire evaluating the perceived quality of the consortium, management and project, will be developed and collected from partners every 12 months. Indicators to be measured could include:

- Integration of the project activities into and across the curriculum or work area (integration and permeation of results in the organization);
- Innovation and variety of approaches (range of approaches of the partners and level of mutual learning);
- Support within each organization (management support, quality of peer support).

The questionnaire will include a set of specific open questions on the perceived impact of the project, its results and outputs on the organization. At M12 and M24 the Quality Manager will realize interviews with 1 representative per partner, where the focus lies on the short and medium-term impact of the project for their organization.

### IMPACT ON STAKEHOLDERS

The impact on the stakeholders will be measured through the indicators used for dissemination. The dissemination indicators will differentiate between the target public of EDUBOT and the other stakeholders, recording in questionnaires, evaluations sheets, etc. This will allow differentiating between the impacts generated.

All measures mentioned in this section will be described and recorded in the section on Impact Evaluation of the Quality Reports.

Explain how you will ensure the sustainability of the project: How will the participation in this project contribute to the development of the involved organisations in the long-term? Do you plan to continue using the project results or implement some of the activities after the project's end?

The sustainability of the project results will depend on their use by Partner organizations and other stakeholders. Software-based educational solutions are more similar to living organisms than to buildings. They constantly change, become richer in functionalities and contents, and attract more and more users - or they slowly fade away. As EDUBOT is itself a third-generation solution built on the results of previous projects, we believe that the Partners have the necessary motivation and experience to grow the network of its users even after project completion.

### LONG-TERM IMPACT ON PARTNER ORGANIZATIONS

Partners themselves will actively use EDUBOT Methodology, App and Tool, as well as the developed contents in their work. EDUBOT solutions will make their activities more efficient. By doing so, they will constantly increase the number of digital content available in the content pools. The results and outputs of the project will allow them to open up new areas for training and support services. The partners expect that the project will help develop new and strengthen the existing long-term partnerships with the educational institutions, in their countries and abroad. It is also expected that through cooperation in this project further cooperation opportunities will be detected and exploited resulting in new initiatives and projects. The project will be an intensive learning process for all of us, as we will cover very different fields (AI-supported chatbot technology, methodologies promoting equal learning opportunities, holistic methodological STEM approach). The staff of partners' organisations will increase their skills in project management, digitally supported adaptive learning, digital use of materials and communication, learn from the exchange of experience among partners and apply the developed training tools in their professional life as they continue to work on.

### SUSTAINABILITY

The complete ICT support system – website, EDUBOT App and Tool, content pools- is foreseen to be maintained for at least another 5 years after the project's end date. The annual report on the experience of the developments of the project will be also made available on the website. InterRegio will maintain the generated website. The Partners will work on the development of new projects financed through other ESF or national or private funds relying on the use of EDUBOT

resources (e.g. preparation of students in remote communities to access higher education, involvement of volunteers in supporting students with fewer opportunities, etc.). EDUBOT is also a tool that can be used in VET and adult education, leading to further extension of the user network by offering the solution to diverse educational institutions, teachers and other stakeholders, not even related to the Partner organizations. For example, EDUBOT can be an optimal free solution for individual teachers preparing students for diverse exams. As its fields of use are very diverse, EDUBOT will thrive.

Please describe the potential wider impact of your project: Will the impact be equally spread among the involved organisations? What is the potential impact of the project on each participating organisation as a whole? Are there other groups or organisations at local, regional, national or European level that will benefit from your project? Please explain how.

The systematic impact of the project can be considerable, as the methodology is transferable and adaptable towards most educational institutions.

InterRegio, RegioNet and Tandem will use the EDUBOT resources to bring adaptive learning support services at the next level, to involve more and more stakeholders in their network, focusing mainly on school education, equal chances for students with fewer opportunities and VET. The fields of use of EDUBOT solutions range from already operational projects and existing networks to the opening of brand new perspectives.

Harghita CC will use results in their work with children under state protection, improving the chances of students from remote communities to access higher education, and influencing education policies to adopt digital solutions and adaptive learning solutions at regional- national- and European levels.

ADN is planning to focus on the application of EDUBOT in adult education, lifelong learning and higher education (e.g. assisting first-year STEM students in maths to decrease the number of those failing at exams because of their insufficient math background).

The Exploitation Plan of Stakeholders will be defined and identified within the Dissemination Plan, in a more detailed manner.

#### IMPACTS ON EUROPEAN/INTERNATIONAL LEVEL

The wider impact of the project will be connected to the priorities set out towards a European Education Area by 2025, especially that everyone should be able to access high quality of education, irrespective of their socio-economic background. Harghita CC is committed to bringing the project results to the attention of the Committee of Regions. EDUBOT is expected to contribute to the development of digital competencies and adaptive learning methodologies in other EU countries as well. Project results will be available free of charge and online in the whole of Europe to an unlimited number of beneficiaries, thus overcoming geographical and social obstacles students and teachers face. EDUBOT Methodology, App and Tool + DEMo content pool (all available in English) will be promoted on a European level. Information about the project will be disseminated through the international networks the project partners belong to so the project results will become accessible to a large number of European stakeholders. To support that process, the partners will offer their international expertise through e-Twinning and School Education Gateway to all interested stakeholders. Large discussion groups on STEM and digital education will provide good opportunities to promote the project results. As the Methodology will provide a complete support system to adaptation, the EDUBOT results can be used by a large number of stakeholders in diverse environments. Partners will also offer online demonstrations through e-Twinning, presenting concrete case studies, and will be open to assisting the adaptation of EDUBOT solutions on request, or in the frame of new cooperation projects.

Please describe your plans for sharing and promoting the project results: How do you intend to make the results of your project known within your partnership, in your local communities and in the wider public? Who are the main target groups you intend to share your results with?

The dissemination activities will be implemented along with a dual strategy. The bottom-up strategy will concentrate on the potential users of the project products: teachers, volunteers, social workers and other stakeholders. The top-down strategy concentrates on the institutional side. Its goal is to present our innovative teaching methodology to educational institutions, institutions specialized in supporting disadvantaged students, maintainers of educational institutions (local and regional governments, foundations, etc.), governmental bodies at diverse levels of the educational establishment, institutions and private enterprises delivering training for teachers.

We will use a combination of online and offline tools, with an emphasis on online communication.

The basis of the online communication will be the project's website, where all project results will be freely available, and all news regarding the project can be found at the same place. The website will be integrated into social media platforms to make sharing of news easy. Social media discussion groups will be set up at the early stage of the project to attract professionals. We would like the target audience to be informed and involved in the development process of the methodologies and tools. Information will be regularly provided, and samples of the prepared results will also be published to attract attention to the products before they are actually completed. By the last quarter of the project, dissemination will intensify. We will launch short information weekly to maintain the attention of the audience. We will use multimedia messages as well. All social media messages must be short and focused. We will regularly post information in professional discussion groups to attract an audience to our website. We will reach at least 400 stakeholders through social media.

To support the implementation of the up-down strategy, 4 newsletters will be edited and sent to a number of 200 institutional stakeholders. Press releases (2) will target 100 media.

To assist dissemination on a European level, we will use possibilities offered by ePALE and eTwinning.

Online dissemination will be strengthened by offline events. The 8 PLAs described in the WP2 and WP4 are not to be



considered pure dissemination events, but they will have their effect on dissemination through strengthening networking activities and offering subject to press communication. 4 targeted dissemination events will be organized, with 40 participants each, and a final conference with 50 participants.

Dissemination activities will be coordinated by the Valorization Manager.

The two dissemination strategies will strengthen each other and will aim at convincing stakeholders to apply EDUBOT Methodology, to use EDUBOT App and Tool, to use the existing Content Pools and to develop new ones, and to support the introduction of project products into the educational practice of a large number of institutions.

## Project Summary

Please provide a short summary of your project. Please be aware that this section (or parts of it) may be used by the European Commission, Executive Agency or National Agencies in their publications. It will also feed the Erasmus+ Project Results Platform.

Be concise and clear and mention at least the following elements: context/background of project; objectives of your project; number and profile of participants; description of activities; methodology to be used in carrying out the project; a short description of the results and impact envisaged and finally the potential longer-term benefits. The summary will be publicly available in case your project is awarded.

In view of further publication on the Erasmus+ Project Results Platform, please also be aware that a comprehensive public summary of project results will be requested at report stage(s). Final payment provisions in the contract will be linked to the availability of such summary.

### Objectives: What do you want to achieve by implementing the project?

The project's goal is to create an innovative blended learning methodology supported by efficient and free digital solutions for teachers applying differentiated instruction in STEM education targeting students with fewer opportunities. The methodology will contribute to tackling early school leaving and providing equal chances to access higher education by offering students adaptive, personalized digital learning paths and small-group personal tutoring to identify and address competence gaps.

### Implementation: What activities are you going to implement?

Multi-language EDUBOT Blended Methodology will be developed by professional staff and tested by 20 teachers and 300 students in 4 countries.

Complex EDUBOT digital support system based on deep learning AI solution will be created along with digital STEM Content Pools of interactive and multimedia elements in local languages and English.

Intensive networking and dissemination activities targeting teachers, institutions and policymakers will be conducted to assure impact and sustainability.

### Results: What project results and other outcomes do you expect your project to have?

The project's result will be the EDUBOT methodology relying on the AI-powered Chatbot Assistant helping both teachers and students, Web Tool for teachers to manage student groups, create new content and get reports, Learning App for students to access adaptive paths and Content Pools as course material and model for content developers.

All results will be free, adaptable by teachers, schools and any interested stakeholder, applicable in the field of STEM and beyond, in the whole EU and beyond.