„InovEduc" project description

The project responds to long-term priorities of PEU aimed at intensifying of Slovakia-Ukraine cooperation in the development of innovative methods of education as it will apply the latest trends in ICT with the support of existing informal SK-UKR cross-border partnership.

The current partnership has identified the **shortages and needs** for effective establishment and sustainable partnership in experimental research applications of 3D models of selected cultural monuments and natural objects using virtual and augmented reality to be used in innovative teaching methods for students and they have considered the joint steps in extended partnership building.

Shortages and needs: lack of common communication channels and instruments for partnership; missing of possibilities to exchange experience in dealing with problems; networking support; mutual inspiration and human resources for partnership. Insufficient knowledge of students in mathematics, physics and science and gaps in logic is the weakness of our educational process; missing techniques and methods that enable students to understand the broader relationships within regions effectively, particularly with regard to inter-regional linkages in various fields. Priorities in educational process tend to reduce the need for memorizing static information, i.e. the practical handling of information, use of interactive approaches and modern methods within the ICT.

The goal of the project is to contribute through bilateral communication platform (BKP) to building partnerships between Slovak and Ukrainian partners at the academic level that will develop methods of display and presentation of 3D data in experimental development. Partnerships between educational institutions at lower levels (secondary school, and methodological centres) will be targeted through the BKP at the exchange of experience in the complex teaching of selected subjects using common characteristics of regions while applying new technologies (virtual and augmented reality). This project aims to link humanities with technical (informatics) knowledge and to motivate pupils and students to look for broader context for learning, and contributed to the increased interest in the use of the latest trends in (ICT) in a playful way.

The project aims also to introduce modern innovative methods of teaching of students and teachers in primary and secondary schools as well as at universities which will present the cultural heritage and natural peculiarities of the Eastern Slovakia and the Transcarpathian region with the use of interactive virtual and augmented reality. Using

digitized 3D objects we contribute to preservation of the current state of selected architecturally valuable buildings in that will promote tourism of these areas through attractive display on websites.

Implemented applications with a presentation of 20 objects (10 on the SK, 10 on the UK) of 3D models of important cultural and natural objects using the methods of virtual reality (an online and off-line application) and augmented reality (an application for mobile devices with an issued booklet with information about each object in both languages) will be the result of the project. In addition to these 3D models, it will be possible to view their current status, or even historical development (for example, look to the past), or simulate natural beauty at different times of the year. Such processed models will be presented on the Internet.

Special devices (virtual glasses) are expected to be used during the presentation of these 3D models while applying virtual reality. Student will be experiencing a sense of current reality, in which they will be able to see the real dimensions of the building in front of them or examine their details with a supporting text or audio information.

Students will be able to use tablets or smartphones through which they see objects with its surroundings and when turning head or the device will be able to "look around" in a given environment. These viewing techniques can be transferred to the student of the world, despite the fact that there are hundreds or thousands of miles away from buildings or real nature. All presented techniques are intended to acquaint students with a realistic appearance of the object only through photographs, but also through interaction with the 3D model and the specific details add to them the relevant educational information- a story, which will be rolled up after clicking to the object and it will contain a data from immaterial cultural heritage category.

Five training and methodological materials for teachers will create another relevant result of the project with applying of modern approaches displaying information for education of broader relations in the region, which will be used by teachers in Slovakia and Ukraine. 20 teachers who will also act as disseminators of individual project results after the project will be trained to use modern means of ICT in teaching in broader regional and supra-regional relations in defined areas as well.

The following target groups will benefit from the project - **students, civil servants / teachers and researchers** who form a synergistic and organic part of the project. Individual project activities are planned in such a way that they always have a direct or indirect impact on specific target groups. Students gain not only the knowledge and respect of history, geographical data and some natural curiosities, but also some basics

of computer graphics and mathematics necessary for creating three-dimensional objects in an accessible way. Processing and presentation of major cultural heritage objects by methods and means of virtual and augmented reality will motivate students to look for similar objects for processing in their neighbourhood. Students gain the ability to use these methods in their studies and increase the potential of their placement.

Teachers acquire new knowledge in the use of modern viewing technology, applicable to the educational process in different subjects and increase their skills in the use of ICT. Researchers create linkages and partnerships for future cooperative research and development projects in the field of science.

Exploring, further education and understanding of common features of the region, creating 20 objects of 3D models, 5 training and methodological materials, their integration into the educational process with the use of ICT has the potential to contribute through the development of bilateral communication platform to create cross-border partnerships and cooperative projects at regional or local level for the preservation and regeneration of particular cultural and historical monuments of the divided region. Results of the project will be directly used to promote the region in the context of tourism.

Activities for reaching the project results:

Activity 1: Building a bilateral communication platform. It will take 24 months.

The aim of this activity is to create a space for building of potential cross-border partnerships and promoting cooperation between Slovakia and Ukraine. Interactive forums, as a tool for learning, effectively serve in building partnerships. Bilateral communication platform will provide a space to exchange experience and build partnership for partner organizations from both countries. It will be co-produce in activity 3. It will be managed and facilitated. The working language of the platform will be Slovak, Russian and English. It will provide the opportunity to search contacts, partners for international cross-border cooperation, sharing of information concerning new trends and current issues, and facilitated space for technical discussions on common problems, sharing experience and providing support, and exchange of information. The platform will be also after the project a functional tool for mutual communication of partners from Slovakia and Ukraine. Project participants will become familiar with the platform during training (activity 3) and will define the scope of topics

and problems in which they expect active cooperation and partnership with Ukrainian partners.

1.1 Opening Conference – in the 3rd month, will be held in Presov

The target group ic created by 75 participants (60 - project partners, representatives of regional associations ZMOS NGOs) and 15 members of the project team. The program will focus on introductory information about the project, presentation of plans and the use of bilateral communication platform, defining objects and excursions locations for seminars, 3D models of objects and augmented reality, creating more accurate timetable, preparation of the seminar No 1.

1.2 Conference to promote tourism – in the 18th month, will be held in Uzhgorod

The target group is created by 60 participants - representatives of regional associations ZMOS, destination management and tourism agencies from both sides of cross-border regions. The conference will be held in Uzhgorod with the participation of Consulate General of Presov and Uzhgorod. Topics: presentation of project experts about the latest results of the project - presentation of 20 objects (10 on the Slovak side and 10 on the Ukrainian side) in 3D models of important cultural and natural objects by methods of virtual reality, mutual introduction and elimination of prejudice, controlled discussion forum for common problems in institutionalized partnerships. Cooperative partnership in relation to the outputs and results of the project will lead to the higher information awareness and also closer cooperation of other regions of Ukraine. The result will be wider publicity of the results of the project focused mainly on tourism and education between Slovakia and Ukraine.

1.3 Final conference – in the 24th month, will be held in Michalovce

The target group o is created by 75 participants (60 - project partners, representatives of regional associations ZMOS, NGOs, school principals) and 15 members of the project team. The program will focus on the presentation of results, presentation of 20 objects (10 on the Slovak side and 10 on the Ukrainian side) in 3D models of important cultural and natural objects by methods of virtual reality, bilateral communication platform, established and working partnerships.

1.4 Activity for the general public – in the 24 month, will be held in Sliemence

The target group is created by100 participants - project partners, representatives of regional associations ZMOS, NGOs, school principals, the wider public, the project team. The program will focus on presenting the results of the project, 3D models,

bilateral communication platform, established and working partnerships with possibility to pass through the border crossing.

Result 2: Developed applications for virtual and augmented reality to display 3D models of important cultural, historical and natural objects in cross-border regions

Activity: Creation of 3D models and development of applications for virtual and augmented reality. The activity will last 24 months.

The activity is aimed at creating 3D models of selected cultural monuments and natural sites with preservation of their current state in a digital form mainly from the region Transcarpathian Ukraine. Experimental research of applications of 3D models will be carried out using virtual and augmented reality in innovative education for primary and secondary schools. Experts - 7 IT university teachers from Slovak PEU and 3 university IT teachers of Ukrainian National University will be involved in the realization. One part of the activity is supply of equipment for the production and experimental research applications of 3D models.

2.1 Creation of 3D models
Implementation of models will be realised in 3 phases:
Phase 1 - obtaining input data (in the form of photographs of the original existing buildings with a focus on the whole and object details. In the 3rd month 4 experts will be taking pictures of selected objects (photo shoots - the one object needs about 400 photos at different light intensity) for 4 days in Presov.
Phase 2 - production of the model itself - modelling object geometry with preserving of the topological structure of the building, including the modelling of textures, with the assistance of modelling software.
Phase 3 - export to various formats, context, panoramas, surrounding of the object. In the 6th month of project realisation 4 IT experts of PEU conduct a training of 3 IT experts from the Ukrainian National University (4 experts / 4 days in Uzhgorod) for creation of 3D models.

2.2 Creating software for displaying models in virtual and augmented reality.
For displaying 3D models there will be created appropriate software for data presentation according to the following scheme of use : (1) Data View Web - Application to view 3D models in a web browser window (2) display data in virtual reality - with the help of glasses for stereoscopic viewing data with a relative

positioning sensor of the user's head, (3) display data using augmented reality - the application will be usable on mobile devices running Android and other OS. When moving the sensor device (tablets, smart phone) the 3D view will be changing so that the user will have the feeling that the object is in front of them. The possibility to interact with object will be a part of the software as well as a printed publication containing basic information about objects with images that serve as markers for viewing objects using augmented reality. Applications or virtual reality – online and offline application for viewing 3D models.

Application for augmented reality - mobile applications, including design of image coding

Result 3: Innovative methods of education on common characteristics of the cross-border region with realized pilot tests in the learning process

Activity 3: Training and development of innovative methods of education on common characteristics of the cross-border region. The activity will last 22 months. 20 experts (teachers, teacher trainers) on both sides of the cross-border region and representatives of the project team will participate in the realisation.

The activity is aimed at training teachers for new innovative methods of education and creating training and methodological papers on common characteristics of the region using 20 objects (10 on the Slovak side and 10 on the Ukrainian side) in 3D models of important cultural sights and natural objects by the methods of virtual and augmented reality. Besides teaching aids for these methods some trainings, seminars and conferences in Slovakia and Ukraine will be carried out with examples of how to use them in subjects such as history, regional studies, geography, civics, biology and so on. After completion of the project it will be possible to add other digital objects in this field of education.

3.1 Realisation of training for 20 teachers multipliers from Prešov and Košice regions and Transcarpathian Ukraine. Realisation of this activity begins at 6th month and ends at 22th month of project realisation.

5 training seminars (Uzhgorod, Košice, Prešov, Mukachevo, and Uzhgorod) will take place in the activity focusing on cooperative processing of topics concerning the common features of the region - history, architecture, religion, culture, traditions, customs, civil society, current events and use of information technology in teaching. A part of each seminar will be an excursion focused on exploring of selected common features of the region. One part of each seminar will be also the activities of bilateral

communication platform, in particular training on fundraising, financial management and project management.

3.2 Creation of training and methodological papers on common characteristics of the region. Realisation of this activity begins in 6th month and ends in 22th month of project realisation.

20 experts - teachers, teacher trainers from both sides of the border will participate in creation of training and methodological sheets. Worksheets will contain both factual information as well as suggestions of adequate methodologies for secondary education. Thus participants of the training program will become co-authors of texts tailored to the conditions of secondary schools in the Eastern Slovakia and Western Ukraine, at the same time they will ensure the follow-up verification of materials in practice as well as the further promotion among teachers. Experts of participating partners - ZIPPO and MPC will contribute with their expertise and experience to the high processing quality of training and methodological sheets. They will also provide valuable counselling on appropriate allocation of developed materials to the items of content and performance standards of subjects and cross-curricular themes in the State educational program.

A part of activity is verification of TMS with 3D models of objects in virtual and augmented reality. Verification of pilot program will take place at two partner high schools which will be realised by 120 students (60 in each school). The activity will be completed with printing of TMS and presentation of project results within seminars for teachers of PO and KE region as well as for teachers of Transcarpathia in Uzhgorod.

3.4 Target groups of the project

1) Students – direct benefit from the project; The project will directly involve 60 students (30 from partnership gymnasium in Presov and 30 of the partnership gymnasium in Uzhgorod to verify the pilot project outcomes - innovative teaching methods comprising 3D models of important cultural, historical and natural objects. Students will acquire knowledge in a meaningful and attractive way with creative use of the latest ICT. By participating in the project they will not only benefit from the knowledge and get respect of history, geographical data and some natural curiosities, but also learn some basics of computer graphics and mathematics necessary for creating three-dimensional objects in an accessible way. Processing and presentation of

major cultural heritage objects by methods and means of virtual and augmented reality will motivate students to look for similar objects for processing in their neighbourhood.

2) Employees in the civil / public service - teachers and teacher trainers will directly benefit from the project. These are the 24 experts guarantors, teachers, teacher trainers, teachers) who will directly participate in the development of innovative teaching methods and outcomes of the project which they will use in everyday work (training and methodological sheets). They will be equipped with 3D models and will control work in an environment of virtual and augmented reality - they will be able to build attractive lessons using these tools.

12 teachers and teacher trainers from partner institutions on the Ukrainian side and 12 teachers and teacher trainers from partner institutions in Slovakia will be involved in the project. Teachers are natural multipliers of acquired knowledge and skills among students as well as colleagues from other schools, so naturally they ensure the sustainability of the project. Teachers will disseminate the acquired knowledge and experience also among their colleagues in schools and even in their neighbourhood.

3) Scientists and researchers – 10 IT university teachers of applied research. They will participate together in the implementation of 3D models of important cultural, historical and natural objects displayed within the application for virtual and augmented reality for teaching of the selected subjects in secondary schools that will be further developed in experimental development.