

Erasmus+

VASTERAS KOMMUN

- **Erasmus+**
- **Swedish Council for Higher Education**
- **Cooperation for innovation and the exchange of good practices**
- **Strategic Partnerships**
- **Strategic Partnerships for school education**
- **Call 2015**
- **Round 1**
- **Grant Agreement Number 2015-1-SE01-KA201-012339**
- **Report Type Final**
- **Date of submission 28/09/2017**

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Main content:	Report Form
Number of attachments:	1

General Information

This report form generated from the Mobility Tool+ consists of the following main sections:

- **Inactive Organisations within Project Activities**
- **Context:** this section resumes some general information about your project;
- **Project Summary:** this section summarises your project and the organisations involved as partners;
- **Description of the Project:** in this section, you are asked to give information about the objectives and topics addressed by your project;
- **Project Management**
- **Implementation:** this section asks for information about all the stages of the project: implementation of main activities including practical arrangements, participants' profile, impact, dissemination of the results and future plans;
- **Follow-up**
- **Budget:** this section gives a detailed overview of the final amount of the EU grant you request;

For your convenience, some parts of this report are prefilled with information from the Mobility Tool+

1. Context

this section resumes some general information about your project;

Programme	Erasmus+
Key Action	Cooperation for innovation and the exchange of good practices
Action	Strategic Partnerships
Action Type	Strategic Partnerships for school education
Call	2015
Report Type	Final
Language used to fill in the form	EN

1.1. Project Identification

Grant Agreement Number	2015-1-SE01-KA201-012339
Project Title	A collaborative European inquiry into Technology Enhanced Mathematical Pedagogy
Project Acronym	TEMP
Project Start Date (dd-mm-yyyy)	01/09/2015
Project End Date (dd-mm-yyyy)	31/08/2017
Project Total Duration (months)	24
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1.2. National Agency of the Beneficiary Organisation

Identification	Swedish Council for Higher Education
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For further details about the available Erasmus+ National Agencies, please consult the following page:

https://ec.europa.eu/programmes/erasmus-plus/contact_en

2. Project Summary

this section summarises your project and the organisations involved as partners;

Please provide a short summary of the completed project.

Please recall that this section [or part of it] may be used by the European Commission, Executive Agency or National Agencies in their publications or when giving information on a completed project. It will also feed the Erasmus+ Dissemination platform (see annex III of Programme Guide on dissemination guidelines). Main elements to be mentioned are:

- Context/background of the project;
- Objectives;
- Number and profile of participating organisations;
- Description of undertaken main activities;
- Results and impact attained;
- If relevant, longer-term benefits.

Please be concise and clear.

The project emerged from the desire across mathematical cultures within the partnership to enhance the experience of math learners in the age group 11 to 19 in secondary schools. The partnership was composed by the administration for child and education in the Swedish City of Västerås, the Colegiul National A T Laurian in Botosani, Romania and the UCL- Academy in London, UK. It was well composed as the mathematical cultures represented within this project each approach the teaching of, the learning process of and the output of math slightly differently, yet all recognise a common need to address the three pedagogic themes, Questioning, ICT enhanced learning and Assessment as Learning. The project was therefore based on drawing these three elements together to enhance questioning, assessment and practices of blended learning. For this to be successful a new pedagogy needed to be developed. We have therefore promoted collaborative teacher development within Math pedagogy, through a shared approach to research, a shared project development and application, shared dissemination of findings and through a joint teacher training enabling math professionals to share practice across European boundaries. Each partner is associated with at least one institution for higher education that has been involved in the project as advisers, part of steering groups and disseminators. Through this projects three partners, representing three mathematical cultures, each with their specific skill set concerning each aspect of the pedagogy and research process, have worked together to devise, trial, apply, review a Technology Enhanced Mathematical Pedagogy (TEMP).

Between September 2015 and June 2016, working collaboratively to develop TEMP each partner has applied TEMP to a particular mathematical concept and cohort of students relevant to the context of each partner: for example underachieving boys learning algebra or functions. An application of TEMP within a partner institution has been facilitated by three educators working in research triads, the City of Västerås had two triads working in lower and upper secondary schools respectively. The research triad consisted of three math educators who had opted into the project and were guided by a project lead within each institution. Within each institution an Action Research approach has been used as the methodology of research. A commonly agreed and collaboratively developed method was applied at the start and end of each phase to measure attitudinal change of both students and teacher participants. The same process was applied with a new focus for TEMP, based on the results of the first run between September 2016 and the summer of 2017. To further facilitate the transnationality and improve the quality of the final results, the implementation and the sustainability of the project results a joint staff training was carried out in the spring of 2017. The project has been widely disseminated through local, regional and national networks of the partners themselves, and through the networks of the associated institutions for higher education and national agencies for education. The project is expected to have an direct impact on the teaching and learning of Mathematics, which in turn will have an impact on the students results. It

will impact the training of future teachers as well as the continuous professional learning of the teachers active in the European schools today. Through Questioning, teachers who put stimulating questions to their students, new innovative ways to use ICT tools, and the use of Assessment as Learning, comes increased interest in math and with that increased motivation and an elevated ability to manage advanced mathematical reasoning. This in turn will enhance the results. This is particularly the case for male learners of math where all partners felt that the gap between the genders was a concern, but is also promoting the quiet girls ability to discuss, ask questions and express themselves.

It is hoped that the report based on the findings of developing and applying variations of TEMP across two years and three mathematical cultures will be of value to a large range of interested parties. We hope that the ICT tools developed through the project, that are available through our project website will be of use to a range of educators. We also hope that this project will lead to further collaborative projects, as we intend to apply for a new Erasmus+ strategic partnership for the development of innovation in school education further enhancing ICT in Mathematics, adding some new partners.

2.1. Summary of participating organisations

Role of the Organisation	PIG of the Organisation	Name of the Organisation	Country of the Organisation	Type of Organisation	Accreditation of organisation (if applicable)	Partnership Entry Date	Partnership Withdrawal Date
Applicant Organisation	968814952	VASTERAS KOMMUN	Sweden	School/Institute/Educational centre – General education (primary level)		01/09/2015	31/08/2017
Partner Organisation	929556821	UCL Academy	United Kingdom	Other		01/09/2015	31/08/2017
Partner Organisation	948554950	Colegiul National A T Laurian Botosani	Romania	Other		01/09/2015	31/08/2017

Total number of participating organisations

3

3. Description of the Project

in this section, you are asked to give information about the objectives and topics addressed by your project;

Were all original objectives of the project met? How were they reached? Please comment also on any objectives initially pursued but not achieved in the project.

In order to achieve our three key objectives we developed a model of 'practitioner research' which, through the design and delivery of standardised systems, enabled each triad to identify an ICT tool, a Math topic, a desired outcome, to design a method of application, to apply, review, refine and evaluate this application to then be followed by inter-triad peer review, synthesis and redesign. This highly academic approach gave the process clear structure, gave it rigour and enabled objectives 1 and 2 to be fully realised and for a refined objective 3 to be met. Our primary objective was to address a pressing need for the development of new methodologies to better utilise the opportunities that ICT in teaching Math could bring. We identified two areas, improve the results of learners using modern techniques (ICT tools) and developing equitable ICT tools which would enable blended learning adaptable to an individuals needs. To these ends we effectively identified tools, adapted these to meet our requirements, implemented and evaluated their usage and drew upon the broad professional experiences of the project group to offer feedback before the tools application was refined and applied again in a differing context. This enabled us to trial a range of ICT tools including Socrative, Zaption, Geogebra and to collectively identify which tools were the best for different purposes; real-time feedback, increasing engagement, hosting flipped-learning. This was highly successful with all participants engaging with a variety of programmes, becoming adept in their use, increasing confidence and as part of this process enhancing their self perception as effective educators of Mathematics. We were able to meet this objective by producing 'Recipe Cards', a step by step application of a named IT tool for a particular purpose linked to Math education. These cards not only represent an effective engagement with the research process but also act as a means for further dissemination of the groups collective work to a wide audience.

We also sought to promote and facilitate transnational teacher development through shared experiences and collaborative research engagement facilitated through the applied design, delivery, evaluation and dissemination process. Through highly structured meetings hosted within each country we were able to offer opportunities to collaborate, communicate and understand the similarities and differences across these Math cultures. We successfully achieved this through the design of the project with participants, indicated through an 'exit' questionnaire, favourably commenting upon these interactions and what they gained from them. Interesting to note is that participants felt that this process not only benefited them as educators but as people enhancing a range of 'soft' skills.

We initially identified that a third key objective was to address the emerging disparity within rates of progress between Boys and Girls in Mathematics. We had an expectation that an application of ICT tools to traditional Math teaching may impact

upon male attainment within mathematics, in particular basic Math skills. Through discussion and following an engagement with the literature we agreed as a group that an area we sought to address was engagement and motivation within Math learning both in and out of the classroom as a causal factor effecting male achievement. A review of the literature linked to male underachievement indicated that female maturation often led to increased in-class confidence thus resulting in female learners engaging more regularly in public displays of learning e.g more often to answer Math questions when asked to do so. This seems in many cases to result in boys being less likely to offer an answer thus impacting on their 'visible' progress within Math. Additionally research on adolescent brain development highlights the need for teenagers to prioritise the development of their social self before their academic self, this manifests itself visibly as a decreased engagement in subjects felt to be not 'necessary' 'authentic' 'valuable' or 'interesting'. This is more prevalent amongst male learners and learners of Math. As such throughout the project we sought to explicitly address the engagement factor and how we could use ICT tools to facilitate more meaningful questioning, to offer real-time feedback and to enable progress at a learners personal pace but to also enthuse and engage learners with a mode of learning that they found real, authentic and meaningful. This important focus of our work was evident within each of the proposals and enquiry questions developed by each triad through the project (8 in total). An assessment of the benefits of ICT enhanced mathematical pedagogies features within both the interim and final reports, with the final reports available through our website www.projecttemp.org

What were the achievements of the project? Please provide a detailed description of the project results (if they are not listed in the sections "intellectual outputs", "multiplier events" or "learning, training, teaching activities"). Please describe achievements exceeding the initial expectations, if relevant.

Objective 1: Our primary objective was to address a pressing need for the development of new methodologies to better utilise the opportunities that ICT in teaching Math could bring. This was articulated throughout the investigations conducted and reported upon by teacher participants.

Objective 2: Our goal was to promote and facilitate transnational teacher development. On reviewing and reflecting upon the impact of this project upon practices as educators all felt that their practice had positively changed. The majority felt that their ability to use ICT was enhanced and that they would wish to pursue this aspect of practice further. A greater sense of mathematical cultural appreciation across countries was achieved alongside a greater awareness of practices across educational phases even within the same country was developed; "A sense of commonality over country borders.", "good opportunities for co-operation and communication with European partners" "The collaboration in my triad with teachers that work in same grade but also very good discussions with the other triad, it has been very interesting discussions between lower secondary and upper secondary. And also to discover similarities and dissimilarities between the countries curriculum and every day work.", "Students (teenagers) are the same.", "discussions during the TEMP meetings with colleagues from different countries as well as lesson observations". Beyond our expectations participants reported upon the way they had

altered their methods of teaching as a result of engaging with the project; “Using flipped classroom with questions as my pre-understanding for planning my lessons.” “I have made changes in my ways of teaching, and hopefully I will continue develop my practice further.” “the flipped learning makes my planning different than before. My expectations on the students change, I expect them to know something when they come to class.” “I have moved towards a more creative way of presenting, assessing and supporting students ever since I started the project. I am highly motivated in continuing to develop my practise and become better in using IT in maths lessons.” and “Although I'm not teaching maths, I have learned new ways of teaching during this project.”

The approaches undertaken to facilitating this project also enabled some educators to recognise that their general teaching skills and soft skills were developed as a result of collaboration with new and ‘different’ peoples, “I've learned about some new methods and ideas of teaching and how to increase the interest students have in learning.”, “My social skills were definitely improved and I think I become a better person.” “improved skills in communication, collaboration and professional knowledge”. All participants reported an increased knowledge of using IT tools within mathematics when compared to the baseline questionnaire. This increase was the most within the Romanian and UK triad. This was matched by a reported increase in confidence in using IT tools within the teaching of Math.

We also sought to have broader impact and to achieve this we developed and disseminated resources others could access and use. We worked to develop and trial these resources before reporting on them through presentations and through a final written report. We have made all presentations and reports available through our project website to enable interested parties to understand the process that led to the final tools. These final tools have taken the form of 'Recipe Cards', step by step guides on using a developed tool within the Math classroom. These cards have been written for teachers by teachers and have been placed upon our website so that access is available to all. These cards also represent the collaborative efforts of all transnational partners through this programme of teacher development.

Objective 3: Address the emerging disparity within rates of progress between Boys and Girls in Mathematics with a particular focus upon learner engagement. The tool developed by each triad had a particular focus on increasing engagement.

Throughout the evaluation phase students voice was collected to ascertain the extent to which the tools increased engagement in and out of the class. Evidence, available within the presentations and final reports, indicates that the application of flipped learning using the Zaption and Screencast-O-Matic tools had a positive impact on student engagement with learning Math independently at home and then in class when class based activities responded to the assessed outcomes of these online activities.

In what way was the project innovative and/or complementary to other projects already carried out?

The project was highly innovative in two ways. The first was the innovate use of a professional enquiry process designed specifically for this project (one which is now being used across two UK schools to support practitioner research). This included

opportunities to engage regularly with the research literature and to meet with and explore the latest research in the field of both Math teaching and ICT development. This enabled a systematic and rigorous approach to research which was applicable across transnational boundaries. This was possible due to the deliberate inclusion of a research specialist as part of the project coordination team. The second was our innovative use of existing ICT Tools. In many cases we took an existing tool, adapted and enhanced its use, this was the case with the UK application of Google Forms. This not only increased participant confidence and knowledge but also paves the way for future activities linked to developing bespoke online tools with IT companies and developers. This has already begun with a UK company called RealSmart, and the Swedish VKlass.

The project as a whole fed back into an ongoing project within Vasteras Stad. A number of members of the Swedish triads and the Swedish project coordinator were active participants in the "count with/on Vasteras" project which has been active since 2012. This project's defining feature is the development of professional competencies and tools for improving the delivery of Math education across the school phases within Vasteras. Problem solving, formative evaluation and blended learning are three features of the "count" project and were key features of the TEMP project. As such a symbiotic relationship was formed where research as part of the "count" project fed into TEMP and the TEMP resources and findings fed back into the "count" project. This was most evident during project meetings within Vasteras. In the first meeting academics linked to the "count of Vasteras" project presented their methods, research and some of their tools, in particular methods of using the IT tool Socrative to enhance mathematical questioning as a means of assessing, providing feedback and then allowing feedforward to occur. This directly impacted upon the work of the UK triad where the principles of using Socrative to pose questions and to offer real time assessment and feedback were implemented. For the three teacher researchers involved in both projects they actively melded together their activities providing and trialling tools for both audiences; "count" and TEMP.

Throughout the project members of the London based triad were able to disseminate their ongoing research and tools with a community of London Math educators. The London borough of Camdens' Math Community is a formal grouping of Math teachers which is an ongoing project to share Math knowledge and enhance mathematical collaboration between professionals. TEMP has impacted positively upon this project with members of the UK triad presenting to the Camden group three times over the two years, sharing with them methods of design and delivery concerning the use of Socrative and the use of using real-time data and feedback methods to enhance engagement and performance within Math learning.

Within Romania the participating teachers were able to draw two projects together providing opportunities for students to develop skills benefiting both the TEMP project and an IT programming project; details found at phpinatl.org. The Romanian TEMP lead also acted as project coordinator on the IT project thus enabling cross pollination of ideas. Specifically students were selected to be part of both projects enabling them to apply newly found programming skills in the service of developing IT tools for TEMP and by doing so taking enhanced programming skills back to the IT specific project. This deliberate drawing together of projects enabled much more to be achieved and acted in itself as a means of addressing Objective 1 and 3.

What was the most relevant horizontal or sectoral priority addressed by your project?(multiple selection possible)

- Enhancing digital integration in learning, teaching, training and youth work at various levels

What were the other relevant horizontal or sectoral priorities addressed by your project?(multiple selection possible)

- Addressing low achievement in basic skills through more effective teaching methods

In case the above selected priorities are different from the ones in the application, please explain why.

N/A

What were the most relevant topics addressed by your project?(multiple selection possible)

- Key Competences (incl. mathematics and literacy) - basic skills
- ICT - new technologies - digital competences

In case the selected topics are different from the ones in the application, please explain why.

The assumption was that a more ICT-based and focused mode of learning Math would benefit all students, but that the group of boys that are underachieving in Maths would benefit in particular, thus contributing towards gender equality. In the initial proposal this was broad and discussed attending to the gender disparity. We moved away from this objective by looking more specifically at the relationship between innovative teaching methods, Math, IT tools and students engagement with learning Math. Through discussion and following an engagement with the literature we agreed as a group that an area we sought to address was engagement and motivation within Math learning both in and out of the classroom as a causal factor effecting male achievement.

To track boys over time and to narrow this specifically to attainment we felt would not enable us to effectively, in the time available, take full advantage of the resources at our disposal during the project. The fact that there would be changes in the student population over two years meant that longitudinal studies would not be viable. As such the third objective evolved to be more focused upon engagement with learning rather than specifically addressing the gender gap.

4. Project Management

Which activities and indicators of achievement (quantitative and qualitative) did you put in place in order to assess whether and to what extent did the project reach its objectives and results? How did you measure the level of success?

At the beginning of the project a survey questionnaire using common questions was conducted with participating teachers and students concerning the quality of the teaching, the use of ICT Tools, confidence in use of ICT Tools and the attitudes students held towards mathematics. The questionnaires were followed up with a new survey after the first year and then again towards the end of the project which enabled us to measure a change in professional competency and self reported competencies as a result of an engagement within the project. The original plan was to make interviews, but the partnership opted for questionnaires as the risk that the persons carrying out the survey will affect the result is less. As such a standardised digital questionnaire was applied. This helped to monitor professional change at the level of the primary target group - the teachers.

All testing activities were systematically documented according to previously agreed set criteria, accumulating an extensive base of relevant data. This included the application of a standardised approach to summarising research articles. All such documents were shared through the website with participants and then were collected, once complete, in a dedicated and open folder on Google Drive. This enabled monitoring of achievement against objectives throughout by the coordinating team at the local and international level. At each project meeting participants presented to the other participants their journey so far, again following a standardised format. This enabled a structured collection of suggested learning supporting activities using modern pedagogy with the support of ICT Tools. In order to ensure that the work is proceeding according to plan, all documentation has been continuously evaluated in relation to the objectives of the project by the group of coordinators and participating teachers. Articles, presentation and open discussions during meetings were all used to monitor achievements with the successful completion of design, trial, implementation and evaluation activities as indicators of achievement.

The local working groups have met regularly to discuss and follow up their activities. All activities have been followed up and discussed on all project meetings according to plans, including implementation and dissemination activities. The visiting teachers have observed their colleagues using set indicators in class, and have provided feed-back in the discussions that followed. All activities were planned for and were clearly shared with participants prior to meetings.

A short-term joint staff training event was carried out in April 2017. It was a combination of lectures, work-shops and class observations. The participating teachers brought all their new knowledge to the training and in doing so also contributed towards the implementation and evaluation of the projects results.

The primary means of measuring success used qualitative measures.

See Section 3 for a detailed discussion of measured successes for each of the Objectives, which were qualitative and physical in nature. Data captured from both

teacher participants and students was done so in a qualitative form and was designed to measure changes in attitude, belief and self-perception. We strongly felt that this means of measurement was the most relevant when exploring Objective 2 and 3. The creation of 'Recipe Cards' born from a rigorous design process exist as evidence of the successful completion of Objective 1.

How were the quality, effectiveness and efficiency of the project monitored and evaluated (include budget control and time management)? Please mention the involved staff profiles and frequency of such activities.

All plans for the implementation of the project, such as general and local activity plans, communication plan, dissemination plan, and budget have been continually followed up by the coordinators. Skype meetings have been fewer than planned, and instead most of the communication between the coordinators took place on e-mail. It has been frequent and efficient. The division of work has been smooth, as has the time management which has followed the plan.

The partnership decided not to divide the funds. The coordinating partner has therefore had the responsibility to manage the budget to make sure that the costs have been covered for all partners depending on their needs, tasks and persons participating. The project leader has had the support of the economical department of the city, as well as the EU-coordinator for the schools of Västerås. This has been a successful way of making all ends meet. This has also led to the possibility of an extra final meeting between the coordinators in Västerås for the conclusions, the future planning and for the completion of the final report.

If relevant, please describe any difficulties you have encountered in managing the implementation of the project and how you and your partners handled them. What measures were used to handle project risks (e.g. conflict resolution processes, etc.)?

The three partners all come from countries outside the EMU, which means that the financial management has had to deal with four different currencies (including Euro). This has led to additional work and loss of money in often double currency exchanges. There has been no need for conflict resolutions.

5. Implementation

this section asks for information about all the stages of the project: implementation of main activities including practical arrangements, participants' profile, impact, dissemination of the results and future plans;

Please describe the activities organised by your project and elaborate on the methodology you applied. Please provide detailed information in particular about the project activities that were supported by the grant for Project Management and Implementation.

It was deemed the most appropriate methodology for this project to use an Action Research approach termed Practitioner Research. This enabled us to firmly root the research into the daily practice of participant practitioners; our primary target group. Teachers are not researchers as such we designed tools that would enable them at every step to engage in an enquiry process. This enquiry process was supplemented with a recognised Design Process drawn from the work of Kolb. Qualitative rather than quantitative measures were the main forms of data collected however mixed methods were used in individual triads to meet their specific needs and to utilise their specific skills sets. A collaborative approach was developed which is why we chose to create working triads and to enable ever increasing scales of collaboration across the project from individual to triad to whole group interactions. This collaboration and the high levels of intercultural communication was a key part of the design as this would best facilitate our goals of transnational professional development.

The participating teachers were working in triads. There was one triad in UK, one in Romania and two triads in Sweden. In Romania the target group of students was from lower secondary school. The Swedish partner had two triads, one for the lower and one for the upper secondary schools as they were differently organised and belong to different internal and external networks. In UK, in first year, the teaching staff group consisted of 2 maths teachers and a project coordinator (non maths teacher), whereas on the second year, as the project evolved, a full maths triad of teachers was formed to support the developments of the project. All teachers involved in the project are teaching all key stages (3 to 5) and all different ability sets.

Each partner had a local project leader forming a group of coordinators ensuring a good execution. The four triads took part of all project tasks except administration. They worked together with the other triads using the pedagogic themes: Questioning, ICT, Assessment as Learning and apply them to the Mathematical concepts. Every triad planned an intervention plan at the beginning of each project year and followed this plan during the school year. At each transnational meeting project, every triad presented a report of all these activities and results in front of the other partners, shared experiences, opinions and made the adjustments in their activity plans with the partners help.

The problems identified for the target student groups in those three countries covered the main research activities proposed in the application form, such as: what are the ways to make learning more efficient by using ICT tools, how can we improve the benefits of questioning in the learning process, and how can assessment contribute

to the learning process.

Between transnational meetings each triad organised regular meetings or extra-classes to adjust the process of implementation of each intervention plan or to create resources for the classes, sharing their experience using ICT tools. For example during the Romanian teachers meetings, each teacher shared the experiences of teaching with ICT tools with the colleagues. Also, there were extra-hours of working in collaboration with the best students to develop a software for geometry and to collect and organise it on the schools website. In the first year of the project, three teachers wrote different research articles, related to the project objective and in the second year, the coordinator put all the articles and planned lessons in a book which was printed and shared in the local community. Computer Science teachers involved in the project managed the resources of the website and made special sessions of assesment for students in the college laboratory. This exemplifies the manner in which the participants of this project continuously engaged in achieving the projects objectives.

At the end of every intervention plan, each triad had organised work-hours for producing evaluation tools, and after applying these tools to students, and to analyse the results. Every triad prepared and sent periodically relevant documents to the administrator of the project website to upload them.

Before each transnational meeting, all the teachers worked collaboratively to create presentations of their results to present them in front of the other partners.

All presentations, plans and reports can be found on the project website www.projecttemp.org

How did the project partners contribute to the project? Please detail specific competences brought in by the partner organisations.

The project created a number of opportunities for individual participants to contribute skills, knowledge and their understanding, all of which was done in a manner which would benefit their initial triad and ultimately the wider group as a result of collaboration.

The coordinating team was constructed to bring together complimentary skills to enhance collaboartion from the centre out. So, from the first meeting, every teacher was guided in the practitioner enquiry process by the researcher Robert Gratton working with UCL University. He created a guideline for participants and shared valuable experience in research process with the participants. Bodil Lovgren brought to the Group expertise in leading Math training and development across schools drawing upon her position as the city of Vasteras' Math coordinator. This was vital in enabling access to the latest research and pedagogy within Math education. Daniela Cardas brought to the coordinating group expertise in ICT and programming (informatics). This drew upon her role as teacher of Informatics and coordinator of a number of Projects linked to ICT more broadly. This was invaluable in helping shape our collective expertise of applied ICT. Ulrika Wennerholm, EU coordinator of the schools run by the City of Västerås, enabled the coordinating team to design and manage the project in line with EU and Erasmus + requirments. This ensured that the project as a whole was well managed, rigourous and sustainable.

The Swedish triads were highly specialised in using a variety of educational software

and shared the benefits or the limitations of using each software to the others. From UK, was obviously very relevant for all the teachers involved the new pedagogical methods implemented in UCL Academy- respectively the collaborative learning. During the London meeting, the teachers had the opportunity to attend classes and to analyse aspects of class management.

In addition, working with the Romanian partners was an opportunity to observe different teaching styles and to recognise the effectiveness of rigorous and systematic teaching of maths. Being exposed to traditional teaching style and a more formal mathematical approach were key in helping set high targets for existing classes. As shown by the analysis of participants answers in final questionnaires some brought existing IT and ICT competencies; "ICT competence and lot of creativity." or enabled others to develop ideas further "professional competences, teamwork, collaboration, communication", "Help to get things going. Develop new methods and ideas and sharing them. Transform ideas into written words." "Sharing my thoughts in the discussions.", "I offered support for collecting data and contributed to analysing data". All brought a willingness to engage with and drive the project forward "A willingness to test new stuff", "I have been testing different things with my students.", "I try a lot of different things and have shared it with my triad and the rest of the team." "Convincing the biggest non believers in my department that the IT tools can be used towards their benefit (school level)" and "I designed [and shared] lessons using Geogebra and assessment tests which could be used during math classes."

All the teachers involved improved both professional competences such as pedagogical methods or ICT skills, but also the social skills like cooperation, positive attitude, understanding of other cultures and teaching approaches.

Each transnational meeting gave the teachers the opportunity to share experience of using new ICT tools or to analyse the limitations or the benefits of them. The teachers attended Math lessons at every meeting, and in this way they found out the pedagogical methods used by other colleagues and also learned about how to manage the lesson time when you must combine teaching using ICT resources with traditional teaching.

During the training activities week, Swedish teachers shared the experiences of using web platforms , like Socrative, Zaption, Classroom Response System, Scalable learning. All participating teachers had to create ICT resources for their classes. This material was tested in classes in the respective home schools, and the results reported during the final meeting in London. Another positive effect was that not only did the teachers involved gained knowledge and understanding of different educational systems and how technology is used in different countries, but they also had the opportunity to showcase their work and inspire others.

What is your qualitative appreciation about the cooperation and communication between the partners and with other relevant stakeholders during the implementation of this project? What are the positive and negative elements of this cooperation process? What are the elements you would improve if you were to carry out a similar project in the future?

Working with one another was unanimously praised. We were able to, through systems, resources and protocols to increase levels of communication within triads

thus encouraging fruitful collaboration. This was especially the case during the meetings; “we had a good communication inside our triads”, “Communication was very good within the team.”, “Me and my colleagues have had a friendly and fruitful interaction.” A positive outcome of the cooperation has been exposure to different mathematical cultures, as we had intended in our original proposal. What existed has been a “realization that we share much more than we differ”, “Interesting to see and be part of lessons in different countries.”. By drawing on these different cultures and upon a broad range of experiences from Math and ICT teachers, academics and researchers participants felt that the project enabled the “sharing the pedagogical practices and latest researches in education were the best achievements from this project” “sharing information, examples of good practice, approaches”, “learned from different teaching techniques (questioning etc)”. A further positive outcome has been an enhancement of skills in relation to Math, ICT and in softer skills such as collaboration and communication; “Sharing the project experience gained during the mathematics classes in which IT tools were used.”, “Obtaining information about up-to-date method of teaching / learning which use IT tools, flipped classroom, for example”.

Levels of communication and openness during meetings was praised with participants feeling that the communication was easy and open in spite of potential cultural and language barriers; “excellent communication with other triads, very good within our triad”, “I am very pleased of level of communication and collaboration from this project”, “Good communication in our triad, we have had a caring and understanding and positive feeling in the triad and also in the whole group.”.

It was felt that a single communication platform would have enhanced communication between triads; “but we should use a software like Slack for communicating process between countries next time around”, “It was good but I think it would improve a lot if we had a communication platform that all persons involved used.” A platform had been created through Google using Gmail and the project website had the means to post questions - however not all participants engaged with these modes despite agreeing to their use in the start up meeting. In future a simple means of communication would be used and all participants encouraged to adhere to it.

One challenge has been the ability for individuals, when the triad was across schools, to meet . This was a particular issue within the Swedish schools due to the organisation of one of the triads; “One problem is that we have to little time to meet each other in Västerås because we work in different schools.”

Feedback with regards to aspects of the project that could have been enhanced were generally around the time constraints placed upon us during meetings (this was the case with the Romanian triad) and back within our own country contexts (Swedish triads). When asked to identify the elements of the project that participants felt went particularly well within the project, their responses could be categorised as below:
ICT knowledge and skill development: testing ICT, increasing ICT usage in class, resources and ideas for the use of IT in maths classrooms from different countries,
Academic skills: delivering quality reports under pressure, research study, the research itself.

Collaboration skills: cooperation inside the triad, communication between partners, the interaction,

Communication skills: sharing the best practices, communication

Organisation of the project and its approach has been identified as effective: Good that only teachers have been traveling. Good to have triads. Discussions between professional teachers from different countries, visiting other teachers lessons, transnational meetings, organisation, the meetings, that we could visit the teachers in their classroom, our investigation, Collaboration during project meetings, lesson visits, the training week, excellent thought provoking discussions during maths TEMP meetings in all 3 countries, university level training by Patrick Gustafson on CRS and questioning, The course in which a participated in Vasteras, The coordination. In summary the group felt that four areas could be improved for future projects, these include:

Enhanced forms/platform for communication between meetings (All)

Increased time during meetings (Romania)

Time created for triads across schools to meet (Sweden)

Enhanced modes of dissemination (UK)

What target groups were addressed in your activities plan? Were the target groups changed in comparison to the ones identified in the application form?

This project is addressed to several distinct categories of professionals in Math education.

First target group is formed by the teachers involved in the triads, respectively 12 Math teachers from three countries. From the initial questionnaire applied to the participants, it can be noticed that 61% of them are teachers with over 10 years teaching experience, 31% have taught for between 5 and 10 years and 8% taught for less than 2 years. The most experienced group of teachers was represented by the Romanian triad. The majority of participants at the start of the project viewed ICT as a tool for teaching specific types of Math or for undertaking assessment.

A secondary target group consists of teachers from local communities, beginning with the schools themselves. Our dissemination activities were and will be focused on Math teachers from each region of schools involved in the project in order to scale up our impact and opportunities for Math professionals to engage with our findings.

A further target group consists of representatives of National Agencies and bodies of higher education that support and monitor the teaching at a national level.

The target groups identified in the application form remained the same throughout the project.

5.1. Involvement of Participants With Fewer Opportunities

Did your project involve participants with fewer opportunities in project activities?

No

5.2. Transnational Project Meetings

Please describe the Transnational Project Meetings organised within your project. What was the purpose and frequency of the transnational project meetings and who participated? Please elaborate how these meetings served the purpose of project coordination and implementation and in case there is a difference between what was planned and what was implemented, please explain why.

At all meeting coordinators met to manage and follow up the project as a whole, including the implementation of activity and dissemination plans. Each meeting also comprised repeated elements of academic article, pedagogic and ICT discussions. Meeting 1: Botosani Romania, involving all participants and coordinators. The purpose of this meetings was to meet, agree upon the enquiry process, to begin planning interventions and the development of ICT tools and familiarisation of the Romanian Math and general culture. This was achieved through formal meetings including presentations to one another on our schooling systems, tours of the school and locality, observing lessons and undertaking collaborative activities in line with the enquiry process. During this meeting we agreed upon all aspects of project management. By the end of this meeting all participants had a clear idea about the whole project and what was expected of them and had produced a proposal and enquiry questions ready to begin the full design and implementation process. Participants also completed baseline questionnaires which would be used to chart changes in perception and professional practice.

Meeting 2: UCL Academy, London, involving one participant from each triad and coordinators. The purpose of this meetings was to further establish the relationship, share experiences of the enquiry process so far, to share, evaluate and plan second iterations of interventions and the development of ICT tools, familiarisation of the London Math and general culture. This was achieved through formal meetings including presentations to one another on the journey of each triad so far sharing resources and any data collected so far, tours of the school and locality, observing lessons and undertaking collaborative activities in line with the enquiry process. By the end of this meeting all participants had a clear idea of what each triad had been trailing, had contributed to the development of the second iteration and were about what was expected of them and had produced a next steps plan.

Meeting 3: City of Vasteras, involving all participants and coordinators. The purpose of this meetings was to further establish the relationship, share experiences of the enquiry process so far, to share, evaluate and begin planning for cycle two of the project. The aim was also to meet with academics to discuss work in the field of applied IT tools to Math education and find out about the "count" project. It also served to enable familiarisation of the Swedish/Vasteras Math and general culture. This was achieved through formal meetings including article discussion, ICT discussion, Pedagogic discussions, a formal academic presentation, and summary presentations to one another on the journey and findings of each triad. This included sharing resources and data collected so far. Tours of the locality, visiting the Expectrum Centre to receive a lecture on coding and undertaking collaborative activities in line with the enquiry process were also key features. By the end of this meeting all participants had a clear idea of what each triad had enquired into, how their tools were applied and what their impact was. Each triad also began thinking about the next cycle and how they could build upon the work already completed. Meeting 4: Botosani Romania, involving participant representatives from each triad

and coordinators. The purpose of this meetings was to agree upon the next phase of the enquiry process, to begin planning new interventions and the development of ICT tools. This was achieved through formal meetings including observing lessons and undertaking collaborative activities in line with the enquiry process. By the end of this meeting all participants had a clear idea about the next stages of the project and what was expected of them and had produced a second proposal and enquiry question ready to begin the full design and implementation process.

Meeting 5: UCL Academy, London, involving all participants and coordinators. The purpose of this meeting was to share experiences of the enquiry cycle 2, experiences of flipped learning and the project as a whole. It would also serve to measure overall professional change and to enable the production of 'Recipe Cards'. This was achieved through formal meetings including summary presentations to one another on the complete journey and findings of each triad were produced, alongside academic reports, and presented. These presentations were delivered conference style to a wider target group of education and Math professionals. Time was also spent producing 'Recipe Cards'. By the end of this meeting all participants had presented their collective findings to a wider audience, had written the final triad reports, had produced 'Recipe Cards', and had completed evaluation questionnaires.

Meeting 6: City of Vasteras. Coordinators met to enable the authoring of the final report and to explore future collaborations.

5.3. Intellectual Outputs

This section doesn't apply for this project

5.4. Multiplier Events

This section doesn't apply for this project

5.5. Learning/Teaching/Training Activities

Please describe the short-term learning, teaching or training activities included in your project and explain how they have contributed to the project's objectives. In case there is a difference between what was planned and what was implemented, please explain why.

Eleven teachers from all three partners took part in the training activities during the week 3rd-7th of April 2017 in Västerås. One of the Swedish teachers was unable to attend. The training was lead by PhD student Patrik Gustafsson from the University of Mälardalen, in his capacity as a developer of ICT-based teaching in the City of Västerås.

The teachers shared their experience of using ICT in their lessons. They also shared their experience of using different programmes and the benifits (or problems) they have experienced.

The training event focused on the use of the programmes Scalable Learning and Socrative, and the method Flipped Classroom. Mr Gustafsson gave lectures on

integrating digital technology in mathematics, and a framework for analysing technology integration. The teachers planned lessons together based on their experiences and the knowledge they acquired during the training. Each teacher planned a lesson (eleven lessons). Three of the Swedish teachers' lessons were carried out during the week, the rest of the group observed according to two given protocols, one focusing on good questions, the other on how the ICT was used. This was then followed by discussions and reflections on future use, testing and dissemination amongst their peers (see attached agenda).

The training activities have contributed to new and/or modified ways to use ICT in the teaching of Mathematics. It has provided the participants with tools and instructions on alternative ways of planning and delivering lessons. They have also enough knowledge and competence to carry out dissemination and coaching of their peers. The training has also enabled them to see new possible applications of the available software, and new ways of thinking outside of the box.

Please describe the arrangements for recognition or validation of the learning outcomes of the participants in the learning, teaching or training activities you organised. Did your project make use of European instruments like Europass, ECVET, Youthpass, ECTS etc. or any national instruments/certificates?

Recognition of the participation and the Learning outcomes was given through certification provided by the City of Västerås as a host organisation.

Activity No.	C1
Field	School Education
Activity Type	Short-term joint staff training events
Activity Description	Joint training of teachers in the use of ICT in Mathematics using the findings of the project
No. of Participants	6
Participants with Special Needs (out of total number of Participants)	0
Accompanying Persons (out of total number of Participants)	0
Is this a long-term activity?	No
Funded Duration (days)	32

Participating Organisations

Colegiul National A T Laurian Botosani, UCL Academy

5.5.1. Participants' Profile

Please describe the background and profile of the participants involved in the learning, teaching or training activities and how the participants were selected.

The participants were a combination of teachers (Math, ICT, English), researchers and educational leaders at a local level. They have been chosen to participate in the project and in the training activities from their interest in the topics addressed by the project and because they are skilled experienced teachers.

In the first year, the UK teaching staff group consisted of 2 maths teachers and a project coordinator (non maths teacher but research specialist), whereas on the second year, as the project evolved, a full maths triad of teachers was formed to support the developments of the project. All teachers involved in the project are teaching all key stages (3 to 5) and all different ability sets. Teachers were selected based on capacity and engagement with IT and Math education. Teachers were also selected based on their personal professional development profiles. The selection was undertaken by the UK project coordinator.

From Sweden there were two triads, each triad was formed from 3 teachers representing 6 schools and two educational phases. Teachers were selected by interest, capacity and their general engagement with educational practices as a whole. This selection process was led by the Swedish project coordinator.

The Romanian TEMP project team was formed from three Math teachers, two collaborating teachers in the first year, two teachers of Computer Science and two English teachers. Teachers were selected as apart of a rigorous internal process organised by the Romanian project coordinator.

As participating Math teachers were also the target group please see further details outlined in section 5. For further details in regards to the coordinators also see section 5.

6. Follow-up

6.1. Impact

What was the project's impact on the participants and participating organisations involved in the project?

All involved across the 2 years agreed that they had benefitted from the communication and collaboration between educators “so much good feedback and discussions”. Participants felt enabled to trial a range of IT tools “I tried different methods on my classes using IT tools” “More focus on the ICT-tools in a good way” “I begin to use software tools in the process of teaching of different mathematical concepts” Significantly involvement also led to altered methods of teaching “Using flipped classroom with questions as my pre-understanding for planning my lessons.” “I have made changes in my ways of teaching, and hopefully I will continue develop my practice further.” “the flipped learning makes my planning different than before. My expectations on the students change, I expect them to know something when they come to class.” “I have moved towards a more creative way of presenting, assessing and supporting students ever since I started the project. I am highly motivated in continuing to develop my practise and become better in using IT in maths lessons.” and “Although I'm not teaching maths, I have learned new ways of teaching during this project.”

On reviewing and reflecting upon the impact of this project engagement upon practices as educators all felt that their practice had changed and was enhanced due to the ongoing engagement. Some felt that their ability to use ICT was enhanced and that they would wish to pursue this aspect of practice further; “Accelerating my usage of ICT.”, “I Think I have leveled up!”, “I use ICT more frequently in my practice and i want to develop it further.” “more ICT tools used, more time allotted to using alternative methods”, “I've definitely gotten a greater focus on how I can use ICT in a good way”, “I now use educational software in teaching Mathematics.”, “[gained] excellent teaching ideas, more confidence in using ICT tools in class, friendship with fellow European teachers”, “I will try to use IT tools more often in my teaching activity.”. A greater sense of mathematical cultural appreciation across countries but also across educational phases even within the same country was developed “A sense of commonality over country borders.”, “good opportunities for co-operation and communication with European partners” “The collaboration in my triad with teachers that work in same grade but also very good discussions with the other triad, it has been very interesting discussions between lower secondary and upper secondary. And also to discover similarities and dissimilarities between the countries curriculum and every day work.”, “Students (teenagers) are the same.”, “discussions during the TEMP meetings with colleagues from different countries as well as lesson observations”. With some educators feeling that general teaching skills and soft skills were developed as a result of collaboration with new and ‘different’ peoples, “I've

learned about some new methods and ideas of teaching and how to increase the interest students have in learning.”, “My social skills were definitely improved and I think I become a better person.” “improved skills in communication, collaboration and professional knowledge”

A hope of the project was to influence the wider system beyond the teacher and their classroom. As first step we sought to enable change through highlighting our methods as a school level. Participants felt that change at this level was beginning and would continue to do so with a sustained approach based upon the principles and tools we have developed. However we recognise that this aspect of the project will require more to enable change, if desired, at the school level. In part this will require increased time and training opportunities. The UK triad and Romanian triad impacted positively upon the culture of their Math departments as a result of this project and their renewed enthusiasm, “enhanced teaching skills for math teachers, ICT tools used during maths classes, flipped classroom, student-centred approaches” “My focus has rubbed off on my colleagues so there are several who work more with ICT in their teaching”, “The end presentations gave everyone who was present a good idea about future plans as well as the hard work that has been going on over the last two years”, “Some classrooms have been endowed with video projectors. Several teachers of Mathematics are now integrating IT tools in their teaching activity.” All participants reported an increased knowledge of using IT tools within mathematics when compared to the baseline questionnaire. This was matched by a reported increase in confidence in using IT tools within the teaching of Math. When asked to comment on what they believed IT could be used for to teach maths at the start and end of the project what is noticeable is a shift away from responses linked to assessment and specific mathematical procedures and a move away from IT as a tool of delivery to a tool with broader teaching and learning benefits.

Outside of the participating organisations which were the project's target groups and other relevant stakeholders? What was the project's impact on them and how did the results reach them?

The main target group was teachers of Mathematics and to some extent teachers of ICT. Other stakeholders were, and are, students, school leaders and organisations, as well as bodies of higher education for teacher training.

The networks of teachers and school leaders on the local level have been reached and have learned from the participants experiences, both in practical use of ICT in Maths, and in other new pedagogical practices that the participants have been able to adapt to their own cultures after attending lessons and sharing experiences during transnational meetings. A number of Math teachers have thus already been involved in using the project results. Some Math colleagues have also tested the new methods and express their interest in continuous development of new practice involving ICT, to be involved in future training activities or even in developing European projects to increase their knowledge. The project has been presented to teachers on a regional and national level. It is however difficult to assess what impact that has had so far.

The impact on the students so far shows positive results. Blended learning practices implemented to the classes generated better results in students' understanding and in

changing their attitudes towards learning Math. The results of final questionnaires revealed a real increased engagement and enhanced motivation of students to learn Math, both in classes and outside the classroom in doing homework. The impact on the actual achievements of the students is difficult to measure over such a short time, as the practices have not yet been fully implemented, for example the 'recipe cards' were finalised during the last semester.

School leaders and organisations have been reached through local and regional networks and steering groups. The response has been positive, but the impact is difficult to measure, and is believed to differ between the partner countries.

Representatives of National Agencies and bodies of higher education that support and monitor the teaching at a national level have also been informed. The presentations of the project results will be further disseminated after the end of the project to this target group, and the intention is to involve several of them in the planned future project. Some companies providing ICT-support and software have already been informed as they are collaborating with the participating schools. The expectation is that they also will cooperate in the future project.

How has the project contributed to the achievement of the most relevant priorities (as outlined in the description section)? To which extent was the expected impact reached?

Our desired impact at all levels starting with the individual teacher (who represented both participant and primary target group) were broad and ambitious. However we sought to prioritise the potential impact the project could have on the practice of teaching Mathematics through an application of ICT tools applied to specifically address low attainment linked to low engagement. As such a further target group consisted of learners of Math (aged between 11 and 19) who may have a profile of low attainment and disengagement with learning Math in and out of the classroom. The application of ICT tools was deemed to be both modern, innovative and relevant and was seen to be a factor with the potential to increase engagement of low attaining and poorly engaged learners, if applied appropriately. Thus the project sought to support teachers in being able to select, adapt and trial such 'appropriate' ICT tools. Appropriate application included the selection of appropriate tools and their use in an appropriate manner, in the first instance this being specific to the individual teachers context and then, if possible, to the contexts at a local-regional-national and European level. We successfully ensured throughout, due to the manner in which the process of enquiry was designed, to facilitate the dual goals of Objective 1: to address a pressing need for the development of new methodologies to better utilise the opportunities that ICT in teaching Math could bring, Objective 2: to promote and facilitate transnational teacher development and Objective 3: to address the emerging disparity within rates of progress between Boys and Girls in Mathematics with a particular focus upon learner engagement. These Objectives, as outlined in detail in section 2 and 3 above, were built around two identified priorities, those being 1: Enhancing digital integration in learning, teaching, training and youth work at various levels, and 2: Addressing low achievement in basic skills through more effective teaching methods.

At the level of the individual teacher, classroom and in some cases at the level of the school and local community level (with community identified as a collection of Math

educators across schools in the locality) the project achieved and in some respects exceeded the expected impact. These achievements, viewed as impact, have been discussed in detail alongside supporting evidence in the form of participant voice in Section 3; 'What were the achievements of the project?'. Evidence pertaining to the effectiveness of meeting Objective 2 has been discussed in Section 5; 'What is your qualitative appreciation about the cooperation and communication between the partners and with other relevant stakeholders during the implementation of this project?'. The level of cooperation and collaboration and our summary of this in both its process and effects has enabled us to gauge success in relation to Objective 2 and to an extent Objective 1, both of which are linked to Priority 1, as without positive and effective collaboration bore through effective inter-cultural communication neither could have been achieved. Working with one another was unanimously praised. We were able to, through systems, resources and protocols to increase levels of communication within triads thus encouraging fruitful collaboration. This was especially the case during the transnational meetings (see Section 5.2). The very design of the project facilitated a journey towards successfully accomplishing Objective 2 and with that working towards achieving Priority 1. Due to success in this area we were able to achieve Objective 1 and 3 and by doing so contribute towards Priority 2.

With specific reference to Priority 1, the project facilitated Math teachers, not all of whom were comfortable using ICT within their teaching, to effectively and sustainably integrate ICT tools into their daily teaching practices. The project also shifted perceptions about how ICT could be used for more than just teaching specific Math concepts. This is evident with the marked change in perceptions between questionnaire 1 and 2. This change contributed towards Priority 2 and Objective 1 & 3 as through a greater perception and competency related to using ICT teachers were able to now use the tools to target low engagement to reach out to low achievers. Evidence collected by participants throughout the project indicates that the tools they have developed have positively impacted on those disengaged and low achieving Math learners within differing contexts. It is worth noting the unexpected consequences of the project upon the primary target group, that being the development of soft skills such as communication and collaboration. For more details of this please refer to Section 3 and 6.1.

What was the impact of the project at the local, regional, European and/or international levels? Please provide qualitative and quantitative indicators.

The impact of the project on the participants is described above. The project has also had an impact on the teaching of Math and ICT in the participating partner schools as a whole, and also in schools that are in close collaborating with Math teachers in other schools locally, for example in networks of Math teachers. The impact has been mainly on professional practice and on the development of alternative teaching methods and use of ICT in Math teaching. It has strengthened the teachers ability to use questioning, flipped and blended learning, formative assessment with the support of ICT. The project has enabled sustainable professional learning by creating a robust network now administered by the participants themselves. The strong bond forged by the teacher participants will support on-going continuous professional

development. The tools that were tested, developed and used have not yet been in place for enough time to evaluate and measure the impact on the students results, however the implication is that it will affect the students results as the use of TEMP methods and tools has led to better support for weaker students and to an improvement of attitudes towards Math.

Through lectures and involvement of researchers and representatives from bodies of higher education in local steering groups, and regional and/or national agencies for education and inspections carrying out inspections and taking part in conferences, the knowledge of the work that has been done within the project is known, but it is difficult to assess to what extent there has been an impact all ready on the training of new teachers in the related bodies of higher education. Information on the work in project TEMP has been given in national and international networks during the project. The results will be further disseminated after the finalisation of the project. There is an interest to follow the continuation of the work that has been started in the TEMP project in particular concerning the effective TEMP tools and methods described on the 'recipe cards' and there will be continued dissemination activities during the coming year that are expected to lead to a widened impact on regional and national level.

The project results has as far as is known had no impact on an overall European level so far.

6.2. Dissemination and Use of Projects' Results

To whom did you disseminate the project results inside and outside your partnership? Please define in particular your targeted audience(s) at local/regional/national/EU level/international and explain your choices.

The Swedish triads consisted of teachers from six different schools. Each teacher has kept their math colleagues continuously informed about the project and its findings. In addition there have been yearly formal information days for all staff, and individual coaching of colleagues. The triad from the upper secondary schools gave a work-shop informing all teachers from the upper secondary schools in Västerås in October 2016. A lecture about the project findings and future was given to the network of all Math teachers in upper secondary schools in January 2017.

The network for Math teachers of the primary and lower secondary schools meet five times per year. In November 2016 the meeting addressed TEMP and its findings on a deeper level. The University of Mälardalen has been reached through the steering group, where the general director of all schools and representatives of the headmasters have taken part. In November 2016 TEMP and its findings had a workshop on the VETT (Västerås Educational Technology Transformation) conference, reaching both Math and ICT teachers. The network of tutors leading the development of didactics in Mathematics in the regions of Västmanland and Dalarna have also been informed of the project and its findings.

On a national level information was given at the yearly conference for Teachers of Mathematics in Sweden June 2016. At a meeting organised within a development

network of the Swedish Association of Local Authorities and Regions (SKL) the coordinator presented the project to the participating representatives from 83 local authorities in Sweden, the National Center for Mathematic Education was addressed in October 2016, and the Swedish National Agency for Education in October 2015, October 2016 and August 2017. At the Erasmus+ thematic seminar in Island in November 2016 the coordinator reached representatives from Nordic and Baltic countries, whom were informed of the project TEMP and its findings.

The Romanian partner targeted the Math and ICT teachers within the Laurian organisation and from Botosani county sharing the findings of using ICT tools in Math. There were organised yearly presentations and workshops with Math teachers and all other teachers of the school. To disseminate the result to the Math and ICT teachers on a national level the partner used national press articles every semester and the participation in national contests, promoting the ICT tools developed and used by Romanian teachers. The goal was to share the research and best educational practices acquired by the partners. The resources used, were posters, flyers, prezi and ppt documents, the book "A Collaborative European Inquiry into Technology Enhanced Mathematical Pedagogy" that was published in the third semester of the project. TEMP activities were presented every semester, in the meetings with coordinators of European projects from Botosani county and in the meetings of ICT teachers from Botosani county.

At the regional and national level presentations were organised with all the Math teachers from the county in regional professional meetings. In may 2017, the Romanian partner organised 2 presentations of project results during the "Education a la citoyennete europeenne" Conference and the "21st Annual Conference of the Society of Mathematical Sciences in Romania", with about 200 participants from all over Romania. Also, the results of the Romanian teachers work were presented on "Gala EDUMANAGER", Bucharest, november 2016 and in the national level of contest "Made for Europe", april 2017.

The London triad disseminated their findings and resources throughout the project within the school itself. This was facilitated through two internal events and 1 conferences open to external practitioners from all fields of education. This gave the group reach to the broader body of local educators from across London. Dissemination was also conducted with the support of UCL IOE, the university sponsor of UCL Academy at the end of each cycle. The audience was student teachers of Math and academics in the field of ed-tech in particular the Futures department of UCL. An opportunity to disseminate findings at the end of year 1 was also created with a visiting delegation of 20 ed-tech companies from Singapore learning about the project. In the final act of dissemination the triad presented to a conference with an audience comprising of Math, IT, Engineering and Special Educational Needs educators. Dissemination will continue through the project website and a formal presentation of the whole project in 2017. The Project has been, or will be, presented at UCL Academy 'Grass roots' Conference February 2016, October 2016 and November 2017, to Camden School Maths Group May 2016 and 2017, to Maths PGCE students at UCL Institute of Education June 2017. An article was published in the widely distributed UCL academy 'Pathways' publication September 2016.

What kind of dissemination activities did your partnership carry out and through which channels? Please also provide information on the feedback received.

The dissemination activities, how they were carried out and through which channels, is described above.

The overall response to the project findings and efforts has been very positive on all levels. The Math and ICT teachers of the participating schools have started to use the results, and also to ask for personal tutoring from the TEMP triads and workshops for Math teacher teams in different schools. Several of the networks and institutions have expressed their interest and have asked for more information when the project is finished. Many dissemination activities are therefore planned for the autumn of 2017 and spring of 2018 in all partner countries, on local, regional and national level, including Math and ICT teachers and students in teacher training, Bodies of Higher Education, National Agencies and associations.

The findings that were presented at the "Gala EDUMANAGER", Bucharest, november 2016 and in the national level of contest "Made for Europe", april 2017 was well received as both software presented (the educational software "Congruence of triangles" and the website <http://mate.laurian.ro/>) were given national awards and recognition.

At the London meeting where the 20 ed-tech companies from Singapore learned about the project, the participants expressed a keen interest in how tools were being adapted for particular purposes within Math teaching. Also the Swedish Company VKlass (a digital school platform) have expressed their interest in coming development of the methods and tools that have been used during the project.

The positive feed-back and the interest that has been shown from all contacts taken, has encouraged the partnership to plan for a new project focusing on implementation and programming as part of the teaching of Math.

Erasmus+ promotes an open access requirement for all materials produced through its projects. In case your project has produced intellectual outputs/tangible deliverables, please describe if and how you have promoted their free access to the public. In case a limitation was foreseen for the use of the open licence, please specify the reasons, extent and nature of this limitation.

In order to enhance the reach and impact of our collective work each triad has written a detailed academic report outlining the entire project and a series of 'Recipe Cards'; easy step by step guides for teachers to be able to select ICT tools and to use them their Math classrooms. We have placed these materials, along with information collected throughout the project including newsletters, on a dedicated project website www.projecttemp.org. This website is publicly visible and accessible and will continue to exist for at least two more clanger years. We will promote this website through our local and national agencies to increase knowledge, awareness to the products of this project. All materials are part of the Collective Commons and freely usable by all and

everyone who wishes to.

How have you ensured that the project's results will remain available and/or will be used by others?

See above.

How did you see the potential to use this project's approach in other projects on a larger scale and/or in a different field or area?

Building upon the success of Project TEMP, the present partnership is planning to apply for a new project on a larger scale in 2018. This time it will be an Erasmus+ strategic partnership for school education, Development of Innovation, focusing on the continued enhancement of the use of ICT in Mathematics, producing intellectual outputs with the involvement of at least two more partners and with a closer collaboration with software companies. The obvious parallel discipline of mathematics seen from this perspective is programming and its application in mathematics. The project and future projects contributes towards a closer relationship and collaboration between the two departments in schools, but also in higher education.

6.3. Sustainability

Which activities and results will be maintained after the end of the EU funding? How will these activities be implemented and supported?

All results will be available through the project website for at least two years after the official end of this project. However we are seeking a further funded project which will enable us to build upon and extend the life-span of both the present website and our research output. We will enable further sustainability by replicating aspects of our findings on the official websites of all three partners. There are also planned continued dissemination activities during the coming year carried out by all partners. The participating teachers have formed a Facebook group and are in constant contact enabling further collaboration beyond this projects funded life-span. This is expected to be continued as the group has formed strong bonds and the schools have become friend organisations, this in itself is a success of the project as a whole and indicative of our achievements related to objective 2.
See also above, last box under 6.2.

7. Budget

this section gives a detailed overview of the final amount of the EU grant you request;

7.1. Budget Summary

PIC of the Organisation	Project Management and Implementation	Transnational Project Meetings	Intellectual Outputs	Multiplier Events	Learning/Teaching/Training Activities			Special Needs Support	Exceptional Costs	Exceptional Cost Guarantee	Total (Calculated)
					EU Travel Grant	EU Individual Support	Linguistic Support Grant				
968814952	12,000.00	12,075.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24,075.00	
929556821	6,000.00	4,025.00	0.00	0.00	550.00	1,000.00	0.00	0.00	0.00	11,575.00	
948554950	6,000.00	7,475.00	0.00	0.00	1,100.00	2,200.00	0.00	0.00	0.00	16,775.00	
Total	24,000.00	23,575.00	0.00	0.00	1,650.00	3,200.00	0.00	0.00	0.00	52,425.00	

7.1.1. Project Total Amount

Project Total Amount Reported (Calculated)	52,425.00
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Please provide any further comments you may have concerning the above figure.

7.2. Project management and implementation

PIC of the Organisation	Role of the Organisation	Name of the Organisation	Total
929556821	Partner	UCL Academy	6,000.00
968814952	Beneficiary	VASTERAS KOMMUN	12,000.00
948554950	Partner	Colegiul National A T Laurian Botosani	6,000.00
Total			24,000.00

7.3. Transnational Project Meetings

PIC of the Sending Organisation	Total No. of Meetings	Total Number of Participants in All Meetings	Distance Band	Grant per participant	Total (Calculated)
929556821	1	3	100 - 1999 km	575.00	1,725.00
929556821	1	2	100 - 1999 km	575.00	1,150.00



929556821	1	2	100 - 1999 km	575.00	1,150.00
948554950	1	2	100 - 1999 km	575.00	1,150.00
948554950	1	5	100 - 1999 km	575.00	2,875.00
948554950	1	6	100 - 1999 km	575.00	3,450.00
968814952	1	8	100 - 1999 km	575.00	4,600.00
968814952	1	3	100 - 1999 km	575.00	1,725.00
968814952	1	3	100 - 1999 km	575.00	1,725.00
968814952	1	7	100 - 1999 km	575.00	4,025.00
Total					23,575.00



7.4. Intellectual Outputs

This section doesn't apply for this project

7.5. Multiplier Events

This section doesn't apply for this project

7.6. Learning/Teaching/Training Activities

7.6.1. Travel

PIC of the Sending Organisation	Activity No.	Activity Type	No. of Participants	Distance Band	Travel Grant per Participant	Total Amount (Calculated)
929556821	C1	Short-term joint staff training events	2	100 - 1999 km	275.00	550.00
948554950	C1	Short-term joint staff training events	4	100 - 1999 km	275.00	1,100.00
Total			6			1,650.00

7.6.2. Individual Support

7.6.2.1. Short-term Learning/Teaching/Training Activities

PIC of the Sending Organisation	Activity No.	Activity Type	Funded Duration (days)	No. of Participants (excluding accompanying persons)	Grant per participant	No. Of Accompanying Persons	Grant per Accompanying Person	Total (Calculated)
929556821	C1	Short-term joint staff training events	5	2	500.00	0	0.00	1,000.00
948554950	C1	Short-term joint staff training events	5	3	500.00	0	0.00	1,500.00

948554950	C1	Short-term joint staff training events	7	1	700.00	0	0.00	700.00
Total			17	6	3,200.00			

7.6.2.2. Long-term Learning/Teaching/Training Activities

This section doesn't apply for this project

7.6.3. Linguistic Support

This section doesn't apply for this project

7.7. Special Needs Support

This section doesn't apply for this project

7.8. Exceptional Costs

This section doesn't apply for this project

7.9. Exceptional costs - Guarantee

This section doesn't apply for this project

Annexes

in this section, you need to attach additional documents that are mandatory for the completion of the report;

Please note that all documents mentioned below need to be attached here before you submit your form online.

Before submitting your report to the National Agency, please check that:

- All necessary information on your project have been encoded in Mobility Tool+
- The report form has been completed using one of the official languages of the Erasmus+ Programme Countries.
- You have annexed all the relevant documents:
- The Declaration of Honour signed by the legal representative of the beneficiary organisation.
- The necessary supporting documents as requested in the grant agreement.
- you have saved or printed the copy of the completed form for yourself.
- You have uploaded the relevant results on the Erasmus+ Project Results Platform: <http://ec.europa.eu/programmes/erasmus-plus/projects/>

List of uploaded files

- TEMP final declaration of honour.pdf DOH
0.02 Mb
8 minutes ago