STEAMitUP Impact Assessment Study

National Workshop Implementation and Practice Recommendations

Project Number: ***2019-1-UK01-KA201-061990***

Contents

Executive Summary

This document covers an extensive impact assessment study undertaken by the consortium across the six partner countries. The impact assessment study involved each organisation implementing a selection of practical workshops with both primary and secondary school teachers in order to measure the impact of the project resources on the key target groups. These workshops included twenty hours of blended learning activities utilising the educational materials developed by the consortium. Each organisation was tasked with engaging with twenty teachers (ten primary and ten secondary) with participants completing the workshops and providing detailed feedback on all aspects of project impact via surveys undertaken at different stages of the assessment process. Upon completion of the workshops, each organisation supported two participating teachers to run national implementation sessions using selected resources with at least two classes in their schools.

This phase of the project was especially impacted by the COVID-19 pandemic and the strain it put upon the educational systems of countries across the EU. Despite the national restrictions and issues faced by each organisation, the consortium was able to engage with a total of one hundred and four primary and secondary school teachers, with twelve teachers implementing elements of the materials in their classrooms with over two hundred students.

As a result of implementing the impact assessment workshops the consortium was able to gather an extensive amount of quantitative and qualitative information. This has enabled the partners to assess the impact of the project on multiple levels and to develop a selection of practice recommendations to support the implementation of STEAMitUP beyond the project lifetime and immediate beneficiaries.

Introduction

STEAMitUP: Preparing Teachers and Students for a Digital World is an *Erasmus+* funded Key Action 2 Strategic Partnership for School Education research project. The project began in November 2019 and involved a selection of schools, colleges, universities and research institutes from six European countries:

Lancaster and Morecambe College (LMC) is a further education college based in Lancaster in the North West of England;

CARDET is an NGO, research institute and education centre based in Nicosia Cyprus;

Doukas School is a school based in Athens, Greece that covers primary, secondary and further education;

Future in Perspective Limited (FIPL) is an SME who specialise in educational research projects and training based in Virginia, Ireland;

University of Groningen (UoG) is a higher educational institution based in Groningen, Netherlands;

Fundación Siglo22 is an NGO and educational research centre based in Madrid, Spain.

The aim of the project was to develop an interdisciplinary STEAM program to empower teachers, school leaders and school communities to apply STEAM activities, robotics and digital tools to develop 21st century skills in students. Throughout the

course of the project the consortium has engaged with well over 30 primary and secondary schools, 200 teachers, 50 school and/or faculty leaders and over 1000 students.

The STEAMitUP impact assessment study was designed to measure the impact of the project on the key target audiences and provide a selection of practice recommendations for future iterations. The study was implemented in three individual phases in all partner countries as outlined below:

> ***Phase A*** – Implementing 20 hours of blended learning workshops offered to 20 school teachers in each partner country. These training workshops were designed to support the participants to utilise the STEAMitUP Toolkit and E-learning Platform while also gaining feedback on their impact from a frontline educator's perspective;
>
> ***Phase B*** – Upon completion of the workshops, at least 2 participating teachers from each country utilised a selection of the STEAMitUP educational materials with learners in their schools and provided further feedback on the impact on learners;
>
> ***Phase C*** – Partner organisations created national implementation reports to be submitted for collation, analysis and the creation of this final impact assessment study report.

This entire process was overseen by LMC who created the workshop guidelines, presentations, resources and supported the implementation of all phases of the impact assessment. LMC then collated and analysed all of participant survey responses and national implementation reports to produce this final impact

assessment study report. The exact methodology used for this impact study is outlined in the following chapter.

Methodology

The methodology used for this impact assessment study involved a combination of structured teacher training workshops, participant impact surveys and classroom based practical implementation sessions. All elements of the assessment were developed in line the EU *Erasmus+ Impact+* guidance.

Teacher Training Workshops

A total of 20 hours of blended learning and training, delivered to 20 teachers in each partner country. This training was delivered as three separate workshops covering all aspects of the STEAMitUP project. Each workshop followed a flexible action plan using a selection of resources (e.g. links, activities and presentations) to train the participants how to use the project resources:

Workshop 1: A 4-hour session to introduce the project rationale, outline the key aims & objectives of STEAMitUP, provide an overview of the content of the educational toolkit and e-learning platform;

Workshop 2: 12 hours of engagement with the e-learning platform content including 2 hours of trainer-led activities followed by 10 hours of self-directed learning. The aim was to support the participants to access and navigate the

e-learning platform, gain a basic understanding of the different module content and provide constructive feedback on all elements of the resource;

Workshop 3: A final 4-hour session to support participants to utilise the STEAMitUP project as part of their teaching practices and facilitate group work activities including the development of multidisciplinary STEAM lessons.

Participant Impact Assessment Surveys

Each workshop included an impact assessment survey to be completed at the end of the session. These surveys were based on the content of the workshop with the aim of assessing the quality, usability and impact of the resources from a user perspective.

Each impact assessment survey included a range of open and closed questions that gathered both quantitative and qualitative information to be used for later analysis. The results and finding from the impact assessment surveys are included in a later chapter of this report, with the raw data included within the annexes.

Practical Implementation Sessions

The final element of the impact assessment study involved each partner organisation supporting two of their participating teachers to deliver practical implementation sessions with two classes. The aim was for those teachers to use their experience from the workshops, along with the project resources, to run multidisciplinary STEAM sessions in their schools in order to assess the impact on students.

As a result of implementing all these elements of the impact assessment study, the consortium was able to gain a detailed understanding of the project impact on all key target audiences.

This phase of the project was heavily impacted by the COVID-19 pandemic due to the nature of the planned activities and face-to-face interactions necessary to effectively assess the impact of the project. Partner organisations were given some flexibility in the delivery of their impact assessment study activities to account for differing national situations at the time of implementation. The following chapter provides each national implementation report covering participant profiles, specific methodologies used and an overview of the findings from each partner organisation.

Impact Assessment Survey Results and Analysis

As covered in the previous chapter of this report, the participating teachers involved in all of the national impact assessment workshops were asked to complete a series of surveys at various points during the workshop implementation phases. These surveys were aimed at collecting valuable qualitative and quantitative data from the participants in relation to the quality and impact of the STEAMitUP resources being presented.

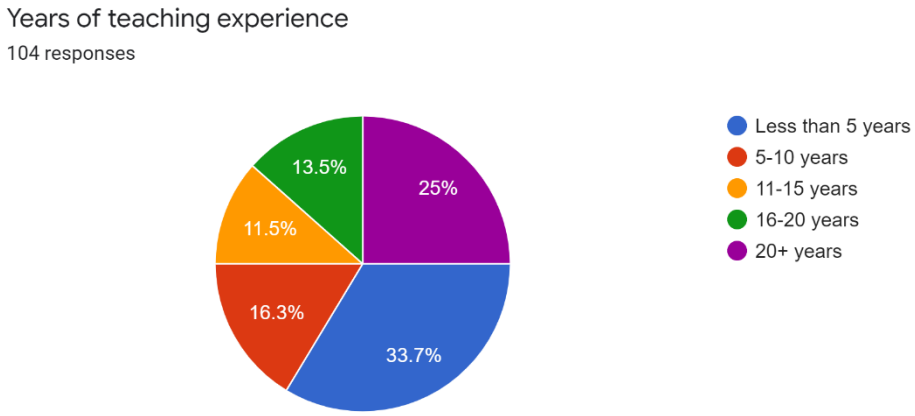
An overview and analysis of the collective findings is outlined in this chapter and the complete data sets are available in the annexes of this report.

Demographic Information of Participating Teachers

A total of 104 teachers participated in the national impact assessment workshops across the 6 partner countries.

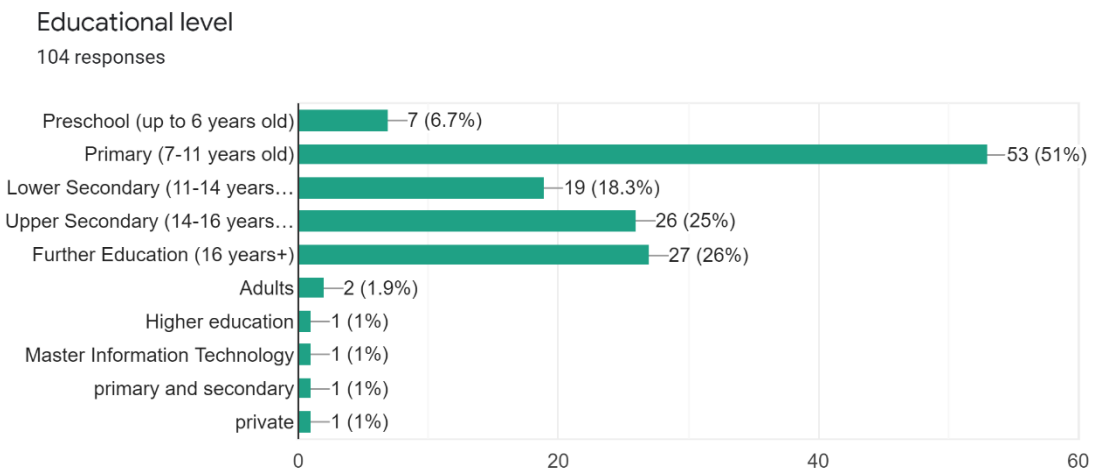
The participating teachers had a varied range of experience with 50% having over 10 years, and 33% having less than 5 years teaching experience. This was a positive outcome for the project and impact assessment process as we gained a diverse range of perspectives and could call on the extensive teaching experience of the participants.

Table 5.1: *Years of Teaching Experience of Participating Teachers*



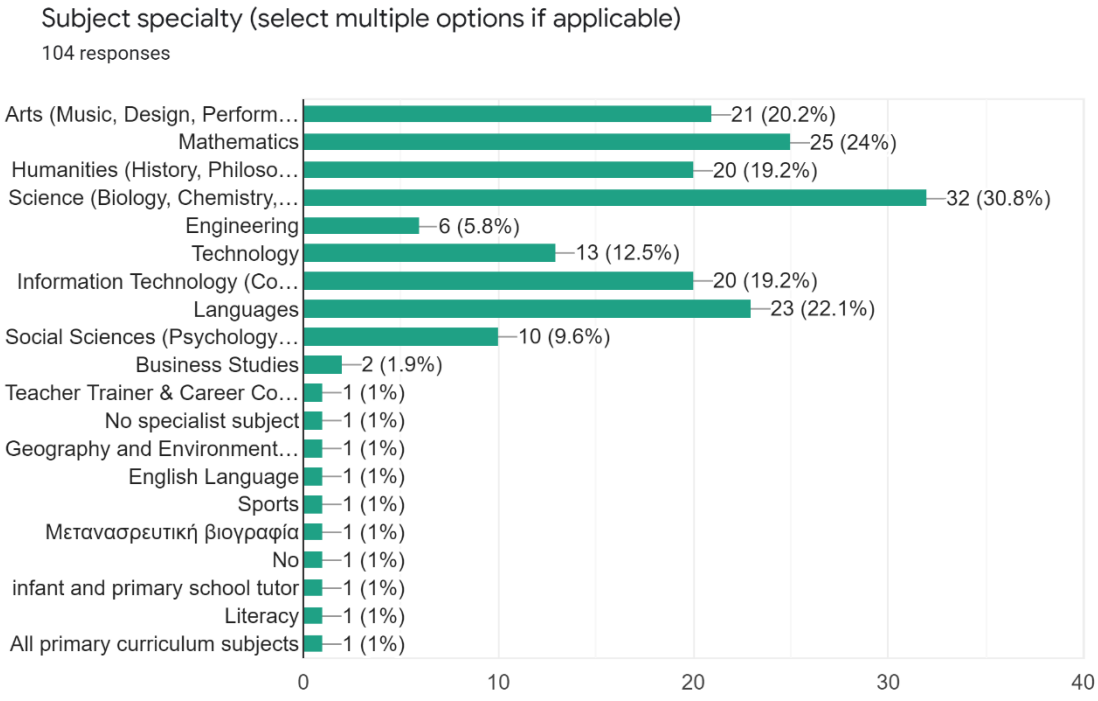
The participating teachers taught at a wide range of educational levels with many teachers covering multiple levels and student age groups. We found that 60 taught at primary level and 78 covered secondary, further or higher education. Again, this provided the project with a diverse selection of teachers covering a wide cross-section of educational levels.

Table 5.2: Educational Level Taught by Participating Teachers



The participating teachers also specialised in a broad range of subjects, with some teachers specialising in one specific area and others covering many subject areas. We found that 97 of the teachers stated that they had some experience and/or responsibility for teaching one or more of the STEAM fields.

Table 5.3: Subject Specialities of Participating Teachers



STEAMitUP Toolkit Evaluation Survey (Workshop 1)

Overall, the participant feedback was overwhelmingly positive. The project team altered some elements of the toolkit as a result of some issues raised by the teachers.

After analysing these findings, we are confident the STEAMitUP Toolkit meets the needs of the target audience and has had the desired impact outlined in the project brief.

STEAMitUP E-learning Platform Impact Survey (Workshop 2)

From the responses to these questions, we found that the vast majority of the participating teachers found the structure and content of the e-learning platform to be very good. There were no negative responses to any of the questions with only one participant stating that they felt the content of the platform was not suitable for their students.

The vast majority of the responses were overwhelmingly positive with the participating teachers providing some interesting and useful feedback. As a result of the comments, the project team made some alterations to the platform interface and progress recording mechanism. The suggestions for additional subjects/topics were also helpful but it was decided that the 6 modules already contained a wide range of STEAM content that was sufficient for the required purposes.

After analysing all of the participating teacher feedback, the project team are confident that the STEAMitUP E-learning platform had been produced to a high standard and that it meets the requirements of the key target groups. The e-learning platform content compliments the toolkit extremely well and the combined resources offer a fantastic suite of OERs that support the delivery of interdisciplinary STEAM lessons and teacher CPD.

From this feedback, we found that the teacher training workshops were well-received by the participating teachers and that the learning content was suitable for the required purposes. Obviously, we would have preferred to hold all the workshops physically as they would have been even more impactful, but all of the partner organisations adapted their plans effectively to deal with the issues caused by the pandemic in each country.

The feedback provided in this section supported our findings from the previous workshop surveys. They show that the project consortium has developed a wide-ranging, well-presented and user-friendly suite of OERs that support teachers to implement STEAM activities, lessons and workshops.

From this detailed and extensive feedback concerning the project impact, we found that from the participating teacher's perspective STEAMitUP has achieved the main aims and objectives outlined at the outset of the project. The STEAMitUP consortium and supporting schools have developed an effective suite of open educational resources that support the implementation and delivery of interdisciplinary STEAM lessons.

The vast majority of the participants stated that from their experience, the STEAMitUP project was having a positive impact on those who had engaged with the website, OERs and general project activities. They provided overwhelmingly positive feedback on all elements of the project impact along with a selection of useful suggestions for ways in which we can further increase our impact on the key target groups.

We also received some fantastic ideas and suggestions from the participants in relation to the planning, implementation and delivery of STEAM activities, lessons and project related actions that can be used for future initiatives. A selection of these are outlined in greater detail in the following practice recommendations chapter.

Some of the most interesting feedback we received was in relation to the question regarding efforts to increase female participation in the STEAM subjects. Many of the participating teachers identified a decrease in female participation as they progress upward through the different educational levels, although this is more evident in the STEM fields than the Arts. The responses gathered outline this as a deeply complex issue with no simple solution. The teachers pointed out the influences of gender stereotypes, societal pressures as well as a lack of attention given to past and present female role models within the STEAM fields as factors that passively discourage or actively restrict female participation at all levels of STEAM education and careers. On a positive note, many teachers stated that they had seen positive improvements in relation to this issue in recent years as attitude's towards 'traditional' gender roles have changed.

Practice Recommendations

As a result of implementing the national impact assessment workshops and analysing our findings, the STEAMitUP project consortium have developed the following practice recommendations to support implementation of STEAM related educational initiatives and activities:

1. **Increase interdisciplinary lessons and activities** – a key recommendation running through the majority of the teacher feedback was to ensure that, wherever possible, an interdisciplinary approach should be used across the STEAM fields. This is vital to educate students in the fact that all these fields are interlinked and compliment each other on many levels. This is an issue that can be difficult to overcome when working within the limitations of strict curriculum requirements. However, if implemented correctly this can empower and enthuse students to overcome any fears or hesitations they have regarding individual subjects and instead understand and appreciate the interconnectedness of these diverse fields;
2. **Encourage practical and experiential learning** – another key recommendation raised by the majority of teachers was to utilise practical activities, experiments and 'hands-on' involvement at all times when delivering STEAM related content. This has obvious benefits and is already widely practiced; however, limited funding, equipment and time can restrict its

effectiveness at all levels of education. The key is to instil an active desire to learn, facilitate practical engagement and encourage both literal and hypothetical experimentation at all levels of STEAM education;

3. **Facilitate extra-curricular activities** – this recommendation can include elements of all the others covered in this section. Providing additional structured and focused STEAM related activities outside of the 'traditional' classroom setting can be extremely useful in boosting engagement and overcoming barriers to participation. STEAM clubs, after-school workshops, themed days or events can all be utilised to promote the fields and offer the freedom for teachers and students to explore new activities outside of the often-rigid hour-long lesson format;

4. **Run female-focused STEAM initiatives** – again this recommendation can run alongside and compliment all others. Female-focused or female-only STEAM initiatives can encourage increased participation as this can negate some of the barriers and social influences outlined in previous sections. This ideally should also involve the inclusion of information regarding relevant female role-models from within the STEAM fields, both historically and from the present day. This could be in the form of case studies and/or guest speakers to show what is possible if you follow a STEAM career. Providing female students with a 'safe space' to investigate, experiment and develop can empower them to discover new aspirations and explore alternative career options that they may not have previously considered or thought plausible;
5. **Involve industry and representatives of the STEAM fields** – providing a 'real-world' context to the STEAM fields is vital to dispelling some of the apprehensions students may have towards studying them at a higher level. Showing students how the STEAM fields are key to many aspects of our lives and how they can open up endless career opportunities can be a powerful

mechanism to increase participation at all levels. Encouraging an understanding of the practical applications of the STEAM fields can be achieved through industrial visits, educational trips and by welcoming representatives of STEAM industries into schools to share their passion and experience with students.

These are just some of the potential actions a school or teacher can take in order to further promote the STEAM fields and encourage increased student participation at all levels. Every school will have their own strategies gained through experience but the STEAMitUP team encourage all schools to implement a combination of these recommendations to embed an effective and sustainable STEAM culture into their existing provision.

Conclusion

The STEAMitUP Impact Assessment Study has provided the project consortium with a fantastic opportunity to engage with a diverse range of primary and secondary educators from across the partner countries. From the implementation of the various teacher training workshops we gained a great deal of information regarding the quality, usability and impact of all elements of the STEAMitUP project. From this experience the project team are satisfied that our efforts have been well-received and had the desired impact on the key target audiences.

As we move toward the completion of the project, the partner organisations and participating schools will continue our activities to promote STEAM education and encourage increased participation at all levels of education. This impact survey, and complimentary policy recommendation paper, provide theoretical backing to the key

project objectives and support the educational resources already developed and piloted. This collective suite of OERs will continue to be freely accessible via the STEAMitUP website while elements of the project can be implemented by any school that desires to do so.

The STEAMitUP project team would like to thank all of those teachers and schools that have supported our work and been involved in this impact assessment study. The process has been vital in our efforts to gain a deeper understanding of the issues faced in STEAM education and how schools can implement relatively simple initiatives to overcome some of the barriers to participation.

Annexes

STEAMitUP Toolkit Evaluation Complete Survey Results - https://docs.google.com/forms/d/1qxuOZYbyormYhgC-LWbvmCkTAUI607vHuFPlTRhD628/edit#responses

STEAMitUP E-learning Platform Impact Complete Survey Results - https://docs.google.com/forms/d/1fkERs-9YALAiHiNLtSQZCrlb37vCpxk1NeeGrOeffDc/edit#responses

STEAMitUP Workshop Impact Assessment Complete Survey Results - https://docs.google.com/forms/d/1F-yY63Hs0tvlMg1dJR-QddsYLg9-QO5znzSoXZIf0pw/edit#responses