



## **PARTNERSHIP AGREEMENT**

**CONCERNING THE ERASMUS+ STRATEGIC PARTNERSHIP FOR SCHOOL EDUCATION**

**Under the Union programme for education, training, youth and sport<sup>1</sup>**

**AGREEMENT No – 2019-1-ES01-KA201-065378**

UNIVERSIDAD DE ZARAGOZA (UNIZAR), ESQ5018001G, Calle Pedro Cerbuna 12, 50009, Zaragoza, Spain, hereinafter referred to as “**the Beneficiary**”, represented by its Rector, José Antonio Mayoral Murillo

on the one part,

and

UNIVERSITY OF PRESOV (U. of PRESOV), SK2020980082, UL 17 NOVEMBRA 15 080 01, PRESOV, Slovakia, hereinafter referred to as “**the Partner**”, represented by its Rector, Peter Konya

on the other part,

both together referred to as “**the Parties**”,

**HAVE AGREED**

to implement the project “**Development of computerized adaptive applications for the dynamic assessment and enhancement of executive functions in students with neurodevelopmental and learning disorders**” under the Erasmus+ Programme, Key Action 2 (Agreement No – 2019-1-ES01-KA201-065378): Strategic Partnerships, hereinafter referred to as “**the Project**”, as follows:

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<sup>1</sup> Regulation (EU) No 1288/2013 of the European Parliament and of the Council of 11 December 2013 establishing 'Erasmus+': The Union programme for education, training, youth and sport and repealing Decisions No 1719/2006/EC, No 1720/2006/EC and No 1298/2008/EC.

## Article 1 – Subject matter

- 1.1. Having regard to the provisions of Regulation (EU) No 1288/2013 of the European Parliament and of the Council of 11 December 2013 establishing, Erasmus+ in the field of education, training, youth and sport, the **Beneficiary** and the **Partner** commit themselves to carrying out implementation of the Project coming under the Agreement No **2019-1-ES01-KA201-065378** concluded between the **Beneficiary** and the **National Agency** in accordance with the *Special Conditions*, the *General Conditions*, the *Financial and Contractual Rules* and the annexes hereto which form an integral part of this agreement and that each party declares to have read and approved.
- 1.2. This agreement shall regulate relations between the parties, and their respective rights and obligations with regard to their participation in the project No **2019-1-ES01-KA201-065378** under the Agreement passed between the **National Agency** and the **Beneficiary**.
- 1.3. The total grant of the project for the contractual period referred to by the Agreement No **2019-1-ES01-KA201-065378** is confirmed at **€268.580,00**.
- 1.4. The final financial contribution shall depend on the evaluation of the quality of the results of the project No **2019-1-ES01-KA201-065378** pursuant to the *Financial and Contractual Rules* which is Annex III of the Agreement No. **2019-1-ES01-KA201-065378** but shall, under no circumstances, give rise to a profit during the project implementation.
- 1.5. With the signature of this Agreement, the **Beneficiary** and the **Partner** accept the grant and agree to implement the Project, acting on their own responsibility.

## Article 2 – Duration

- 2.1. The duration of the Project is **28 months**. It starts on **01/09/2019** and ends on **31/12/2021**.
- 2.2. This agreement enters into force on the date of signature by the last of both Parties to the agreement and terminates five years after the date of the payment of the balance by the **Beneficiary** to the **Partner**.
- 2.3. The period of eligibility of the costs starts on **01/09/2019** and ends on **31/12/2021**.

## Article 3 – Obligations of the Beneficiary

The **Beneficiary** shall undertake:

- 3.1. to take all the steps necessary to prepare for, perform and correctly manage the Project in accordance with the objectives of the Project as set out in the Agreement concluded between the **National Agency** and the **Beneficiary**;
- 3.2. to send to the **Partner** a copy of various reports and of any other official document concerning the Project;
- 3.3. to notify and provide the **Partner** with any amendment made to the Agreement No **2019-1-ES01-KA201-065378** concluded with the **National Agency**;

- 3.4. to define in conjunction with the **Partner** the role and rights and obligations of the two Parties, including those concerning the attribution of the intellectual property rights;
- 3.5. to comply with all the provisions of Agreement No **2019-1-ES01-KA201-065378** binding the **Beneficiary** to the **National Agency**.

#### **Article 4 – Obligations of the Partner**

The **Partner** shall undertake:

- 4.1. to take all the steps necessary to prepare for, perform and correctly manage the Project in accordance with the objectives of the Project as set out in the Agreement **2019-1-ES01-KA201-065378** concluded between the **National Agency** and the **Beneficiary**;
- 4.2. to comply with all the provisions of Agreement No **2019-1-ES01-KA201-065378** binding the **Beneficiary** to the **National Agency**;
- 4.3. to communicate to the **Beneficiary** any information or document required by the latter that is necessary for the management of the Project;
- 4.4. to accept responsibility for all information communicated to the **Beneficiary**, including details of costs claimed and, where appropriate, ineligible expenses;
- 4.5. to define in conjunction with the **Beneficiary** the role and rights and obligations of the two Parties, including those concerning the attribution of the intellectual property rights.

#### **Article 5 – Financing**

- 5.1. The total costs to be committed by the **Partner** for the period covered by the Project is estimated at **24.770,00 EUR**
- 5.2. The grant shall take the form of unit contributions and reimbursement of eligible costs actually incurred in accordance with the following provisions:
  - eligible costs as specified in Article II.19 of the *General Conditions* of the Agreement No **2019-1-ES01-KA201-065378**;
  - financial rules as specified in Annex III of the Agreement No **2019-1-ES01-KA201-065378**;
  - estimated partner budget as specified in Annex I of this agreement.

#### **Article 6 – Budget transfers**

- 6.1. Without prejudice to Article II.22 of the *General Conditions* of the Agreement No 2019-1-ES01-KA201-065378 and provided that the Project is implemented as described in Annex II, the Parties are allowed to adjust the estimated budget set out in the Project, by transfers between the different budget categories, without this adjustment being considered as an amendment of the Agreement within the meaning of Article II.13 of the *General Conditions* provided that the following rules are respected:
  - 6.1.1. The Parties are allowed to transfer up to 20% of the funds allocated for Project management and implementation, Transnational Project Meetings, Intellectual Outputs

and Multiplier Events to any other budget category with the exception of the budget categories Project management and implementation costs and Exceptional costs.

- 6.1.2. Any budget transfer shall result in an increase of maximum 20% of the amount awarded to that budget category as specified in Annex I.

## Article 7 – Payments

- 7.1. The **Beneficiary** commits itself to carrying out payments relating to the subject matter of this agreement to the **Partner** according to the fulfilment of the tasks and according to the following schedule:

1 <sup>st</sup> payment	% 20	EUR 4.954,00 within 30 calendar days of receipt of the first tranche of the grant and the signature of this agreement.
2 <sup>nd</sup> payment	% 20	EUR 4.954,00 once receipt and analysed the two first periodical reports of the activities executed (one year after the start of the project - September 2020).
3 <sup>rd</sup> payment	% 40	EUR 9.908,00 within 30 calendar days of receipt of the second tranche of the grant (june-july 2021).
Final payment	% 20	EUR 4.954,00 within 30 calendar days after receiving the final payment from the <b>National Agency</b> on the condition that the <b>National Agency</b> has approved the full amount of the final payment (February-March 2022).

- 7.2. All payments shall be regarded as advances pending explicit approval by the **National Agency** of the final report, the corresponding cost statement and the quality of the results of the project.
- 7.3. The final payment as mentioned in point 7.1 of this Article shall constitute the payment of the amount necessary to balance revenue and expenditure.
- 7.4. In case a desk check or audit shows that not all obligations in the project have been fulfilled and this has financial implications 2 options can occur:
- The final payment will be reduced to the final sum received by the **National Agency**, meaning the final payment will be less than stated above.
  - The reduced amount is bigger than the final payment, meaning money has to be returned to the **National Agency**: in that case the partner will refund to the beneficiary the amount requested by the beneficiary.
- 7.5. In either case of 7.4 this will be carefully analysed and spoken with the whole consortium. In case the reduction is due to not fulfilling tasks (as mentioned in Annex II) by a specific party, then he alone will be requested to make the refund or will receive less money on the final payment.

## Article 8 – Bank account

Name of the Bank: Štátna pokladnica  
Address of the Bank: Radlinského 32, P.O.BOX 13, 810 05 Bratislava 15  
Account holder: Ministry of Finance of the Slovak Republic

Account number: 7000082706/8180

BIC/Swift: SPSRSKBA

IBAN code: SK04 8180 0000 0070 0008 2706

## **Article 9 – Reports**

- 9.1 The **Partner** shall provide the **Beneficiary** with any information and document required for the preparation of the interim and or final reports and, where appropriate, with copies of all the necessary supporting documents *completed and signed by the legal representative by January 31, 2021 (for the interim report) and by December 31, 2021 (for the final report)* at the latest.
- 9.2 The **Partner** shall provide the the **Beneficiary** with periodical reports on the performed activities every 6 months since the beginning of the project.
- 9.3 The required information and documentation within the Project shall be provided in English.

## **Article 10 – Monitoring and supervision**

- 10.1. The **Partner** shall provide immediately the **Beneficiary** with any information that the latter may request concerning the carrying out of the Project covered by this agreement.
- 10.2. The **Partner** shall make available to the **Beneficiary** any document making it possible to check that the Project is being or has been carried out.

## **Article 11 – Liability**

- 11.1. Each contracting party shall release the other from any civil liability in respect to damages resulting from the performance of this agreement, suffered by itself or by its personnel, to the extent that these damages are not due to the serious or intentional negligence of the other party or its personnel.
- 11.2. The **Partner** shall protect the **National Agency**, the **Beneficiary** and their personnel against any action for damages suffered by third parties, including project personnel, as a result of the performance of this agreement, to the extent that these damages are not due to the serious or intentional negligence of the **National Agency**, the **Beneficiary** or their personnel.

## **Article 12 – Termination of the agreement**

- 12.1. The **Beneficiary** may terminate this agreement if the **Partner** has inadequately discharged or failed to discharge any of the contractual obligations, insofar as this is not due to *force majeure*, after notification of the **Partner** by registered letter has remained without effect for one month.
- 12.2. The **Partner** shall immediately notify the **Beneficiary**, supplying all relevant information, of any event likely to prejudice the performance of this agreement.

## **Article 13 – Jurisdiction clause**

13.1. The law applicable to this contract shall be the law of Spain.

13.2. Failing amicable settlement, the Courts of Spain shall have sole competence to rule on any dispute between the contracting parties in respect of this contract.

#### **Article 14 – Intellectual Property Rights**

Without prejudice to paragraph Article II.9 of the *General Conditions*, the **Beneficiary** grants the **Partner** the right to make free use of the results of the Project as it deems fit, provided it does not thereby breach its confidentiality obligations or existing industrial and intellectual property rights.

#### **Article 15 – Amendments or additions to the agreement**

Amendments to this agreement shall be made only by a supplementary Agreement signed on behalf of each of the Parties by the signatories of this agreement.

#### **Annexes:**

##### **Annex I      Estimated partner budget**

Budget items	Euros
Project Management and Implementation	7.000
Transnational Project Meetings	3.450
Intellectual Outputs	10.320
Multiplier Events	4.000
Total Calculated	<b>24.770,00</b>

## **ANNEX II Partner's project tasks and responsibilities**

### **Project management and implementation:**

For the successful implementation of the project, management led by the coordinating partner, will adhere to the following,

- i) facilitate the process by agreeing on what the project is meant to do and what it is meant to deliver, the scope, timelines, cost and quality of a project and the schedule and project plan to be maintained;
- ii) ensure the timely and cost-effective implementation of all tasks according to the agreed objectives, effective collaboration within the partnership and the fulfilment of contractual obligations among all partners;
- iii) facilitate, monitor, evaluate and ensure high quality processes and outputs throughout the project lifecycle; provide communications, reports and progress updates throughout the lifecycle of the project; manage risks, issues and dependencies and
- iv) manage policies, processes, tools, frameworks, techniques, people and relationships to a successful project outcome.

The project coordinator in collaboration with the partnership will implement a transparent and effective management system that will ensure that the project meets the overall objectives as specified in the project's contract, monitor the progress of each partner with respect to the partnership agreements, arbitrate and resolve possible disagreements among the partners and clarify potential discrepancies in respect to the procedures to be followed and continuously monitor the quality of the program and its outputs.

Specifically, effective project management involving all partners will launch the project on the basis of the signed Grant Agreement, hold the kick-off meeting in Zaragoza, Spain; agree on a final project timeframe, based on that submitted in the proposal; prepare a final management plan that defines how the project is executed, monitored and supervised; prepare and circulate the meeting minutes to all partners involved and coordinate the collaboration between the partners. Management will monitor and evaluate the progress of the project through planned communication based on the timeframe of the project and ad hoc communication if the need arises and prepare and submit all the required narrative and financial reports.

The management grant will be utilised as follows for the implementation of this project:

#### **A. Costs as needed for managing actions on the Intellectual Outputs**

IO1: Design and content in a physical format (editable document, doc and pdf document) of the activities for the dynamic assessment and the optimisation of executive functions in students with special educational needs (SEN) derived from neurodevelopmental and learning disorders.

IO2: An open-access educational web platform on which the games and interactive applications of assessment/intervention will be developed.

IO3: Software that includes interactive games and computerised adaptive applications for dynamic assessment and interventions in the executive functions of students with SEN derived from neurodevelopmental and learning disorders. The code of the software should be available in an editable document.

IO4: A database containing the record of all the performed applications to be consulted and analysed by professionals and researchers.

IO5: Manual /Tutorial of application and interpretation of the results.

#### **B. organisation and participation in meetings: There will be 4 meetings:**

1. The kick-off meeting will be held in December 2019 in Zaragoga (Spain), during which the following activities will be addressed:

- \* Offer the up-to-date presentation of the project objectives and its scope
- \* Sign bilateral agreements between the University of Zaragoza, as Project Coordinator, and all the other partners
- \* Agree on the tasks that each partner will be specifically involved in, the outcomes which each one can lead, and the role they will play while the project is underway
- \* Make known the instruments to be used to assess and follow-up the project
- \* Agree on a schedule to be followed while the project is underway, and decide on common communication channels
- \* Solve any pending management and administration matter
- \* Initial dissemination activities of the project
- \* In short, during this kick-off meeting, and before starting any project activities, all the partners' roles and responsibilities will be determined, the project plan will be established, the decision-making process will be clarified, and both the financial and project managements will be agreed.

2. The second meeting will be held in June 2020 in Presov (Slovakia), during which the following activities will be addressed:

- \* Write and present the 6-monthly report on the performed activities
- \* Coordinate via email and Skype the progress of the activities scheduled for the first 6 months
- \* Jointly revise and report on the web platform's development that will allow the computerised adaptive applications device to be developed for the assessment/intervention in executive functions (EF) in students with neurodevelopment and learning disorders
- \* Jointly revise and report on the process of adapting, devising and extending contents in the games and interactive applications
- \* Prepare the mediation patterns (graduated prompts, feedback, metacognitive guidance) in relation to the device's different games/applications
- \* Transfer to Inthecity Project Development the content of the developed games/applications, and start developing the computerisation process.

3. The third meeting will be held in December 2020 in Nicosia (Cyprus), during which the following activities will be addressed:

- \* Write and present the 6-monthly report on the performed activities
- \* Coordinate via email and Skype the progress of the activities scheduled for the first 12 months
- \* Revise and report on the process of adapting contents in the games and interactive applications to an electronic format
- \* Revise and report on the internal structure and the specific sequence of the items and tasks that the assessment/intervention device will include
- \* Report on the process of creating the database that will allow the sequence of answers offered by students, and their response to the offered mediation, to be recorded and analysed.
- \* Start the process of including the algorithms that will allow the adaptability characteristics to be introduced into the sequence to present items, as well as those characteristics that will enable data to be recorded and then be analysed by IRT-based techniques
- \* Start the process of including the algorithms that will allow neurofunctional data to be recorded and analysed
- \* Prepare and coordinate the pilot applications in the different associated schools and organisations
- \* Coordination and progressive elaboration of the Manual of application and interpretation of the results.

4. The fourth meeting will be held in June 2021 Praha (Czech Republic).



- \* Prepare and present the 6-monthly report on the performed activities
- \* Coordinate via email and Skype the progress of the activities scheduled for the first 18 months
- \* Coordinate the pilot applications in the different associated schools and organisations
- \* Coordinate the preliminary analyses that will lead to the items calibration process
- \* Revise and adjust the levels of difficulty associated with each item according to the empirical determination made from the calibration analysis
- \* Configure and develop the computerised adaptive applications as a result of the outcomes obtained during the items calibration process.
- \* Configure and develop the database
- \* Prepare and coordinate the activities and multiplier events to diffuse the project outcomes
- \* Coordinate and write the Manual of application and interpretation of the results.
- \* Final review and adjustment of deliverables, final reporting and finances.

C. Coordination and project management by all partners. This involves the smooth and effective project organisation and concerns providing management services from the Project Leader and for each partner, focusing on administration, quality and evaluation, dissemination of the outcomes.

D. Dissemination. Actions that will take place during the project, adhering to different goals each time. The dissemination actions will include translation, multiplier events, Web site creation and social media campaigns, events and presentations, press releases and other opportunities.

Grant amount: the grant amount is calculated by multiplying the project duration by the unit contribution applicable to the beneficiary, as beneficiaries must agree on their respective workload and contribution to the project activities and results.

### **Transnational Project Meetings**

Partners have agreed on the organisation of four transnational project meetings that will take place at key moments during the overall project implementation.

The grant amount: the grant amount is calculated by multiplying the total number of participations by the unit contribution applicable, as specified in the application.

### **Intellectual Outputs**

**O1: Output title - Design and content in a physical format (doc, pdf) of the activities for the dynamic assessment and the optimisation of executive functions in students with special educational needs (SEN) derived from neurodevelopmental and learning disorders.**

**Output type -** Learning / teaching / training material – Toolkit

The work will be coordinated by Universidad de Sevilla.

To obtain this output, work will be led by the RG “Individual Differences, Language, and Cognition LAB” from the University of Seville. Along with this RG, the University of Zaragoza, the DYS-centrum NGO, the University of Presov, and the Cyprus Mathematical Society will especially participate.

Firstly, the writing, adaptation, redefinition and/or extension (if necessary) of the set of items that will be finally included in the assessment/intervention device will be carried out. The content, format and structure of all the items making up the devices’ Items Bank (IB) will be

outlined. This process will be constantly revised and pilot applications will take place in the associated education centres. In relation to the assessment items, these preliminary applications will be made using a standard application format to calibrate items. How the items perform will be assessed as a result of their standard application (non-adaptive) in the Pilot 1 application in order to start the calibration process by using Item Response Theory (IRT) techniques and the subsequent adaptive configuration of activities.

The development methodology also considers the continuous and joint revision of the formulated items, which will be done by all the participating partners to improve their quality and the internal coherence of the set of undertaken tasks.

The sequence of actions that will lead to acquiring this intellectual output will be:

- \*O1/A1 Design and elaboration in physical format of the set of items for the dynamic and adaptive assessment of the executive functions (EF) (Production of the evaluation item bank).
- \*O1/A2 Design and elaboration in physical format of the set of items for the optimisation of the EF (Production of the intervention item bank).
- \*O1/A3 Review and expert validation related to the content and the estimated items difficulty.
- \*O1/A4 Configuration of the internal structure of the set of tasks and items according to the construction and revision process established.
- \*O1/A5 Initial establishment (expert judgment) of the mediation guidelines (graduated prompts, metacognitive guidance and feedback)
- \*O1/A6 Initial dissemination activities of the project.

The lead partner will coordinate the development and completion of this output by firstly devising a schema to be introduced in the kickoff meeting.

The information will be collected and organized by the lead partner who will draft a review produced for comment and editing before finalising and publishing the output.

**O2: Output Title - Open-access educational web platform on which the games and interactive applications of assessment/intervention will be developed.**

**Output Type - Services / structures – E-learning platform**

The work will be coordinated by Inthecity Project Development.

The platform will be basically developed by Inthecity Project Development and by the Team of Research and Artificial Intelligence Applications of the University of Málaga. This team from the University of Málaga will be essentially in charge of developing the algorithms that will allow adaptability to be introduced into the sequence of the items that the DA/adaptive tasks integrate, and will allow data to be processing by IRT-based techniques. The platform will also include technology that allows neurofunctional data to be collected in the tasks scheduled specifically to apply neuroimaging techniques (fNIRS, EEG, etc.). These work teams will also be in charge of implementing the graduated prompts system into all the assessment tasks.

The development methodology will contemplate the joint work of both these teams to develop all the web platform's functionalities. The sequence of the specific tasks that will lead the platform to be developed requires integrating the different modules that allow all the functionalities described in the project (pp. 115-117).

The sequence of actions that will lead to acquiring this intellectual output will be:

- \*O2/A1 Development of the manage items module.
- \*O2/A2 Development of the manage activities module.
- \*O2/A3 Development of the adaptive implementation module.
- \*O2/A4 Development of the calibrate items module.
- \*O2/A5 Development of the data analysis module.
- \*O2/A6 Dissemination activities of the project.

The lead partner will coordinate the development and completion of this output by firstly devising a schema to be introduced in the kickoff meeting.

**O3: Output Title - Software that includes interactive games and computerised adaptive applications for dynamic assessment and interventions in the executive functions of students with SEN derived from neurodevelopmental and learning disorders.**

**Output Type - Learning / teaching / training material – Toolkit**

The work will be coordinated by Universidad de Zaragoza.

The software will be basically developed by Inthecity Project Development, and by the team from the University of Málaga, which will closely collaborate with the team from the University of Zaragoza and the other partners. The sequence of actions that will lead to the software being developed (including the revision and assessment aspects) will be as follows:

- \*O3/A1 Design and computer development in interactive games format of the set of assessment and intervention items that will make up the computerized adaptive applications device.
- \*O3/A2 Pilot application 1 (standard, non-adaptive application) of a sub-sample representative of the set of items. Review/modification.
- \*O3/A3 Implementation of a Likert scale for the analysis of the degree of satisfaction and perceived quality by the users, technicians and researchers, in relation to the items, games and activities.
- \*O3/A4 Data collection from the pilot application 1.
- \*O3/A5 Calibrated and assembled items using a response model based on the IRT following the initial implementation, in order to empirically establish different levels of difficulty associated with each item, as well as the estimated levels of initial performance established for each student.
- \*O3/A6 Establishment of the mediation guidelines associated with each item according to the difficulty levels established empirically.
- \*O3/A7 The configuration of the iterative algorithms that will make up the adaptive applications that form the assessment device.
- \*O3/A8 The final configuration of the computerized dynamic assessment device and optimisation of executive functions (C-DAOEF) of students with SEN derived from neurodevelopmental and learning disorders.
- \*O3/A9 Staff training that would carry out the pilot application 2 of the C-DAOEF device (dynamic/adaptive format).
- \*O3/A10 Pilot application 2 (dynamic/adaptive format) of a sub-sample representative of the set of items. Review/modification.
- \*O3/A11 Implementation of a Likert scale for the analysis of the degree of satisfaction and perceived quality by the users, technicians and researchers, in relation to the C-DAOEF device.
- \*O3/A12 Data collection from the pilot application 2 (dynamic/adaptive format).
- \*O3/A13 Data analysis. Establishment of the difficulty levels overcome by each student, of the specific difficulties that it presents each student in terms of the items not overcome, as well as of the type and degree of prompts required during the resolution process of the activities to optimize their performance and to solve successfully the items.
- \*O3/A14 Dissemination activities of the project.

Regarding the development methodology, the process output will be a device that will allow implementing games and computerised adaptive applications to students. It will be possible to implement the results of this process on the aforementioned web platform. The application will allow activities to be performed in both their standard and adaptive formats, which could be used in different project phases.

**O4: Output Title - A database containing the record of all the performed applications to be consulted and analysed by professionals and researchers.**

**Output Type - Services / structures – Database development.**

The work will be coordinated by Universidad de Málaga.

This output will be led by the Team of Research and Artificial Intelligence Applications of the University of Málaga. Despite all the partners participating, Inthecity Project Development will closely collaborate with the University of Málaga researchers. The database's configuration will be revised by the other partners, which will provide computer experts with the keys needed for the final output to collect any information considered essential for researchers and professionals. Likewise, the database will be assessed during the dissemination meetings by the potential professional users of the system, who will offer feedback to help improve features.

This output basically contains two milestones:

\*O4/A1 The configuration of the database that will allow to store the information.

Configuring the database which will allow the data obtained from implementing the C-DAOEF device to be saved. These data refer to (a) the right answers/mistakes for each item in the device; (b) the efficient assistance required; (c) the time spent by each student to perform tasks.

\*O4/A2 Processing of the application data that allows to configure the dynamic scores.

Obtaining data, which will allow the dynamic scoring obtained by implementing the C-DAOEF device to be configured. This scoring is defined essentially by (a) right answers; (b) the prompts required while solving tests, and (c) the execution time. They will also allow subsequent analyses to be done. Likewise, this data will allow adaptations and continuous improvements to be made by recalibrating items.

**O5: Output Title - Manual /Tutorial of application and interpretation of the results.**

**Output Type - Learning / teaching / training material – Manual /handbook / guidance material.**

The work will be carried out by all partners and coordinated by University of Presov.

This intellectual outcome will be led by the research group of the University of Presov, in collaboration with all the other partners. This output will take a textual format and could be edited and printed. Also, it will be possible to edit as an electronic format tutorial, by forming part of the platform contents which both researchers and professionals can access. The content in the first part of the Manual will be worked basically by the Team of Research and Artificial Intelligence Applications of the University of Málaga and by Inthecity Project Development. The content of the second Manual part will be basically developed by the teams from the Universities of Presov, Seville and Zaragoza, DYS-centrum and the Cyprus Mathematical Society.

The methodology followed to develop the Manual contemplates its constant revision by the different partners to enhance the quality, simplicity and accuracy of the end result. The Manual

will gradually form as the activities in the device are carried out. Before developing the final manual version, preliminary application instructions will prevail, which will act as a guide to implement Pilot applications 1 and 2. These instructions will be revised and amended depending on the observed requirements until the final manual version has been shaped.

This output basically contains two milestones:

\*O5/A1 User manual - step by step. Guide with which it is intended to facilitate access to the platform and its contents.

\*O5/A2 Manual of application and interpretation of the results.

### **Multiplier Events:**

E1: Multiplier Event Zaragoza (Spain).

E2: Multiplier Event Presov (Slovakia).

E3: Multiplier Event Nicosia (Cyprus).

E4: Multiplier Event Sevilla (Spain).

E4: Multiplier Event Praha (Czech Republic).

The objectives of the multiplier events to be held on Zaragoza, Presov, Nicosia, Sevilla, and Praha, are set out below:

- ✓ Diffuse the different outcomes of this project and the conducted work.
- ✓ Make known in particular the C-DAOEF device for the dynamic assessment (DA) and the optimisation of executive functions (EF) in students with neurodevelopmental and learning disorders.
- ✓ Act as an initial space for training and for expert validations at national level, which address the potential users of this tool (special education and hearing-language teachers, counsellors, educational psychologists, etc.).

The multiplier event will be held on one day, in the morning and the afternoon, and will include two different parts.

1. A session to present the project and its outcomes.

Expected duration: 2 hours

At least 40 participants will attend

Its fundamental objective is to present the outcomes obtained while the project was underway and to make known in particular the C-DAOEF device. The participants will include (among others):

- ✓ Representatives of the public administrations interested in the progress made with and the outcomes obtained from the project.
- ✓ Representatives and management teams from the education centres and associations participating in the project as associated partners.
- ✓ Special education and hearing-language teachers, counsellors and educational psychologists interested in applying the project outcomes.

During the presentation session, the participants will have the chance to explain their doubts and concerns about certain aspects like:

- ✓ Accessing the platform and materials

- ✓ The technical/training requirements of professional users
- ✓ The maintenance, sustainability, transfer and exploitation of the project outcomes
- ✓ Accessing training and the possibility of establishing training courses with follow-up.

As a result of this event, attendees will be invited, especially representatives of the public administration, and the associated partners, to actively participate in diffusing the project outcomes over their networks and via mass media, and the following validation/transfer studies.

## 2.- Initial training session and expert validation at national level.

Expected duration: 4 hours

At least 30 participants will attend

The main objective is to act as a space for the initial training and expert validation for potential users (professionals).

The participants will be the potential users of the tool –special education and hearing-language teachers, counsellors and educational psychologists– interested in applying the project outcomes.

The session will include the following points:

- ✓ General knowledge about the C-DAOEF device and the Manual of application and interpretation of the results.
- ✓ Knowledge of both the device's structure and contents.
- ✓ General description of the device and implementing the games and the assessment/intervention activities.
- ✓ Guided access for and tests by users (practical sessions to work with the project outcomes).
- ✓ Expert validation by using the Likert-type assessment scale and work groups.
- ✓ Improvement suggestions and proposals. Collect the remarks made for the next project steps and directions.
- ✓ Information about the pilot and the experimental applications and about the initial validation processes.
- ✓ Collect the remarks made about using and transferring outcomes.
- ✓ The next networking sessions about the interchange of practicals and future cooperation.
- ✓ Aspects related to participating in the next validation studies.
- ✓ Aspects related to training other professionals (accessing training and materials, possibility of determining training courses with follow-up, etc.).

The main partner will compile and issue an assessment report on this event.

There will be a list of signatures at the end of the event, and a short illustrated report will be prepared.

### **Annex III Description of the Project**

Research has evidenced the adaptability and plasticity of our cognitive functioning and the constructive and interactive character of learning processes. Nonetheless, schooling practice often emphasises the use of static-type diagnostic tests by adopting an evaluation model to assess only the product of learning. This is particularly relevant for evaluating special educational needs (SEN). In these cases, static testing offers very limited information that centres on execution deficits. This information does not allow specific difficulties that students display while performing activities to be specified and scarcely helps to identify the optimising conditions of the learning process. Accordingly, an evaluation is not often linked to educational interventions to optimise development and learning.

One of the main challenges of inclusive education in Europe consists precisely in providing teachers with tools and adaptive resources that serve as effective supports to care for the education of students with SEN. In line with this, teachers perceive that support materials are lacking, as is guided access to such material, which is one of the most significant weaknesses of education systems in relation to inclusive education. We believe it is most relevant to deal with this challenge by a transnational approach that contemplates quality education for all everyone and caring for diversity as the fundamental and shared principles of socio-education policies.

To respond to this situation, the objective of this project consists of developing and validating a device for computerised dynamic assessment (DA) and optimisation of the executive functions in students with SEN derived from neurodevelopmental and learning disorders (C-DAOEF). We include Autism Spectrum Disorder (ASD), Attention-Deficit Hyperactivity Disorder (ADHD), Intellectual Disability (ID), Specific Learning Difficulties (SLD) and Specific Language Impairments (SLI). Executive functions (EF) constitute a set of skills involved in controlling and regulating cognitive functioning that is determining factors for learning, flexible conduct adjustments, social functioning and academic success, especially in children with SEN. The C-DAOEF device will contemplate several levels of difficulty and graduated prompts related to each item. Its essential characteristic consists in the dynamic adaptation of these elements to the level of students' progressive competence. The system will allow the sequence of performed actions and execution times. Its application will help obtain information about (a) the levels of difficulty shown while dealing with different activities; such as (b) the type and degree of support required to successfully solve them.

The sequence of activities to be performed contemplates 1. Initially designing both the content and structure of assessment and intervention activities; 2. Establishing the graduated prompts system; 3. Designing the web platform with all its functionalities; 4. Computerising the set of items and designing interactive games; 5. The application and the initial validation; 6. Calibrating and assembling the items according to the results; 7. Configuring the C-DAOEF device; 8. Configuring the database to be used to record and store information. 9. Preparing the manual of application, and establishing diffusion channels and teacher training. The addressed population is composed by: (1) Schoolchildren aged between 4 and 16 years with SEN derived from neurodevelopmental and learning disorders; and (2) Teachers of special education, and hearing and language, educational psychologists, speech therapists and classroom teachers who usually work with school children in inclusive education contexts. The expected results should include designing games and activities for DA and optimising EF; a web platform with specific functionalities; software containing the C-DAOEF device; the database to allow professionals and researchers to make inquiries; the application manual and interpreting the results.

**The end products will be:** (1) The design and content of the activities and games for DA and for the optimisation of EF in students with SEN derived from neurodevelopmental and learning disorders in a physical format (pdf). (2) An open-access educational web platform on which the

games and interactive applications of assessment/intervention will be developed. Users' activity (levels of difficulty of the performed items, number of right answers, number and typology of mistakes, number and type of prompts and required suggestions, and the execution times) can be recorded online. The platform will include technology and will enable adaptability to be introduced into the sequence of items and tasks, and data processing using item response theory (IRT) techniques. It will also include technology that allows neurofunctional data to be collected in the tasks scheduled specifically to apply neuroimaging techniques (fNIRS, EEG, etc.). (3) Software that includes interactive games and computerised adaptive applications for DA and interventions in the EF of students with SEN derived from neurodevelopmental and learning disorders. (4) A database containing the record of all the performed applications to be consulted and analysed by professionals and researchers. (5) An application manual and interpretation of the obtained results.

The project offers high transfer potential according to the requirements detected in relation to the population group it addresses. The project intends to contribute to bringing about significant changes in assessment and intervention processes that, in turn, allow optimised learning. It is expected to particularly allow students with neurodevelopment and learning disorders to participate and learn by contributing to their socio-educational inclusion process.

The innovations of the present project consist basically that (a) aims at EF, metacognition and language, and (b) aims to develop a computerized dynamic assessment device and optimization of EF in students with neurodevelopmental and learning disorders (ASD, ID, ADHD, SLD, and SLI). More specifically, the main characteristics of the proposal consist of:

\*Intervention-oriented adaptability and evaluation in EF: this project contemplates developing a computerised adaptive applications device, which comes as interactive games for the DA of EF, and for the cognitive enrichment of students with SEN derived from neurodevelopmental and learning disorders. The different processes involved in learning, several levels of difficulty and a graduated prompts system are contemplated. All this is offered according to the responses that students provide while performing activities. Its basic characteristic consists precisely in the contents and the sequence of presented items by adapting to the progressive level of competence shown by students. Therefore, the items presented to each student depending on the solving capacity that he or she displays at all times. From students' performance, a dynamic score can be obtained, which is defined according to (a) the initial and end levels of difficulty; (b) right answers obtained according to attempts made; (c) the number and typology of mistakes made; (d) the number and type of prompts required; (e) the execution time. This device will allow the assessment/intervention process to be individualised, which still allows parameters to be established to compare results by methods taken from the IRT. The information acquired from applying the device will contemplate data about the assistance that proved efficient during the process, which will allow successful intervention improvement-oriented patterns to be inferred. The main difference (and advantage) over conventional assessment/intervention tools is precisely its adaptive capacity, and its dynamic orientation because they allow different mediation patterns to be included while performing tasks to evaluate students' response to the intervention, and to obtain information to help make improvements.

\*Main functional, operational and productive differences. The items calibration process based on IRT models (Embretson & Reise, 2000) provides greater accuracy when configuring the items making up the device's different interactive games and applications. During the evaluation process, configuring computerised adaptive applications allows the acquired information to be more accurate because subjects are presented with only those items with a higher level of discrimination, and it avoids applying items that are too easy or difficult for subjects. The essential advantage of the database lies in the possibility of not only constantly enriching the developed items bank but also recalibrating items according to the responses obtained in



successive applications. The system will also allow information to be acquired about the type/degree of support that students require to successfully solve each item, which will guide the evaluation process towards intervention and improvement.

\*The implementation of the C-DAOEF device will generate the following benefits to the professionals: the automatic storage of a series of data that are relevant in the evaluation/intervention process (right answers, mistakes, execution times, offered graduated prompts, percentage of right answers, level of performance, characteristic curves of items, psychometric indicators, discrimination index of each item, etc.). The recording and analysis of neurofunctional data and the application of non-invasive functional cortical brain mapping techniques will allow to better understand subjects' profiles in neurocognitive and behavioural terms. The possibility of having all these data and analysing them in an integrated manner can offer valuable information about the intervention and improvement of the evaluated processes.

\*The benefits for users (students) stem from the greater accuracy obtained with which their performance can be evaluated. This means offering support systems that better adapt to their needs.

#### Tasks and responsibilities of the partners

##### University of Zaragoza

\*It will coordinate the project management.

\*It will lead the IO 3: Software with interactive games and adaptive applications, computerised for the dynamic assessment and intervention in executive functions (EF) for students with SEN derived from neurodevelopmental and learning disorders.

\* The tasks it will participate in: design, plan and coordinate the project. Design the games and applications for the dynamic assessment of EF involved in learning. Design the games and applications of intervention for the enrichment and cognitive improvement of subjects with neurodevelopmental and learning disorders. Participate in the pilot application and diffuse the obtained results.

##### DYS-centrum

\* It will coordinate the dissemination of the project.

\* The tasks it will participate in: design the games and applications for the dynamic assessment of EF involved in learning. Design the games and applications of intervention for the enrichment and cognitive improvement of subjects with neurodevelopmental and learning disorders. Participate in the pilot application and diffuse the obtained results.

##### University of Presov

\*It will lead the IO 5: Manual / tutorial of the application and interpretation of the obtained results.

\* The tasks it will participate in: design the games and applications for the dynamic assessment of EF involved in learning. Design the games and applications of intervention for the enrichment and cognitive improvement of subjects with neurodevelopmental and learning disorders. Design and write the manual / tutorial of the application and interpretation of the results and the followed process. Participate in the pilot application and diffuse the obtained results.

##### University of Seville

\*It will lead the IO 1: Design and the content in the physical format (pdf document) of the activities and games for the dynamic assessment and the optimisation of EF in students with SEN derived from neurodevelopmental and learning disorders.

\* The tasks it will participate in: design the games and applications for the dynamic assessment of EF involved in learning. Design the intervention games and applications for the enrichment

and cognitive improvement of subjects with neurodevelopmental and learning disorders. Participate in the pilot application and diffuse the obtained results.

University of Málaga

- \* It will lead the IO 4: Database that contains the registry of the applications made for the consultation and analysis of professionals and researchers.

- \* The tasks it will participate in: develop the algorithms that will allow adaptability to be introduced into the sequence of the items that make up the dynamic/adaptive assessment tasks. Implement the graduated prompts system in all the computerised assessment tasks. Participate in the pilot application and diffuse the obtained results.

Cyprus Mathematical Society:

- \*It will coordinate the evaluation of the project.

- \* The tasks it will participate in: design the assessment/intervention games and applications in the specific learning difficulties in mathematics. Participate in the pilot application and diffuse the obtained results.

The Inthecity Project Development:

- \*It will lead the IO 2: Open-access educational Platform web on which the assessment /intervention games and interactive applications will be developed.

- \* The tasks it will participate in: perform the computer engineering of both the educational web platform with all its functionalities and the games and interactive applications. Participate in the perform of the project website, the pilot application and diffuse the obtained results.

All the partners are expected to carry out dissemination activities throughout each phase of the project, with the objective of impacting the stakeholders beyond the consortium. The NGO DYScentrum leads the dissemination of the project and will manage a dissemination plan supported by the plans of the local partners. The dissemination plans will be reviewed and updated during the project, incorporating new interested associated partners, communication methods to be used, roles and responsibilities of each partner, and specific activities and key messages that will be transmitted.

The plans for the dissemination and exploitation of the results will complement the common strategy. The materials and dissemination actions will include the following: project website, academic references, project brochures, electronic bulletins, articles, public events, dissemination reports, corporate identity, etc. Likewise, the coordinators will be supported in the management and evaluation activities at all levels by all project partners. The project management and evaluation will keep a close and permanent eye on the results of internal quality management actions and will decide on possible steering actions from these. Frameworks, instruments and procedures will be presented and discussed at the kick-off meeting and revised continuously.

For the **Partner**,  
The legal representative

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Peter Konya  
Rector of University of Presov

For the **Beneficiary**,  
The legal representative

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Dr. José Antonio Mayoral Murillo  
Rector of Universidad de Zaragoza

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*[date]*

*[date]*

Done in Zaragoza, Spain, and Presov, Slovakia, in two copies.