

Guide for communication, dissemination, exploitation and sustainability / WP6

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Executive Summary

The EU funded project MaSDiV (2017-2020) aims at promoting fundamental values and intercultural learning in maths and science teaching in order to deliver inclusive education for all students. To this end, communication, dissemination and exploitation are important tasks as the project aims at mainstreaming and scaling-up a policy measure. This resource reports on the project's strategy for communication, dissemination and exploitation and presents related project activities carried out by all partners on the national and European level. In doing so, it is analysed to what extent the plans, strategies and activities were effective, were appropriate to the target groups and had a good impact. This may serve as an example for the design and strategy of future projects.

Based on this analysis and these experiences, a guide for implementing successful dissemination and exploitation activities is given to partners and further readers in order to provide relevant information to be able to successfully carry out further dissemination activities beyond the project's lifetime as well as for future projects. Central terms and concepts are defined and explained. A step by step guide leads the reader to an effective planning and implementation of the dissemination activities.

Furthermore, relevant recommendations for a sustainable exploitation after the project's lifetime are given and are intended to provide ideas and inspiration to the project partners and other readers. After explaining and defining terms and concepts of exploitation and sustainability, the related strategies on the National as well as the European level are presented and concretely demonstrated, using the example of the MaSDiV project.

Examples of effective dissemination activities within the MaSDiV project illustrate the presented strategies. The given best practices round off this guide, which is meant to cater for sustainable dissemination and exploitation activities and guide partners after the end of the project.

All in all, special features of the MaSDiV project have been identified as being very effective in regard to a successful dissemination and sustainable exploitation: The university-ministry tandems, cooperating on a national as well as on the European level; The MaSDiV National Impact Boards (NIB) as well as the European Impact Board (EIB), providing expertise and advice as well as extra dissemination support with their contacts and networks to policy makers and important stakeholders in the field of STEM education; Peer learning, viewed within the project as an effective means to overcome challenges as well as develop plans and strategies. Furthermore, it proved to be very supportive to dedicate a work package especially to quality assurance: The continuous monitoring of the dissemination strategies and activities by this work package ensured that all measures were carried out through appropriate channels that are directed at precisely identified target groups at the right time.

These aspects have been crucial in achieving the highest possible impact of the MaSDiV project and should be taken into account when planning and applying for a new project.

1. Introduction

1.1 About this guide – aims and purpose

Within the framework of the European project MaSDiV, we provide a European communication, dissemination and exploitation (from now on referred to as dissemination) strategy, which lies within the responsibility of the lead partner. This strategy is based on a European and six national dissemination plans (every partner country is – supported by the leader - responsible for national dissemination).

The European dissemination plan is supposed to focus on European policy levels and secure the “bigger picture”, taking further countries (beyond partners) into consideration, as well as connecting each national measure to a purposeful overall result, which serves the requirements of “initiatives for policy innovation”: Developing an innovative and evidence proofed teaching approach to induce change on systemic and policy level. As each partner country has slightly different key aspects when performing national dissemination activities (due to differing educational systems, infrastructure, policies, etc.), the national plans make sure that each partner country can use the full potential of their planned measures and that varying demands from national stakeholders/target groups are met.

To maximize our impact and support sustainable dissemination and exploitation of each project output, we provide this guide to be used as a basis and template for all MaSDiV partners as well as for future projects when performing dissemination or exploitation activities. It offers a basic guideline on how to plan and structure dissemination activities and shows examples to highlight national particularities. The responsibility to identify national particularities and specific needs and to decide on concrete measures best suitable for their country (supported through lead partner/coordinator’s office) lies with each partner.

Furthermore, the purpose of this guide is to summarize, at the end of the project, what has been achieved in relation to dissemination, communication and exploitation in the past three years and thereby lay the foundation for the dissemination and exploitation to come, in particular in terms of sustainability. Presenting lessons learned in regard to communication and dissemination as well as challenges and ways to overcome them in the project MaSDiV may serve as an example for the design and strategy of further projects. The guide is meant to cater for sustainable dissemination and exploitation activities and guide partners after the end of the project.

1.2 Introduction to the MaSDiV project dissemination

MaSDiV is a high-level research and evaluation project involving 13 partner institutions from six European countries, arranged in university-ministry tandems plus one research institution as an expert for the research carried out. The main focus of the project is on developing and evaluating the impact of professional development courses for STEM teachers. The aim is to better equip them to promote science and mathematics literacy for all students (including disadvantaged students from diverse cultural and social backgrounds), together with the learning of fundamental values in mathematics and science education. Thus, MaSDiV aims at seeing the bigger picture of maths and science and not only learning scientific facts but also learning about maths and science, its role for society, how decisions are taken based on maths and science and its cultural dependency.

MaSDiV is a policy experimentation measure, which is funded within Erasmus+ Key Action 3. The aim is to scale-up successful measures across Europe. Thus, the final goal of the MaSDiV project is to provide evidence to inform educational policies across Europe about effective teacher professional development which lead to high quality STEM education for all students, addressing diversity and

promoting fundamental values. A multi-method research design has been used to evaluate the impact of specific teacher professional development courses, combining STEM education and the promotion of fundamental values in multicultural settings in the different partner countries.

In order to reach this goal, we identified different target groups which have to be addressed with different objectives. Teachers are the project's main target group. Winning teachers for the field trials in the beginning of the project as well as participants for the MaSDiV PD course even beyond project's end is an important task. Further stakeholders are policy makers, educational authorities, PD providers and influential networks. Here we differentiate between European level, Consortium countries, and beyond. In Consortium countries, the focus of dissemination is on mainstreaming the measure (including accreditation of courses, certificates for teachers). In countries beyond the Consortium, the focus is on establishing contacts with high-level authorities, to secure that they have knowledge of the measure and on its potential use in the country. At European level, target groups are high-level networks providing exchange about innovative approaches and on the potential to leverage scaling-up.

To reach these goals, an extensive and successful dissemination strategy, supplemented by suitable measures for a sustainable exploitation of the project outcomes and results, is crucial. From the beginning, the MaSDiV Consortium recognized that dissemination activities are an essential and pervasive task throughout the project's life and integrated it within all project's working packages under the lead of work package 6 (Dissemination and communication). To ensure that the dissemination and exploitation strategy is clear, always raises awareness, and keeps target groups' needs at the forefront, our dissemination process comprised four phases: Setting up the targeted (National and European) dissemination plan(s), execute the plan(s), monitor goal achievement, and reflect and revise.

Furthermore, we have developed an effective, manifold reporting and monitoring system to ensure highest quality project dissemination activities through continuous evaluation of the selected dissemination means. Based on previous research and literature, personal exchange with diverse stakeholders, and fruitful discussions in the consortium, "criteria to evaluate the selected dissemination means" were developed by WP 5 (quality assurance), available as an online resource restricted to partners. In order to maximize the project's impact, the project consortium carefully planned the type and the timing of any activity focused on dissemination. Further, the consortium focused on choosing the most appropriate period for dissemination, depending on national priorities, availability of resources, and opportunities.

We disseminate before, during and after the project's lifetime. Even after the project's end, every partner is fully committed to further promote the project's results and goals on a national basis using their raised knowledge on integrating fundamental values and intercultural learning in maths and science education. The project will influence the relevance of the university and ministry partners PD offer and make it more attractive, hence competitive. Especially the MaSDiV ministry partners will use its extensive channels to reach teachers, PD providers and policy makers, and spread the word to further promote the MaSDiV PD course, its evidence and its importance. ICSE plays an important role in the dissemination of MaSDiV after the project's end: Committed to the transfer from research into practice, the center contributes to sustainably link stakeholders from research, practice, policy and industry, nationally as well as internationally, and serves as the international hub for this aim. ICSE has an extensive network which is continually used to further promote MaSDiV and its aims and results.

Our dissemination strategy has both qualitative and quantitative targets. It is intended to reach both large numbers of people in our target groups and have a large number of dissemination activities, but at the same time, it is revealing to particularly look at the achievement of key stakeholders. For example, if a person responsible for teacher PD in a whole area participates in a dissemination event, this might have much more impact than the participation of a teacher, as this key stakeholder is

enthusiastic about the MaSDiV materials and will act as a multiplier. Follow-up inquiries as feedback, newsletter registrations etc. are also important indicators to evaluate the effectiveness and impact of a dissemination activity.

During the course of the project, all consortium partners performed various dissemination activities. With regard to the main objectives mentioned above, the project consortium has succeeded in:

- Informing and winning over teachers to participate in the MaSDiV PD course
- Informing teachers about the MaSDiV project and winning them over to participate in the field trials
- Informing stakeholders (policy makers, educational authorities, PD providers, researchers of science and mathematics education and influential networks) on the project's effective and evidence-based PD course, materials and evaluation results
- Mainstreaming the measure in the Consortium countries (e.g. accreditation of the MaSDiV PD course in Spain and Malta, official certification in Cyprus and Turkey, implementation of the PD course in national PD offers by ministries or HEI)
- Informing and consulting high-level authorities in countries beyond the consortium on the measure and its potential in their country (for example informing policy makers, researchers, researchers associations of science and mathematics in France, Lithuania and Norway)
- Promoting the project's objectives and results in high-level networks on European level
- Establishing a policy-research-practitioner triangle to further strengthen the exchange of different stakeholders in the field of maths and science education in order to initiate new and maintain existing cooperation between different stakeholders, resulting in sustaining innovation and closing the gap between research and practice.
- Raising public awareness on the need for more inclusive science education

In cooperation with ICSE and the ICSE consortium, the MaSDiV consortium, led by the coordinator Prof. Maass, organised the third *Educating the Educators* conference, MaSDiV's final conference in Freiburg in October 2019. This conference was very successful, both in terms of the number of participants, the stakeholders involved, and of course the quality of contributions related to the MaSDiV project. In particular the policy seminar, set up as an international platform to reflect and exchange experiences on cooperation between different stakeholders, brought together policy makers, researchers and stakeholders from influential networks from thirteen European countries. Based on these outcomes, it is expected that this final conference was not only a successful event, but also a relevant conference in bringing together researchers, practitioners and policy makers at an international level.

2. Guide for implementing successful dissemination and exploitation activities

Based on the experiences gained when disseminating the project during the past three years, we recommend the following approach when planning dissemination activities. To meet the objectives mentioned above, dissemination has to be an ongoing process that should be understood as beginning in the first stages of the project and continuing long after the project's end. This chapter is also intended to provide a framework to the consortium for a sustainable exploitation after the project's end as well as to follow-up projects.

2.1 Dissemination and communication

A well planned and target group tailored dissemination and communication is indispensable to maximise the project's impact and visibility. It also ensures sustainable exploitation. *Dissemination and communication* – but what does it mean exactly and where is the difference?

Dissemination and communication relate to the following articles in the Grant Agreement:

- Promote the action and its results, by providing targeted information to multiple audiences (including the media and the public), in a strategic and effective manner and possibly engaging in a two-way exchange) (Article 38 of the Model Grant Agreement).
- Disseminate results — as soon as possible — through appropriate means, including in scientific publications (Article 29 of the Model Grant Agreement).
- Take measures aiming to ensure ‘exploitation’ of the results — up to four years after the end of the project – by using them in further research activities; developing, creating or marketing a product or process; creating and providing a service, or using them in standardisation activities (Article 28 of the Model Grant Agreement).”

Further, the EC Glossary and the IPR helpdesk say:

Dissemination is “The public disclosure of the results by any appropriate means (other than resulting from protecting or exploiting the results), including by scientific publications in any medium.” (EC Glossary). It shall “Transfer knowledge & results with the aim to enable others to use and take up results, thus maximising the impact of EU-funded research [...]and describe and ensure results available for others to use” (European IPR Helpdesk).

Communication promotes the project, its activities and its results to multiple audiences beyond the project consortium (including media and public) (Grant Agreement art. 29). The goal of good communication is to raise awareness and enhance the visibility of the project’s activities, showing the benefit of research. Communication creates public awareness and enhances the visibility of our project, the consortium and the research programme. It encourages people to use the results, increasing the chances that our measure will make an impact.

Dissemination informs only about results. It addresses specific audiences that may use the results in their own work, e.g. peers (scientific or the project’s own community), professional development providers, industry and other commercial actors, professional organisations, policy makers, and educational authorities. The goal of dissemination is to enable the use and uptake of results (Grant agreement art. 29). Dissemination therefore facilitates the use of the results and thereby creates long term impact.

Consequently, the activities and used channels of communication and dissemination differ: Communication events, for example, are events for the general public, such as open-door days or public talks. Dissemination events, on the other hand, address identified stakeholders, for example by providing workshops for teachers, by giving presentations to professional development providers at specific conferences, or giving presentations to educational authorities who might decide to mainstream the materials in their sphere of action. Publications for communication are for example newsletters or factsheets which inform on the project, whilst publications for dissemination are scientific publications such as articles in scientific magazines, addressing particular target groups.

2.2 Establish and sustain common ground

To decide upon best measures, it is highly important that all partners have a common understanding of: (1) rationale of the project, (2) planned activities and outputs, and (3) expected outcome and impact, also long-term. An option to discuss such matters certainly are the project meetings and bilateral exchanges among project partners. The Erasmus+ impact exercise, for example, is a fruitful and highly recommendable tool to support projects in thinking about what the expected outcome may be. However, we highly recommend to continuously check whether all project partners in the project still have a common understanding and facilitate internal exchange whenever possible or necessary, e.g. when workflows have to be optimized.

The objectives of the MaSDiV policy measure are to support maths and science teachers in (1) delivering education and support the development of basic skills for all students; (2) promoting fundamental values and enhancing active citizenship which also helps in developing social and civic competences; (3) promoting intercultural learning and developing teachers' competence in inclusive science education. To reach these goals, we developed and delivered a high-quality and evidence-based professional development course, which is the main outcome of our project. Further outcomes include a variety of innovative teaching materials (available online as well as in print -MaSDiV booklet), the results of the extensive evaluation of the PD course, and the gained experiences in peer learning through the unique cooperation of research and ministry in our project. These outcomes have to be disseminated and prepared for exploitation.

2.3 Continuous monitoring as quality element

To ensure that the planned activities are suitable and qualified perfectly for what they intended to achieve, it is necessary to continuously monitor, review and revise their effectiveness and impact. It is recommended to keep a revision & progress log for each measure. This makes it easier to keep an overview, discover discrepancies at an early stage and (e.g. when talking to partners) simplifies sharing experiences.

In the MaSDiV project, work package 7 (WP7) is dedicated to quality control, and monitoring the partners' dissemination activities is one feature of this work package. At the beginning of the project duration, the document "Criteria to evaluate the selected dissemination means" was provided. Project partners are supposed to consult it to monitor and evaluate their dissemination activities within and beyond project duration.

In order to deliver related activities following a clear strategy, information about dissemination activities was collected regularly by WP7 within its monitoring grid in the course of the project. The collected data was analysed by WP7 with regard to the overall strategy and the possible need to rectify the proceeding or intensify efforts. Respective feedback as well as constructive recommendations for optimisation were provided by WP7 in reflective workshops on quality control. This allowed monitoring the overall dissemination and exploitation strategy and comparing it to the national dissemination & exploitation plans as set up in Work package 6 (WP6), which ensures widespread communication, dissemination and exploitation.

In several related workshops on communication and dissemination as well as on exploitation performed by WP6 during the project meetings, partners reported on their activities and the impact they had. The dissemination activities conducted by partners were monitored through an electronic form, which was part of the monitoring grid, to ensure that we will meet the promised figures related to dissemination, communication and exploitation of the project. Specific feedback was given through emails or as oral feedback in the consortium meetings. Based on the exchange of information and the monitoring carried out by WP7, partners refined their strategies. Recommendations for optimization were to remind partners to report on dissemination activities on a regular basis, to keep in mind the promised figures and to get inspiration from other partners' good practices concerning dissemination.

Lessons learned were discussed among partners at project meetings and beyond. Long-term exchange will then be considered when planning future projects.

2.4 Dissemination and Exploitation Planning: 7 steps

Dissemination and exploitation means promoting the project, presenting and spreading results and making them available for use with maximum success. In our project we followed a 7-step procedure, which we will present in the following paragraphs.

First step - Objectives of your measures

Analyse in detail, why you intend to set up your measures, e.g. raise awareness? Attract teachers? Get input from peers? Keep in mind, what reaction or change is expected from the target audience, for example receiving feedback, win over teachers for participation, influencing the attitudes of decision makers. On the basis of the defined goals and objectives you can easily monitor whether you achieved what you planned.

In the MaSDiV project, for example, it was very important to win over an adequate number of teachers participating in the field trials (implementation of the MaSDiV Professional Development (PD) course in every partner country). In order to support the advertisement of the PD course, a standardised announcement was provided by work package 4, dedicated to the field trials. This announcement introduced the content and aim of the PD course, included the purpose of the policy experimentation and its evaluation and gave the rationale for the need of a teacher education programme that promotes inclusive STEM education. The text also clearly indicated what participating would involve, for example filling out questionnaires for evaluation. This announcement served as a template and provided the participating countries with basic information for disseminating the PD course. Nevertheless, it was important that partners adapted the template according to national premises. It was recommended, for example, to link the PD course to the respective curricula in order to meet precisely the target groups' needs and requirements.

Second step – Content

Define precisely and clearly what will be communicated and disseminated.

- Identification of general content/the main topics of information
- Project promotion, easily understandable by a non-scientific audience : introduction, activities, expected outcomes, benefit...
- Outputs and outcomes (linked to timetable for deliverables)
- Internal data such as results from evaluation data
- Internal data such as expert knowledge, scientific information, agreements, meeting minutes

When editing your content, think of what is new, what solution you are offering, what are the consequences, if no action is taken. Also try to connect to what your audience already knows respectively wants to know about the topic.

Third step – Target groups

Define precisely and clearly to whom you will communicate and disseminate, for example, within the Consortium:

- Higher education institutes (HEI) (appointed WP leader, their staff, curriculum designers, PR, ...)
- Business partners (representatives working on the project, public relation, non-governmental and non-profit organisations, ...)
- Members of the National Impact Board (NIB) – a panel which was set up in every partner country in order to guarantee large impact, exploitation and project scale-up. Members are e.g. PD facilitators or subordinated school authorities, depending on the national context. They are also asked for advice and feedback about project activities.
- Members of the European Impact Board (EIB) – a panel of representatives from countries outside the Consortium and of European networks relevant to scaling-up. The members ensure exploitation beyond the Consortium and contribute specific advice and expertise to ensure the highest possible quality of work.
- Project Office
- Coordinator

Target groups beyond the Consortium, for example:

- Teachers
- PD providers
- Policy makers, public authorities involved in education
- Industry representatives
- Parents
- Relevant initiatives and networks

It is important to precisely identify all target groups and wider audiences with importance ranking, using keywords such as regional, national, European level; non-scientific and scientific audience. For each target group, working on a distinct strategy using purposeful messages, means and language is important.

In regard to MaSDiV, target groups have been identified as follows:

Teachers (main target group are in-service teachers teaching particular students at lower secondary level): The aim of the dissemination activities for our main target group is attracting teachers to participate in Professional Development (PD) courses and field trials.

Stakeholders (policy makers, public authorities involved in education, PD providers across Europe, influential networks): The aim of the dissemination activities are to win them over in using our PD toolkit and advertise and disseminate it on a large scale.

Here we differentiate between European level, Consortium countries, and beyond.

In Consortium countries, the focus of dissemination is on mainstreaming the measure (including accreditation of courses, certificates for teachers).

In countries beyond the Consortium, the focus is on establishing contacts with high-level authorities to secure that they have knowledge of the measure and its potential use in the country.

At European level, target groups are high level networks providing exchange about innovative approaches and on the potential to leverage scaling-up. The aim of the dissemination measures are to inform these target groups about our measure.

Public at large: The aim of dissemination activities are to create awareness of combining STEM education with intercultural learning and the promotion of fundamental values.

Pupils: indirect target group. The most important target group in the long-run – though targeted indirectly – are students. By supporting teachers to deliver inclusive science education for all students and promoting fundamental values, as well as intercultural learning, challenges such as underachievement, early school leaving and unemployment are addressed.

A detailed identification and analysis of the stakeholders addressed in the MaSDiV project was presented to the project partners in the report “Detailed identification and analysis of stakeholders”.

Fourth step – Channels and tools

Define precisely and clearly which media channels and tools are best suitable for achieving your objectives.

There are many possibilities, and we list a few of them here:

Information based dissemination means:

- project website (with password secured area)
- social media: Posts on, for example, Twitter, Instagram, Facebook
- digital and printed newsletters
- promotion kit with templates for fact sheets, presentations, posters and leaflets in different languages
- articles in regional newspapers
- articles in (peer-reviewed) academic journals
- poster exhibition, for example, at conferences
- policy briefings

Face to face dissemination means

- workshops
- roundtables/face-to-face meetings/interviews
- contact via email, telephone, skype
- presentations at conferences
- pilot measures

Within the MaSDiV project, we differ between face-to-face dissemination means (events/workshops/meetings/conferences etc.) and information-based dissemination actions in print or online (including social media).

Face to face dissemination activities are interpersonal, characterized by two-way communication. This offers the opportunity to be responsive to the audience, clarify topics and open up new pathways. This approach is interactive and good for acquiring input as well as being flexible – tone, strategy and content can be easily adapted if necessary.

Information based dissemination actions are rather one-way communication and potentially have a rather large audience. Within this group, social media means are an exception as they offer possibilities to interact with open audiences or specified groups.

In the MaSDiV project, we used a wide range of channels and means to disseminate the project. Personal contacts, meetings and round tables with higher educational authorities as well as policy briefings have been good opportunities to reach out to our target groups in order to ensure systemic impact. Presentations at conferences, fairs and scientific festivals on both the national as well as the European level had a great impact on researchers, PD providers and further stakeholders in the field of innovative education. In addition, information based dissemination activities, for example reporting on different aspects of the project in the ICSE newsletter (using ICSE's extensive contact list as well as contact lists from partner HEIs), proved to be very successful. More information on the social media strategy as well as the use of different means for a successful dissemination can be found in chapter 4.

Fifth step – Schedule

Align your measures with the other project activities and key stages of the project (see project's timetable). It is important to keep a close contact to the management team as management staff holds an overview of all ongoing activities.

The communication, dissemination and exploitation strategy of the MaSDiV project implied the following key phases:

2017 Preparing the ground: Strategic planning of dissemination, communication and exploitation (month 3 to 6)

- Detailed identification and analysis of stakeholders

- Development of criteria to evaluate the selected dissemination means
- Setting up European and National dissemination plans
- Setting up European (EIB) and National Impact Boards (NIB) and meeting twice
- Setting up of international and national project websites
- International newsletters
- Advertising the PD course through all channels

2017 – 2020 Execution of dissemination plan and monitoring of plan (from month 7 onwards)

- Carrying out dissemination activities on national and European levels
- Workshops with focus on dissemination
- Connecting with relevant networks
- EIB and NIB meetings (ongoing)
- International newsletters

2018 – 2020 Prepare for exploitation, sustainability and scaling-up (from month 18 onwards)

- Carrying out dissemination activities on national and European levels
- Workshops with focus on exploitation and sustainability
- EIB activities beyond consortium
- Informing all European ministries via formal letter on the policy measure
- Connecting with relevant networks (ongoing)
- Mainstreaming the measure through Ministry and University channels (including accreditation of courses, certificates for teachers)
- Dissemination activities to prepare scaling-up
- Planning and holding a final conference including a policy seminar
- Writing a report on dissemination activities, analysing the extent to which they have been effective as guidelines (D 6.1).

The key deliverables have been listed in the project`s timetable.

Sixth step – Responsibilities

For each measure, a responsible person/party has to be named and the tasks have to be clearly assigned. It is recommended to stay in contact in order to monitor the progress throughout performances and to enhance the quality of the activities and products of the project.

Seventh step - Opening up new pathways

Pathways that cannot be foreseen during initial project planning might open up. It is therefore required to review planned measures, target groups, exploitable results, etc. continuously during the project in order to respond to the needs of the target groups as well as wider developments in policy and practice. In MaSDiV, the coordinator contacted each partner regularly to find out if there is a need to discuss further steps. Additionally, it is essential that each partner contacts the coordinator`s office or management team if new options or further ideas arise on how to maximize the success of our dissemination activities and maximize our project`s impact.

3. Recommendations for sustainable exploitation after the project`s lifetime

In this chapter, we will give the MaSDiV partners as well as institutions beyond MaSDiV a useful tool, a direction and some perspectives which will allow them to carry on the development of sustainability & exploitation activities once the grant agreement ends with the European Commission.

3.1 Exploitation and Sustainability

In advance, some words about the definition of exploitation, sustainability and its interconnection:

Exploitation “is (a) a planned process of transferring the successful results of the programs and initiatives to appropriate decision-makers in regulated local, regional, national or European systems, on the one hand, and (b) a planned process of convincing individual end-users to adopt and/or apply the results of the programs and initiatives, on the other hand.”¹ This means that related exploitation actions aim to ensure that the results of our project will be used at different levels, during and after the implementation of the project. These actions further aim to involve the target groups, end-users and stakeholders, convincing them to use the main products and results of the project and transfer it in their professional scope.

Sustainability “is the capacity of the project to continue and use results beyond the end of the funding period.”² This means that the project results are used and exploited continuously and in the long term.

Exploitation is closely connected with the sustainability of the project after its lifetime, since exploitation activities should ensure that the results of the project are used by its target groups and possibly transferred to other contexts.

In terms of exploitation, it is important to think about how results can make a difference to the project, end-users, peers or to policy makers. In MaSDiV, for example, it is important to differentiate if we address a teacher, a policy maker or a researcher to disseminate our results. For teachers, we advertise our classroom materials, a policy maker is interested in the evaluation results (if the measure is well tested and effective), whilst a researcher may be much more interested in the experimentation itself.

The effects of successful exploitation activities will imply an increased awareness of innovative ways of learning STEM subjects, in particular of the approach of inclusive science education. Successful exploitation will also include a raised positive reputation for the institutions of the project consortium as well as an increased influence on policy and practice.³

Consequently, dissemination and exploitation isn't finished at the end of the project's lifetime. At the end of our project, we want to give recommendations how to maximize our project's impact in longer term. This should encourage and guide partners and other project partners to

- make the project's outputs and results known and used outside the consortium
- develop new ideas for new partnerships and further cooperation in the future
- create new opportunities to extend the project and its results
- further inform policy and practice
- further deliver the MaSDiV PD course
- evaluate achievements and impact
- provide useful input to dissemination and exploitation efforts of the European Commission
- share the results and serve as examples to inspire others

3.2 Strategy for Exploitation and Sustainability on European level

All project partners are strongly committed to the MaSDiV approach and objectives. Therefore, one of our main concerns is to sustain project achievements using different means and channels. Based on

¹ Erasmus + Guide, Annex II – Dissemination and exploitation of results, page 2

² Erasmus + Guide, Annex II – Dissemination and exploitation of results, page 2

³ Erasmus + Guide, Annex II – Dissemination and exploitation of results, page 4

their prior MaSDiV expertise, but also on the rich experiences from the MaSDiV dissemination activities, partners have further evolved strategies for sustainability. Key elements have been developed and discussed in several sustainability workshops during WP6 sessions at MaSDiV project meetings. They also include recommendations of the EIB members given in regard to exploitation and sustainability.

On the European level, we plan to exploit and ensure the sustainability of our project outcomes and results through the following channels and measures:

- Enter the project summary and update the project results on the Erasmus + Project Results Platform and make deliverables and intellectual outputs available so that researchers and practitioners can access it.
- Contribute to systemic communication with relevant ET2020 Working Groups, in particular on promoting common values and inclusive education, and incorporating our results into their strategy. The aim is to support policymaking at the EU and national levels and discuss policy solutions on key issues of the Paris Declaration (2015). The results of our MaSDiV project are of high interest as we contribute in particular to three important objectives as set in ET2020: (1) Improving the quality of and efficiency of education and training (here science), (2) promoting equity and social cohesion, and active citizenship and (3) enhancing innovation at all levels of education and training (here lower secondary education).
- The MaSDiV conference *Educating the educators III* brought together representatives of research, practice and policy from all over the world and is meanwhile a well-established platform to explore, discuss and exchange approaches to scaling up professional development in maths and science education. We plan to run a fourth conference (with possible national funding) to further enhance the scaling up of science teacher education after the project's end.
- Further expand the Policy-Research-Practice Exchange Forum, which was established during the Policy Seminar at MaSDiV's final conference in 2019, to a strong network which will deal with the topic of teacher education as well as with the significance of promoting fundamental values and intercultural learning in math and science education. This forum, consisting of important representatives of ministries, research and industry of and beyond the consortium, will encourage further peer learning and allows for exchange on long-term monitoring of post project scale-up. It also ensures working with members of the EIB will continue.
- The MaSDiV project activities align with the UN sustainable development goals, especially in terms of IBS, multiculturalism and inclusion. We will further highlight that the MaSDiV message is in line with these goals, supporting the implementation of these goals by promoting and delivering the MaSDiV ideas and PD course via ICSE and all partner institutions across Europe.
- Link the project to the OECD initiative *Future of Education and Skills 2030* by providing insights from the MaSDiV project, in particular to the framework *Teaching and learning for 2030*. The framework provides a common taxonomy for policy makers and practitioners and establishes some underlying principles for education systems. The first step is to contact the project team to share the MaSDiV project results and connect via newsletters, website and social media.
- Link the project to the EU Youth strategy 2019 – 2027: Core areas of action of the new EU Youth strategy are around the three words engage – connect –empower. MaSDiV fosters science learning which is used to promote cultural awareness, critical thinking, decision making and consequently, social and civic competences. In this sense, science learning is also citizenship education, which aims towards a meaningful civic, economic, social, cultural and political participation of young

people, as outlined in the new EU Youth strategy. The first step will be to send information on the project and its results to the EU Youth Coordinator in order to contribute to knowledge development and exchange on youth issues.

- Continue to incorporate the MaSDiV measure and results in European networks like Erme, Etuce and Eurashe to raise awareness on our PD course materials, classroom materials and evaluation results. Through the ICSE webpage as well as through personal contacts, the project is already linked to European Networks such as Science on Stage, The European STEM PD Network and the European Schoolnet.
- We have already uploaded all classroom materials under a Creative Commons license on the Scientix platform. Through Scientix, translation on demand of the teaching materials into more than 30 European languages can be enabled. This promotion of the MaSDiV outcomes via the Scientix community makes them easily available and visible to the thousands of teachers and teacher educators who use this online portal.
- Develop recommendations for national science curricula to provide inclusive education through IBL, and promote fundamental values and intercultural learning. Some of the consortium members are part of working groups that are concerned with the elaboration of recommendation for national science curricula (NL, TY, ES), incorporating the MaSDiV message and results in this work. Based on these national experiences, an Erasmus+ KA 2 project (strategic partnership) can be proposed, which aims at incorporating the MaSDiV message in the curricula of further countries.
- Develop a course especially aimed at facilitators (multipliers who are educated and in turn run their own PD courses). The Maltese team adapted the international PD materials to educate facilitators. These experiences can be used and transferred to design a specific international course which serves as a template for all countries in order to scale up the measure and reach out to many more teachers (snowball effect). In addition to policy actions addressed to teachers directly, such a measure can further enhance the project's long-term impact.

3.3 How to sustainably explore the measure in partner countries and beyond?

All partner countries developed national strategies to explore project results and outcomes as well as ensuring sustainability. These strategies are based on the single national context and experiences. To provide peer learning, the different strategies as well as the approaches and channels are comprised in the following overview. These recommendations should inspire partners to further work on a successful and sustainable exploitation beyond the project's end, but also to take the advantage of profiting from partners' experience in different approaches. This can also be taken as a template for the exploitation in countries beyond the consortium, especially countries represented in the project by members of the European Impact Board.

In the partner countries as well as in countries beyond the consortium, we plan to exploit and ensure the sustainability of our project outcomes and results through the following channels and measures:

- Continue to work with high level educational authorities, stakeholders and those that have been informed about the MaSDiV project, in particular with the members of the National Impact Board as well as the countries represented in the European Impact Board.
- Further cooperate and incorporate the MaSDiV message into national, regional and local networks in the field of STEM education.

- Keep informing further teachers about the MaSDiV classroom materials and PD providers on the PD course material, in particular by using the international network of PD centers which has been established under the lead of ICSE, Freiburg.
- Ongoing distribution of the classroom materials to be better available for teachers: In Germany, ICSE is currently developing a data base for innovative and hands-on classroom materials, incorporating materials from MaSDiV but also from previous projects that dealt with IBL (mascil, primas, compass, lema). The development of the data base is funded by Vector-Stiftung, Germany. Once set up, we plan to enlarge this collection of classroom materials with further tasks relating to inquiry-based learning in realistic contexts and multicultural settings.
- Make sure that MaSDiV project information stays available on the national websites keep links up-to-date to equip teachers with resources , ensuring that people who will look online for open tasks will be redirected to the international project website.
- Continue working towards the official accreditation or certification of the MaSDiV PD course for teachers.
- Offer a mentored online course as done by the partners from Spain: The adaption of the PD course modules for a mentored online course in Spain can serve as a template for adapting the international PD modules to national online courses. In addition, the Cyprus team is offering parts of the MaSDiV PD course online.
- Offer CPD courses for leaders: Teachers trained in these courses will in turn teach, guide and support other teachers in their school as CPD leaders. The Maltese team have been very successful with this strategy to ensure sustainability beyond the project`s lifetime.
- Establish teacher networks for participants of the MaSDiV PD course: Offer working groups/communities of practice for teachers who already took part in a MaSDiV PD course. This makes it easier for teachers to exchange experiences after teacher training and go on to implementing the MaSDiV ideas in day-to-day teaching. This could also be a starting point for further courses to consolidate the acquired knowledge from previous courses.
- Use social media groups (Facebook, Instagram) for the above-mentioned working groups for teachers.
- Implement the PD course in the frame of an Erasmus + Mobility Program (Key Action 1) through a training course at a school.
- Prepare reports for the national ministries, accompanied by recommendations for integrating MaSDiV ideas in national mathematics and science curriculum.
- Transfer the MaSDiV ideas to other school forms and subjects by choosing more complex tasks for higher secondary level and easier tasks for primary level.
- Provide MaSDiV courses in particular to teachers called upon to teach children with migrant background. In Turkey, for example, MaSDiV PD courses in Adiyaman in particular were well received. Adiyaman province lies in the southeast of Turkey and there are many immigrant students in this province. Teachers valued the MaSDiV project and its resources as an effective approach to deal with diversity in the classroom.

- Link and exploit the MaSDiV measure to ongoing initiatives and projects like the *Professional Learning Initiative* in Cyprus and the *Education 2032 program* in the Netherlands.
- Sustain project achievements by further distributing the MaSDiV booklet to teachers and teacher educators.
- Collaborate with groups that organize science fairs and other informal education actions, offering our expertise and participating with stands, talks, workshops and such. The German team, for example, presented related tasks on the science days in October 2019, which is visited by about 17.000 students and their teachers to draw attention to the links between fundamental values and science.
- Use social media and continue to link all stakeholders. Social media (Facebook, Instagram, twitter) are also good channels to communicate with teachers, establish networks and guide them online. The Turkish team, for example, uses social media intensively and strategically. They use both Instagram and Twitter regularly and successfully, with over 30,000 Followers on both channels combined. In Germany, ICSE aims to improve STEM education through presence on Twitter and Instagram. The first pilot project, called STEM challenge (ongoing), is regularly posting STEM related questions on twitter to attract followers and to highlight the message “STEM is all around”. More information on ICSE’s social media strategy and examples for formats and contents can be found in the next chapter (see 4.3).

4. Examples of effective dissemination

The selection of successful dissemination activities presented in this section covers various target groups and uses of media, and aims to work as a toolkit for future dissemination activities beyond the lifetime of the project.

4.1 Face-to-face dissemination activities

Panels and workshops at STEM Conferences in Turkey and Malta

In Turkey, huge conferences with high numbers of participants are held in the field of STEAM resp. STEM education. These conferences gather representatives from research, policy and practice and are an interesting forum to present the MaSDiV ideas as well as to promote the MaSDiV PD course and materials. Our Turkish team attended several of these conferences annually, such as the STEAM Teacher Conference in Ankara (Dec 8, 2018), the World STEM Education Conference in Istanbul (June 8-10, 2018) and the STEM Makers Fest / Expo in Ankara. The latter is organised annually in collaboration with Hacettepe University, Feza Gursev Science Center, OSTIM Industrial Zone and Ministry of Education. More than fortythousand people from 53 different cities attended the festival. At these conferences, our Turkish partners from Hacettepe University promoted MaSDiV in a panel



Photo: © Istanbul Aydın University, 2018

discussion, reaching a broad audience of stakeholders in the field of STEM education. Additionally, MaSDiV workshops were held as part of the conference to give interested teachers and researchers a deeper insight in the approach promoted by the project. This is also a good opportunity to refer to the MaSDiV PD courses organised by Hacettepe University in collaboration with the Turkish

Ministry of National Education. These workshops are ongoing: the Turkish team will for example offer workshops within STEM & Makers Fest/Expo in Van, Kastanonu and Bolu in 2019 and 2020.

Our project partners from Malta also used conferences in the field of STEM education to promote MaSDiV: Our Maltese partners participated in the first STEM popularization networking festival held at Kalkara (May 31, 2018). The Minister of Education and Employment attended the event and pledged the commitment and action of different stakeholders. The event showcased MaSDiV together with other national and European science outreach initiatives. The Festival was attended by 120 participants from various strands: professionals from the science, technology, engineering and mathematics educational fields; Heads of School together with members of the Faculty of Education and Faculty of Science; representatives of local councils; European Representation in Malta; Embassies; Employers' Associations; and local industry.

MaSDiV dissemination at a multiplier event in Spain

Partners from the University of Jaén were invited to a multiplier event organised by the STEM PD Net project in Madrid (May 23 and 24, 2018). The main goal of the meeting was providing a stimulating space for the exchange of experiences and the discussion of successful models for teacher professional development in STEM education. Different stakeholders took part in the event, including representatives from regional governments, teacher centres, universities, science museums and private companies, who shared a common interest of better preparing teachers to face current challenges in STEM education. In this event, MaSDiV was presented as an international project making a significant contribution in teacher professional development on inclusive pedagogies for science and mathematics learning. This face-to-face dissemination was extremely important as subsequently, many teacher educators from all over the country contacted our Spanish project partners, interested in having the MaSDiV course in their region.

Participation in working groups for curriculum change in the Netherlands

To ensure systemic impact, it is crucial to participate in working groups concerning curricula development. This is a great possibility to place the MaSDiV approach and ideas, anchoring in the official educational plans.

In the Netherlands, for example, the recently started curriculum change is following a bottom-up approach by giving the lead to teachers in formulating strategies and plans for the future. These teachers are organised in design-groups for several domains, and they invite experts to inform them about recent developments in all subjects and in general educational research. Aims of the change are to better prepare students and teachers for the future society and to better connect primary, secondary and higher education. The challenge for these teachers is to think what that could mean for science and mathematics education. In all feedback rounds, our Dutch partners were invited to respond to their designs and plans from the MaSDiV perspective.

High-level policy meetings in Cyprus

Since policy makers have been identified as one of the very crucial target groups for the MaSDiV project, face-to-face meetings with high-level officials are key elements to ensure systemic impact of our policy measure. The participation of representatives from the national ministries in our project as well as the fact that important national stakeholders are involved in the project as a member of the National Impact Board could facilitate the contact to high-level officials, informing about the MaSDiV project and objectives.

In Cyprus for example, members of our Cyprus partner team have regular meetings with high level officials at the Ministry of Education and Culture to ensure not only the participation of teachers in the project's events and actions, but also to ensure the active engagement of a large number of teachers with project outcomes and key deliverables. Following this approach, the leaders of the UNIC and the

CPI had meetings with all directors at the Ministry of Education and Culture, and they had the opportunity to present the project's key ideas in regional and national meetings of the elementary and secondary education inspectorates.

Teacher symposia in Germany

Symposia especially addressed to teachers offer an important platform to reach out for our main target group. In Germany, for example, the German partner team used the annual symposia "Mathe für alle" (Maths for everybody) that is part of the Freiburg Advanced Center of Education (FACE), as a forum to promote the MaSDiV project and attract teachers for the ongoing PD course at ICSE Freiburg. The symposium is well-known and well-attended by about 150 – 200 maths teachers from the region. In Germany, all PD providers have problems to win over teachers for Professional Development. There are various reasons: A lack of teachers at numerous schools, a lack of support by school directors, a confusing selection of various PD offers and providers, the fact that professional development is optional and demands to invest free time, to mention just some reasons. Maths for everybody does



not have this problem and regularly wins over large numbers of visitors. The strategy followed by the MaSDiV workshop at the teacher symposia was to involve teachers directly in the topics and highlight the reference of the MaSDiV approach to their day-to-day teaching. On the one hand, teachers get directly involved,

and on the other hand, the instructor can directly correspond to the needs and wants of the target group, illustrating possibilities and solutions of the MaSDiV approach. Interested teachers were provided with further information on MaSDiV, its objectives and materials. In particular, they were informed on the next date of Professional Development in their region. This kind of marketing proved to work out very well.

4.2 Information based dissemination activities:

All project partners are strongly committed to the MaSDiV approach and objectives. Therefore, one of our main concerns is to sustain project achievements, using, amongst other means, materials and publications.

MaSDiV booklet

In order to ensure the project's success, we developed the MaSDiV booklet under the lead of the Dutch team, responsible for WP2 policy measure. The publication (only available online in English, Spanish and Turkish) addresses the project's main target groups: teacher and teacher educators. We had very good experiences with similar books from former projects: It is very well accepted by teachers and will make a huge impact on the dissemination and sustainability of our project. How sustainable such a book can be is shown by the books developed within Primas (2010 – 2013) and Mascil (2013 – 2016), as teachers still ask for them.

Supporting Mathematics and Science Teachers
in addressing Diversity and promoting
fundamental Values

MaSDiV

The main goal of this book is to provide a basic introduction to inclusive science education and what it means in practice both for classrooms and for professional development courses. As its core it contains a collection of inspiring mathematics and science lessons at secondary school level (connected to fundamental values or intercultural learning). The booklet is completed with a general introduction to the MaSDiV project, its partners and objectives as well as results and evidence.

The colourfully illustrated online booklet aims to support teachers and teacher educators who have actively participated in the MaSDiV project as they continue to pursue inclusive science education methods - IBL in connection with intercultural

learning and the promotion of fundamental values - in their daily classroom practice. The MaSDiV booklet is also an informative and reader-friendly designed online publication for anyone interested in learning more on inclusive science education and its potential benefits for teachers, students and society as a whole.

Articles in leading Newspapers and magazines in Turkey

One of the objectives of the MaSDiV project dissemination is to raise awareness to the need of innovative approaches in mathematics and science teaching in order to deliver inclusive education for all students. In Turkey, our measure is part of new, long-term PD initiatives to promote IBL and education for students of different achievement levels.

Within this context, Prof. Gultekin Cakmakci, team member of the Turkish University partner, published several articles to promote MaSDiV ideas in newspapers and magazines, amongst others in Hürriyet newspaper, which is the leading news source in Turkey and the region. His article on "Creating an innovation-driven entrepreneurship ecosystem" was one of the most popular articles in this issue of Hürriyet newspaper. As a result, Prof. Cakmakci was asked for an interview to elaborate STEM education in Turkey. Journalist Esra Ülkar interviewed Dr. Cakmakci on innovative approaches in STEM education in Turkey. This interview was again published in Hürriyet newspaper and therefore addressed a broad audience in the whole country.

Hürriyet GÜNDEM DÜNYA EKONOMİ SPOR ARENA VIDEO BEYAHAT KELEBEK SON DAKİKA YAZARLAR LEZZET

Şimdi maker olma zamanı, hadi sen de üret!

Prof. Dr. Gultekin ÇAKMAKCI - Harvard Üniversitesi STEM & Maker Laboratuvarı | 21.05.2018 - 09:57, 3er Cevaplandı | 21.05.2018 - 09:57

Ekonomik anlamda gelişmiş ülkelerle rekabet etmek istiyorsak 21'inci yüzyılın becerilerine sahip, inovasyon yapan ve bunları pazara aktarabilen girişimci ruha sahip bireylere ihtiyacımız var. Bu anlamda maker yani 'yapan, üreten' bireyler ekosistemini incelemek ve bu ekosistemde sokulmaktaki bizlere yön verecektir.

KONUK YAZAR

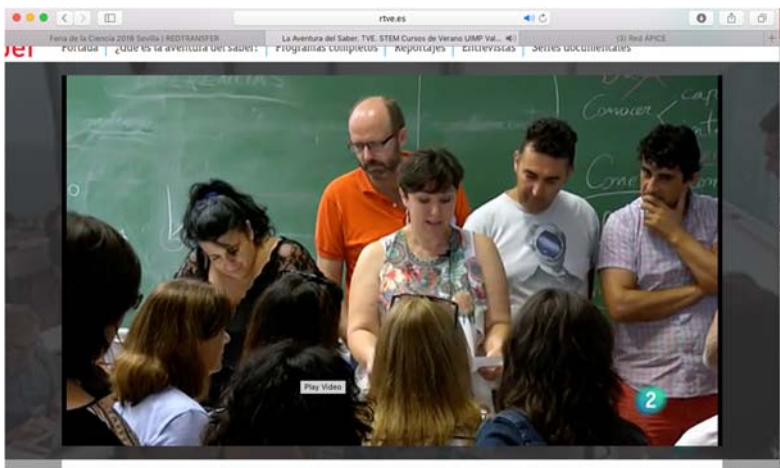
© Hürriyet Newspaper

Partly due to close collaboration with a NIB member from the media, the Turkish team members were also invited to elaborate more on STEM education and its relationships with the world of work. Prof. Cakmakci' s article on "Industry 4.0 vs. Education X.0" was published in İstihdam popular magazine. 15 000 copies of this magazine were distributed to all ministries and their regional offices, which again was a great dissemination of MaSDiV.

MaSDiV PD session in the National TV program in Spain

The course for teacher professional development focusing on the MasDiV PD concept was included in the 2018 edition of the summer courses for teachers organised by INTEF. These summer courses are very popular among teachers and in high demand at a national level. Introducing the MasDiV PD course in this context provided us with a nice opportunity to get teachers from all around Spain for our experimentation protocol.

Some of the MasDiV sessions from the summer courses were video recorded for a wider distribution among teachers, enhancing the potential impact of the project on teacher professional development. Additionally, one of the TV national channels recorded some of the sessions and produced a special documentary about the MaSDiV course held in Valencia, July 2018.



Screenshot of a scene of the TV program showing moment of the MaSDiV course in Spain

Photo: © RTVE Spain

Dissemination through the Ministry channels in Malta

The main aim of the dissemination activities targeted at teachers is to attract teachers to participate in the field trials and, beyond piloting, in further MaSDiV PD courses. Hereby, the participating ministry partners as well as the National Impact Boards proved to be key to effective dissemination for the recruitment of teachers. In Malta, for example, the Directorate for Learning and Assessment Programmes within the Ministry of Education and Employment is the highest educational authority responsible for teaching and learning in Maltese schools. They advertised the courses directly with teachers, college principals and school management teams of all secondary level schools in Malta and Gozo. The campaign to inform teachers and invite them to participate in the MaSDiV PD course involved face to face meetings with management and teachers; use of social media as well as emails and circulars have been very successful. Furthermore, an article about the project was written in the Newsletter of the Maltese Association for Science Educators (MASE), which is distributed to all teachers of science in the Maltese Islands. An article about MaSDiV was published in Mathsline, a publication for Mathematics teachers which reaches all teachers of mathematics in the Maltese Islands. In fact, the campaign managed to attract 27 continuing Professional Development Leaders and 132 teachers who participated in the MaSDiV training as part of the field trials.

4.3 Social Media: Promoting MaSDiV classroom materials

The use of social media to disseminate MaSDiV and reach out for the project's main target groups differs within the consortium. To give advice in regard to a social media strategy and give an idea how different channels and formats can be used to disseminate MaSDiV, we will describe how ICSE (PH FR) started to disseminate the MaSDiV classroom materials on Instagram.

The decision to disseminate the MaSDiV classroom materials on Instagram as well as the selection of the appropriate format is based on and embedded in ICSE's social media strategy. ICSE takes on the role of a facilitator that mediates and connects a multitude of different stakeholders in the field of STEM education. On social media, ICSE intends to inform, inspire and connect with as many members of the diverse STEM education community as possible, in order to reshape the STEM education social media landscape into a creative and exciting communal learning space. In this sense, ICSE acts as a facilitator of exchange of information as well as a provider of services.

In terms of providing services, ICSE decided to promote the MaSDiV classroom materials as an online resource for teachers with ready-to-use worksheets, in order to implement topics from mathematics and science teaching in connection with intercultural learning and the promotion of fundamental values. When we scanned the platforms and their users, we found that young teachers are often using Instagram, also as a platform to exchange ideas on class room materials. Twitter and LinkedIn are used more intensively by policy makers, the industry and researchers to discuss strategies and research findings. This led us to the decision to use Instagram as a platform to reach out to teachers, raising awareness on ICSE's services in regard to innovative teaching materials.



Image: © ICSE

In order to introduce ICSE, its services and its projects (included MaSDiV) to the Instagram teacher community, we first started a campaign with a fairly simple, but attractive format called "Fun facts." This includes a series of surprising statements from the world of STEM, and always starts with the question: Did you know? An example would be: "Did you know? Strawberries are considered nuts. Not berries." or "Did you know? An ice cube takes about 0 percent more volume than the water used to make it." Short explanations follow in the subtext as well as an image which illustrate the topic. The design of all fun facts is similar to underline the affiliation with ICSE. Another format is the "STEM challenge" which was already established on twitter. Questions related to STEM are posted, normally with a current reference, for example: "Why is ice slippery" in wintertime. Some days later, the answer is published. This format invites the user to interact with ICSE on a fairly simple level, by answering the question and getting involved in STEM related topics.

The next step was to adapt the MaSDiV course materials for Instagram for German teachers. We know from research that platforms with ready-to-use worksheets are getting more and more popular. ICSE is currently in the process of building a comprehensive material platform for innovative teaching material from all our past projects (IncluSMe, Primas, Compass, etc.). The MaSDiV material will be featured prominently. Thereby it will be available in the long run within an easily accessible, attractive and timely format. This materials platform will then again be heavily advertised through our social media channels.

While the platform, once up and running, will revolutionize how we disseminate our class room materials, we did not want to wait for it to go online. Thus, we already started to promote ready-to-use worksheets on Instagram for direct implementation of the MaSDiV classroom materials, which were developed in the course of the project. Every post opens with a teaser illustrating the topic: For example, a stop motion video shows a classroom stifling from plastic waste. The subtext builds the bridge from too much waste to how to produce less waste and how much waste can be saved, for example by shopping in an unpacked store. Questions like these can be perfectly discussed in maths teaching, using mathematical modelling. The teacher will find a ready-to-use worksheet here to integrate this topic in its day-to-day teaching.

This example is a first step towards using the possibilities that social media offers to promote our materials. There is still a lot to experiment, develop and innovate within this field. How can we attract

further users and make sure that we actually reach those, who find what we offer beneficial? What is the best time to reach our target groups? How can we increase conversations and encourage interaction between and within different target groups? How can we use the internet to encourage conversations between different cultures (of teaching) and help them facilitate learning from one another within the online spaces that we provide? This is something that time and experience will show. However, the use of social media offers lots of possibilities to reach out to our target groups.

4.4 Networking: *Educating the Educators III* MaSDiV's final conference

Networking activities are a great means to spread information on the project and a crucial step in achieving maximum impact. A good example for successful networking activities is the *Educating the Educators III* (short: ETE III) conference, MaSDiV's final conference, which took place at the University of Education in Freiburg from October 7-8, 2019. 170 participants from 24 different countries visited



this international conference. Amongst them, many European countries as well as countries like the United States, Turkey and Kazakhstan were represented. The participants, who came from a variety of professional backgrounds such as research, policy making, industry, STEM education networks and teacher education all shared a common interest in the improvement of STEM education. *Educating the Educators III* thus offered a unique **cross-field framework** for the

discussion of the future of innovative STEM education professional development. Many of our MaSDiV project partners took an active role in participating and presenting at the conference. Thus, the event served as an excellent opportunity for us to actively disseminate our project outputs.

All participants were able to use a vast variety of formats and spaces such as workshops, oral presentations, poster presentations, programme specials, a network lounge and a materials market to connect with one another. There they discussed their work, their coherent and sometimes opposing ideas and visions. Some used the space of the network lounge to brainstorm future projects and corporations. Selected guests had the opportunity to participate in a policy seminar with the topic "Initiating and Sustaining Cooperation for Innovation in STEM Education – Strategies and Communication of Cooperation between different stakeholders". The seminar was set up as an international platform to discuss the importance of cooperation on the national as well as on the European level. Important STEM education stakeholders (e.g. Marc Durando, the president of the European Schoolnet and Mónica Kepe-Holmberg from the European Commission, Deputy Head of Unit B.2 – Schools and Multilingualism) took part in the seminar and gave input based on their experiences in cooperating on different levels. Amongst the participants were representatives of the Turkish National Ministry of Education, the director from the Swedish National Resource Center for Physics Education (NRCF) at Lund University and the director for Alliances Europe at Texas Instruments, a global semiconductor IC design and manufacturing company.



We also used the marketing campaign for the conference as an opportunity to utilize and extend our network. We facilitated several coordinated marketing pushes with different foci (for example call for proposals, encouragement of submissions, opening of registration, announcement of the conference programme, etc.). In order to spread the word, information was edited in an appealing and clearly arranged way using a website, e-mail campaigns, social media campaigns and print media such as posters and leaflets. The information was sent digitally or in printed versions to STEM education networks, relevant industrial partners, researchers, research institutions, STEM PD training centres, teacher educators and other relevant stakeholders across Europe and beyond. First receivers were the MaSDiV inherent networks: The project consortium as well as the National and European Impact Boards. Members of these networks again shared the information with their networks, which kicked off a far reaching snowball effect. Subsequently, the information was distributed, for example, in France through the IREM network (Research Institutes on Mathematical Education in France) and associated lists. It was also announced in the newsletter of CFEM, the French commission for mathematics education. The ICSE network with its consortium members as well as the STEM PD network provided further expansive ways of communicating the conference.

During the course of these actions, contacts to existing networks were strengthened and contacts to new networks were established. These networks helped us to promote the conference and their support proved to be very effective. Subsequently, the conference was announced and promoted for example on the website of the European Science Education Research Association (ESERA, the most important science education network in Europe), on the distribution channels of the European Schoolnet (EUN) (a network of 34 European Ministries of Education) as well as announced on the website, in the newsletter and on social media of Science of stage (a European Teachers network) and Scientix, just to name a few of them.

All in all, ETE III served as an excellent opportunity to strengthen already existing contacts, establish new contacts, boost exchange between our existing networks, establish new corporations and networks and most of all: to get the MaSDiV outputs into the world and thereby ensure an impact of the project on a number of important stakeholders from all relevant fields of STEM education within Europe and beyond.

5. Conclusions and recommendations

Dissemination and exploitation have been important tasks during the course of the project, as MaSDiV is a research project aiming at scaling up and mainstreaming the policy measure. Therefore, we disseminated before, during and after the project's lifetime and used a wide range of channels and media to reach the well-defined target groups. A clear and awareness raising dissemination strategy and careful planning and execution of dissemination activities that are tailored to different target groups have been key factors to promote the ideas and goals of the project: Implementing and scaling up an innovative approach in STEM education which innovatively connects IBL with intercultural learning and the promotion of fundamental values.

In terms of dissemination and exploitation, two aspects have been identified as crucial to raise the impact of our measure: Cooperation within the project as well as the inclusion of important stakeholders on the national and the European level. These contacts and collaborations open doors which a single institution would not be able to open. There are some special features in the project's design which proved to be successful in this regard:

- **The ministry-university tandems:** This cooperation is the focus of the project. On the national level, the lead of the ministry ensured that the project's outputs and outcomes are in line with the national premises and highly relevant in the national context, which is very important to achieve

systemic impact. The ministries also have widespread channels to advertise and implement the projects goals and results. Without the ministry it would not have been possible to reach the high dissemination numbers (teachers, stakeholders). Furthermore, as the ministry representatives were highly involved in the project work, they were very committed in disseminating MaSDiV and paving the way for further implementation.

- **The consulting panels (EIB and NIBs):** The National Impact Board, which involves different stakeholders and policy makers in teacher professional development at local, regional and national level, not only advised the project's process, but they also often are door openers, using their contacts and network for extra support in disseminating the project. It also facilitates to collaborate with policy makers at a regional and local level.

The European Impact Board provided strong support in dissemination and exploitation in countries beyond the consortium, for example by including selected MaSDiV materials in existing or new Teacher Education courses and PD activities in Austria, Greece and Norway, or through informing teachers, researchers, policy makers and relating associations of science and mathematics in France, Lithuania and Norway. Dissemination on the European level was supported by spreading the word in European networks such as the European schoolnet and ESERA.

- **Peer Learning:** Every partner reported regularly about its dissemination activities during the project meeting. This was a good forum to exchange experiences, present best practices and discuss on challenges faced and how to overcome these challenges. In the beginning, for example, some partners had difficulties in winning over an adequate number of teachers for the field trials in their countries. Different approaches for the advertisement of the PD course were discussed among all partners and finally, all partners had sufficient participants for the courses.

Furthermore, every partner had specific approaches and used different means in order to disseminate the project's ideas and to offer the project's results for exploitation. The Spanish team, for example, set up an MaSDiV online PD course. In Malta, the project team worked with PD leaders. The project meeting was also the forum to share these experiences and support partners to adapt this approaches.

- **Quality Control:** As mentioned before, the MaSDiV project had a work package dedicated to quality control, which also monitored dissemination activities and provided constructive feedback for optimisation. This continuous feedback had an enormous impact on the dissemination strategy, which was constantly reviewed and revised if necessary. It also ensured that dissemination and exploitation occupies a central position in the project's activities during its lifetime, as the project aims at mainstreaming and upscaling the measure.

These aspects have been crucial to achieve the highest possible impact of the MaSDiV project. Careful project planning should include these aspects as well as a clear and awareness raising strategy for communication, dissemination and exploitation. Finally, a clear distribution of tasks and responsibilities supports the achievement of the project's goals.

To ensure that the project's results will constantly be used and the emerged cooperations will be continued and strengthened in the future, ICSE (International Center of STEM Education at the University of Education Freiburg) as the project's coordinator plays an important role. ICSE takes on the role of a facilitator that mediates and connects a multitude of different stakeholders in the field of STEM education. As a future-oriented centre, ICSE stays up-to-date with the newest educational and technological trends, while being deeply rooted in the past work and expertise of its members. In doing so, the promotion of the MaSDiV outputs and services through appropriate channels directed at precisely identified target groups at the right time will be continued in the future.

6. References

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