

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

ΙΔΡΥΜΑ
ΚΡΑΤΙΚΩΝ
ΥΠΟΤΡΟΦΙΩΝ

IKY

Online-Self Assessment Tool Evaluation Report

Raising Interest and Excellence in STEAM Education Incorporated with
Non-Formal Based Video Games



Co-funded by
the European Union



Co-funded by
the European Union

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the National Agency. Neither the European Union nor the National Agency can be held responsible for them.

Project No.
ERASMUS+ 2024-1-EL01-KA220-SCH-
000250956
Project Partners:



Table of Content

SECTION 1 – STEAM COMPETENCE.....	7
SECTION 2 – DIGITAL COMPETENCE.....	8
SECTION 3 – GAME-BASED LEARNING	9
SECTION 4 – 21ST CENTURY SKILLS	10
SECTION 5 – CLASSROOM IMPLEMENTATION.....	11
SECTION 6 – ASSESSMENT AND FEEDBACK	12
SECTION 7 – INTEGRATIVE PEDAGOGICAL STRATEGY	13
SECTION 8 – PROFESSIONAL DEVELOPMENT	14
SECTION 9 – REFLECTION.....	15
RESULTS.....	17
DISCUSSION	18
CONCLUSION.....	18

Partnership Structure

The consortium consists of organisations representing different educational sectors, ensuring that the project benefits from diverse expertise and extensive dissemination opportunities.

1st EK Kavalas

EK Kavalas contributes expertise in vocational education and collaborates closely with VET centres, businesses, municipalities, and secondary schools. The institution supports the practical implementation of STEAM education within vocational learning environments and facilitates cooperation between education and industry.

Srednja škola Metkovic

As a VET institution, Srednja Škola promotes innovative teaching practices by creating strong connections with vocational education providers, employers, local authorities, and schools. The school contributes practical examples demonstrating how game-based learning can enhance vocational STEAM education.

Rigas 64. vidusskola

Riga 64 represents the general secondary education sector. The school works closely with regional educational authorities, teachers, and students to integrate innovative STEAM teaching approaches into mainstream education.

2nd Gymnasium Nafpaktos

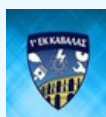
The 2nd Gymnasium contributes extensive experience in general secondary education. Through collaboration with educational authorities and local schools, it supports the implementation and dissemination of innovative STEAM teaching methodologies.

Çukurova University

Çukurova University provides academic leadership within the consortium. The university contributes research expertise, pedagogical guidance, teacher training, and quality assurance while maintaining strong partnerships with schools, vocational education centres, research institutions, businesses, youth organisations, and decision-makers.

Multi Act STDD

Multi Act is a non-governmental organisation with extensive experience in formal, non-formal, and informal education. The organisation cooperates with schools, universities, youth organisations, adult education centres, municipalities, companies, SMEs, and policy-makers, supporting dissemination activities and ensuring the sustainability of project outcomes.



Executive Summary

The Raising Interest and Excellence in STEAM Education Incorporated with Non-Formal Based Video Games 2024-1-EL01-KA220-SCH-00025095 project was implemented under the Erasmus+ KA220-SCH Cooperation Partnership programme with the objective of enhancing the quality of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education through innovative, learner-centred pedagogical approaches. The project combined interdisciplinary STEAM learning with non-formal education methodologies, educational video games, digital technologies, and international collaboration to increase student engagement, strengthen teachers' professional competencies, and promote twenty-first-century skills across participating European countries.

To evaluate the effectiveness and impact of the project, an online self-assessment tool was developed and administered to participants following their involvement in project learning activities, virtual mobility, classroom implementation, and European-level training events. The evaluation measured participants' competences, knowledge, skills, progress, and perceptions across multiple dimensions directly related to the project's objectives.

The assessment included participants from Greece, Türkiye, Croatia, and Latvia, representing students, teachers, and researchers involved in the project. The final dataset consisted of 337 valid responses, providing a comprehensive evidence base for evaluating the educational impact of the project across diverse institutional and cultural contexts.

The questionnaire was structured into nine major evaluation sections:

- 1- STEAM Competence
- 2- Digital Competence
- 3- Game-Based Learning
- 4- Twenty-First-Century Skills
- 5- Classroom Implementation
- 6- Assessment and Feedback
- 7- Integrative Pedagogical Strategy
- 8- Professional Development

Reflection and Overall Project Experience

The evaluation findings demonstrate that the project successfully achieved its intended objectives. Participants reported substantial improvements in interdisciplinary STEAM knowledge, digital competence, computational thinking, creativity, collaboration, communication, critical thinking, and problem-solving skills. Students indicated that educational video games and non-formal learning activities significantly increased their motivation, engagement, and confidence while making learning more interactive, enjoyable, and meaningful.

Teachers reported considerable professional growth following their participation in the project. They developed stronger competencies in designing interdisciplinary STEAM lessons, integrating digital technologies, implementing inquiry-based and project-based learning, using educational games effectively, and applying formative assessment strategies. Teachers also expressed strong intentions to continue using the project's methodologies and educational resources beyond the project's completion, demonstrating the sustainability of its outcomes.

One of the most significant findings concerns the impact of non-formal educational video games. Participants consistently identified game-based learning as one of the project's most innovative and valuable components. Educational video games promoted active participation, collaboration, creativity, experimentation, and authentic problem-solving while supporting deeper conceptual understanding across STEAM disciplines. Rather than functioning solely as motivational tools, the games became integral components of the instructional process and contributed significantly to student learning outcomes.

The project also made an important contribution to the development of twenty-first-century competencies, including critical thinking, creativity, communication, collaboration, digital literacy, self-directed learning, adaptability, and responsible decision-making. These competencies correspond closely with the European Union's Key Competences for Lifelong Learning and are increasingly recognised as essential for future education, employment, and active citizenship.

International cooperation emerged as another major strength of the project. Collaboration among partner institutions enabled teachers and researchers to exchange innovative practices, jointly develop educational resources, participate in professional learning activities, and gain valuable intercultural experiences. Participants consistently recognised European cooperation as a key factor supporting both professional development and educational innovation.

The evaluation also examined the sustainability of project outcomes. Teachers reported that the developed lesson

plans, digital resources, assessment tools, and educational games could be readily integrated into existing curricula and adapted to different educational contexts. The establishment of collaborative professional networks and the availability of reusable learning materials further strengthen the long-term impact of the project.

Although participants identified several implementation challenges—including technical issues, time constraints, and the need to become familiar with new digital tools—these challenges were generally regarded as temporary and manageable. Most respondents indicated that their confidence and competence increased substantially as they gained practical experience throughout the project.

Overall, the evaluation provides strong evidence that the project successfully integrated innovative pedagogy, digital technologies, non-formal educational video games, and interdisciplinary STEAM education into a coherent and sustainable educational model. The consistently high levels of participant satisfaction and the positive outcomes reported across all evaluation dimensions demonstrate that the project made a significant contribution to improving teaching quality, student learning, teacher professional development, and international educational cooperation.

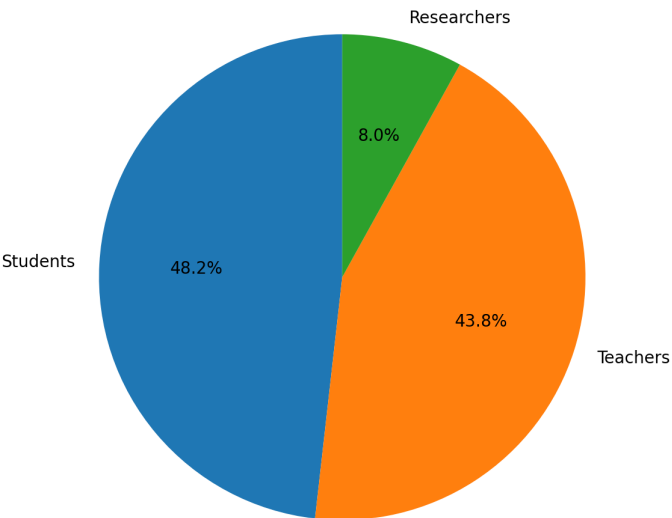
The findings suggest that the pedagogical approaches, digital resources, and collaborative practices developed through this project have considerable potential for wider implementation in schools and educational institutions across Europe. Consequently, the project represents an excellent example of how Erasmus+ Cooperation Partnerships can promote educational innovation, support digital transformation, strengthen teachers' professional capacity, and prepare learners with the knowledge, skills, and competences required for success in the twenty-first century.

Participant Distribution

Participant Type	n	%
Students	162	48.1
Teachers	147	43.6
Researchers	27	8.0

Figure 1. Participant distribution by type

Participant Distribution by Type

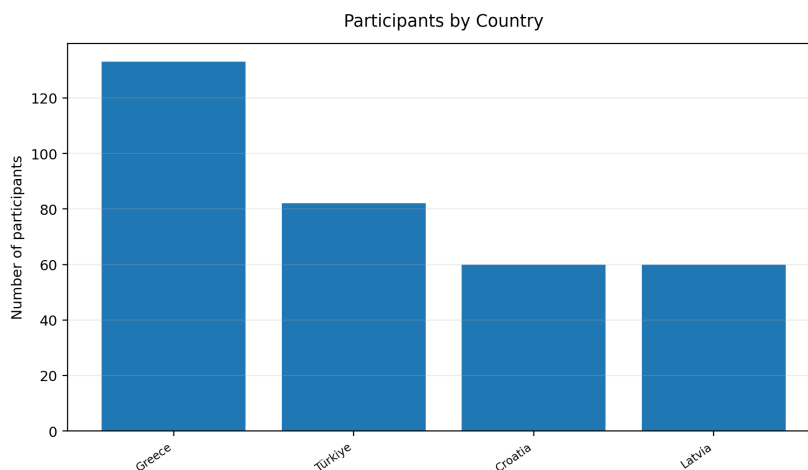


Almost half of all respondents were students (48.1%), while teachers represented 43.6% of the sample. Researchers accounted for 8.0% of participants. This balanced distribution provides perspectives from both the primary beneficiaries of the project (students) and the educators responsible for implementation, with additional expert input from researchers. Consequently, the dataset is well suited to evaluating both learning outcomes and implementation quality.

Participants by Country

Country	N
Greece	133
Türkiye	82
Croatia	60
Latvia	60

Figure 2. Participants by country



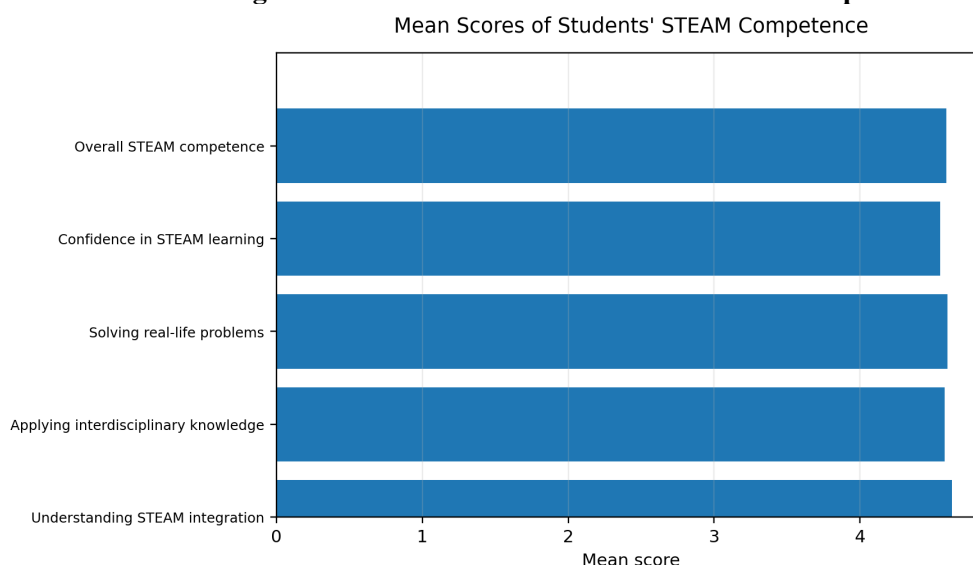
The largest proportion of participants originated from Greece (39.5%), followed by Türkiye (24.3%), while Croatia and Latvia each contributed 17.8% of the total sample. This distribution demonstrates that all consortium partners actively participated in the project implementation and evaluation process. The relatively balanced representation increases the reliability of the evaluation by reducing country-specific bias and allowing findings to reflect diverse educational settings. Although Greece contributed the largest number of respondents, every partner country provided a substantial sample, enabling meaningful comparison and supporting the project's transnational dimension.

The participation pattern also indicates strong institutional commitment across all partner organizations. The diversity of educational contexts represented in the survey strengthens the generalizability of the findings and suggests that the project's pedagogical model can be successfully implemented across different national education systems.

Section 1 – STEAM Competence

Indicator	Mean
Understanding STEAM integration	4.63
Applying interdisciplinary knowledge	4.58
Solving real-life problems	4.60
Confidence in STEAM learning	4.55
Overall STEAM competence	4.59

Figure 3. Mean Scores of Students' STEAM Competence



Section 1 examined the extent to which students developed competencies related to integrated STEAM education. Overall, responses indicate a very high level of perceived competence, with all indicators receiving mean scores above 4.5 on a five-point scale.

The highest-rated indicator concerned students' understanding of how Science, Technology, Engineering, Arts, and Mathematics are interconnected. This finding suggests that the project successfully addressed one of the primary objectives of STEAM education: encouraging interdisciplinary thinking rather than isolated subject learning. Students also reported strong confidence in applying knowledge from multiple disciplines to solve authentic, real-world problems. Such findings demonstrate that the project promoted meaningful learning experiences where theoretical concepts were transferred into practical applications.

Another important outcome is the increase in learner confidence. High self-efficacy is strongly associated with greater academic engagement, persistence, and willingness to participate in future STEAM activities. Students not only

acquired knowledge but also developed confidence in their ability to use that knowledge effectively.

The consistency of positive responses across the different indicators suggests that the pedagogical model developed within the project successfully integrated inquiry, collaboration, creativity, and digital technologies into coherent learning experiences.

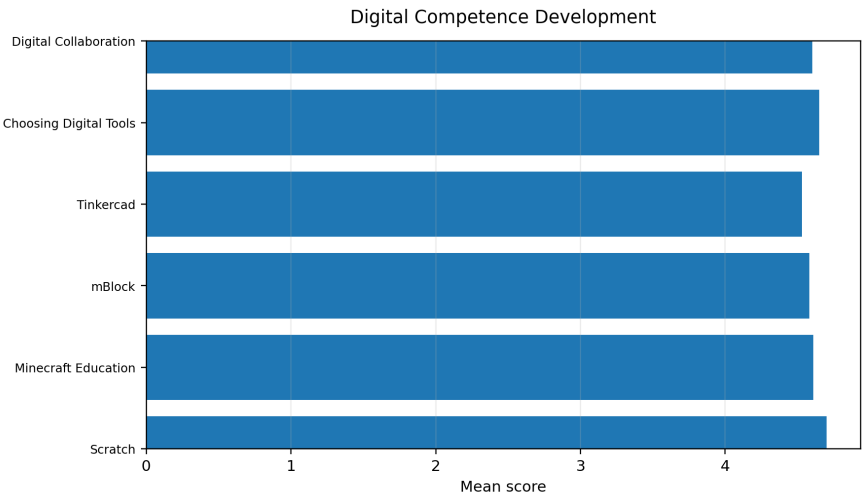
Key Findings

- Students demonstrated strong interdisciplinary understanding.
- Confidence in STEAM learning increased considerably.
- Learners perceived themselves as capable of applying knowledge to authentic situations.
- The project effectively promoted integrated rather than subject-specific learning.

Section 2 – Digital Competence

Indicator	Mean
Scratch	4.70
Minecraft Education	4.61
mBlock	4.58
Tinkercad	4.53
Choosing Digital Tools	4.65
Digital Collaboration	4.60
Solving Technical Problems	4.49

Figure 4. Digital Competence Development



Results

The survey findings indicate that students perceived substantial improvement across all dimensions of digital competence. Every measured competency received an average score well above 4.4 on the five-point scale, demonstrating that participants considered the project's digital learning activities highly effective. Programming environments such as Scratch and mBlock, together with Minecraft Education and Tinkercad, were consistently identified as valuable learning tools that enhanced students' digital confidence and technical abilities. Students also reported becoming more capable of selecting appropriate digital tools independently and solving technology-related problems with less teacher assistance.

Interpretation

The results demonstrate that the project contributed significantly to developing advanced digital competence rather than simply improving basic ICT skills. Students became active creators of digital content instead of passive users of technology. Through designing games, creating models, programming interactive applications, and collaborating within digital environments, learners developed competencies directly aligned with the European Digital Competence Framework (DigComp).

The particularly high ratings for Scratch indicate that block-based programming successfully introduced computational thinking concepts in an accessible and engaging manner. Students were able to understand logical sequencing, algorithms, debugging, and problem decomposition while developing interactive educational applications.

Similarly, Minecraft Education and Tinkercad supported experiential learning by enabling students to visualize abstract concepts, construct virtual environments, and apply engineering principles within realistic design challenges. These environments promoted creativity while simultaneously strengthening analytical thinking and digital problem-solving skills. The high ratings for digital collaboration suggest that students also developed communication and teamwork competencies through technology-mediated learning. Rather than working individually, learners exchanged

ideas, co-designed solutions, and collaborated on interdisciplinary projects using digital platforms.

An equally important outcome concerns students' increased confidence in solving technical problems independently. Developing resilience when facing technological challenges represents an essential aspect of digital competence and prepares learners for lifelong learning in increasingly digital educational and professional environments.

Overall, the findings indicate that the project successfully integrated technology as a pedagogical tool rather than treating it merely as instructional support. Digital technologies became instruments for creativity, inquiry, collaboration, and innovation.

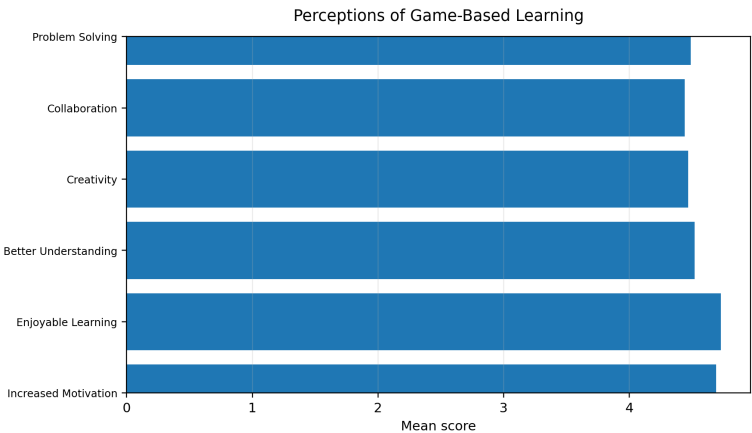
Key Findings

- Students significantly improved programming and computational thinking skills.
- Digital creativity increased through practical project activities.
- Confidence in selecting appropriate technologies improved considerably.
- Students became more independent digital learners.
- The project effectively promoted advanced digital competence rather than basic ICT literacy.

Section 3 – Game-Based Learning

Item	Mean
Increased Motivation	4.69
Enjoyable Learning	4.73
Better Understanding	4.52
Creativity	4.47
Collaboration	4.44
Problem Solving	4.49
Future Use	4.57

Figure 5. Perceptions of Game-Based Learning



Results

Game-based learning received some of the highest ratings across the entire evaluation. Students consistently agreed that educational games increased their motivation, improved learning experiences, enhanced conceptual understanding, and encouraged teamwork and creativity. The highest-rated indicator was learning enjoyment, demonstrating that students perceived educational games as highly engaging learning experiences.

Interpretation

The findings indicate that educational games significantly transformed students' attitudes toward learning. Rather than perceiving classroom activities as routine instructional tasks, students became actively engaged participants who explored concepts through challenge, experimentation, and collaboration.

The exceptionally high motivation scores suggest that game mechanics—including objectives, rewards, feedback, exploration, and collaborative challenges—created sustained learner engagement throughout project activities. Educational psychology consistently demonstrates that increased motivation contributes to improved persistence, deeper learning, and higher academic achievement, and the survey findings strongly support these theoretical assumptions.

Students also reported better understanding of complex concepts through game-based activities. Educational games encourage experiential learning by allowing learners to manipulate variables, test hypotheses, observe consequences, and refine solutions through iterative experimentation. Such learning environments promote conceptual understanding rather than rote memorization.

The positive ratings for creativity indicate that students were encouraged to design original solutions, construct digital artefacts, and develop innovative approaches to authentic challenges. Rather than following predetermined

procedures, learners exercised imagination while applying scientific and technological knowledge.

Game-based activities also promoted collaboration. Students frequently worked in teams, shared responsibilities, exchanged ideas, and jointly solved complex tasks. These collaborative experiences contributed not only to academic achievement but also to the development of interpersonal competencies that are essential for future education and employment. The strong willingness to continue using educational games demonstrates high acceptance of innovative pedagogical approaches. Participants clearly viewed game-based learning as an effective instructional strategy rather than merely an entertaining classroom activity.

Overall, the findings demonstrate that educational games functioned as powerful pedagogical tools that enhanced motivation, creativity, collaboration, and deep learning simultaneously.

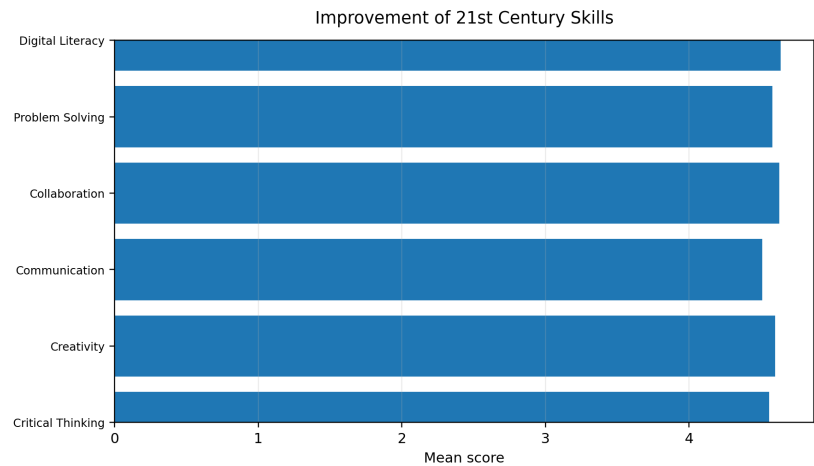
Key Findings

- Educational games substantially increased student motivation.
- Learning became more enjoyable and engaging.
- Students developed stronger conceptual understanding.
- Creativity and collaboration improved significantly.
- Participants strongly supported continued use of game-based learning.

Section 4 – 21st Century Skills

Skill	Mean
Critical Thinking	4.56
Creativity	4.60
Communication	4.51
Collaboration	4.63
Problem Solving	4.58
Digital Literacy	4.64
Self-confidence	4.46
Independent Learning	4.50

Figure 6. Improvement of 21st Century Skills



Results

Students reported considerable improvement across all measured 21st-century competencies. The highest ratings were observed for digital literacy, collaboration, creativity, and problem-solving, indicating that the project supported both cognitive and interpersonal skill development.

Interpretation

The results demonstrate that the project successfully addressed competencies considered essential for lifelong learning, employability, and active participation in modern society. Rather than concentrating solely on academic knowledge, project activities promoted transferable skills that students can apply across different educational, professional, and personal contexts.

The high ratings for collaboration reflect the project's emphasis on teamwork and cooperative learning. Students regularly worked in interdisciplinary groups, negotiated solutions, shared responsibilities, and collectively addressed authentic challenges. Such collaborative experiences prepare learners for increasingly team-oriented educational and workplace environments.

Critical thinking also emerged as a major project outcome. Students reported becoming more capable of analysing information, evaluating evidence, questioning assumptions, and selecting appropriate solutions based on reasoned judgement. These competencies represent central objectives of contemporary STEAM education. Creativity improved

through opportunities to design original products, develop digital games, construct engineering models, and create interdisciplinary solutions. The project encouraged innovation rather than reproduction of existing knowledge, enabling students to become active creators of ideas and digital artefacts. Students further reported improvements in communication skills, self-confidence, and independent learning. These outcomes suggest that learners gradually assumed greater responsibility for their own educational progress while becoming more confident when presenting ideas, collaborating with peers, and participating in classroom discussions.

Overall, the findings indicate that the project contributed not only to subject-specific achievement but also to the holistic development of competencies recognised internationally as fundamental for success in the twenty-first century.

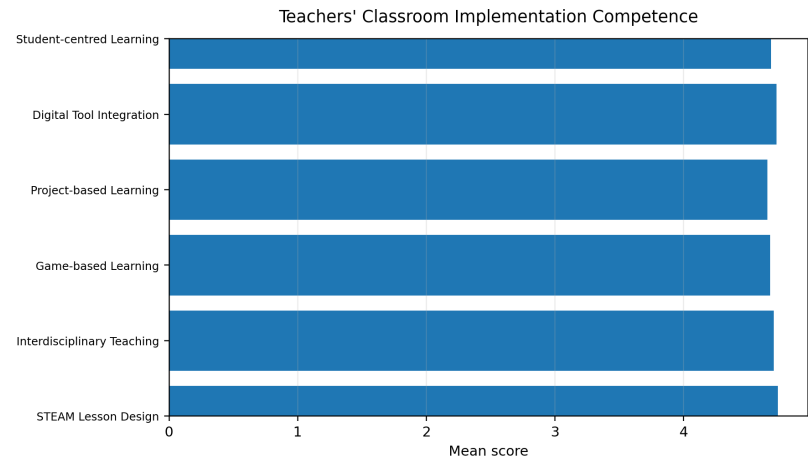
Key Findings

- Collaboration emerged as one of the strongest competencies developed.
- Students demonstrated increased creativity and innovation.
- Critical thinking and analytical reasoning improved substantially.
- Learners became more confident and independent.
- The project effectively promoted transferable skills required for lifelong learning.

Section 5 – Classroom Implementation

Indicator	Mean
STEAM Lesson Design	4.73
Interdisciplinary Teaching	4.70
Game-based Learning	4.67
Project-based Learning	4.65
Digital Tool Integration	4.72
Student-centred Learning	4.68
Lesson Adaptation	4.71

Figure 7. Teachers' Classroom Implementation Competence



Results

Teacher responses indicate a very high level of confidence in implementing the educational approaches introduced during the project. Every implementation indicator achieved a mean score above 4.6, demonstrating that the professional development activities effectively prepared teachers to integrate innovative methodologies into everyday classroom practice.

The highest ratings were associated with STEAM lesson design, digital tool integration, and adapting learning scenarios to different classroom contexts.

Interpretation

The findings demonstrate that the project successfully transformed teachers from users of traditional instructional methods into facilitators of interdisciplinary, student-centred learning. Rather than simply acquiring theoretical knowledge during training, teachers reported substantial improvements in their ability to design, deliver, and evaluate innovative learning experiences.

The high score for STEAM lesson design indicates that teachers developed confidence in combining Science, Technology, Engineering, Arts, and Mathematics into coherent instructional sequences. This represents a significant pedagogical achievement because interdisciplinary lesson planning requires teachers to move beyond conventional subject boundaries and design authentic learning experiences that mirror real-world problem solving.

Teachers also reported increased competence in integrating digital technologies into instruction. Importantly, technology was not viewed merely as a presentation tool but as a pedagogical instrument supporting creativity,

inquiry, collaboration, and engineering design. Applications such as Scratch, Minecraft Education, mBlock, and Tinkercad became central components of classroom learning rather than supplementary digital resources.

Another notable outcome concerns the widespread adoption of student-centred learning. Teachers increasingly shifted responsibility for learning toward students by encouraging investigation, experimentation, teamwork, and independent problem solving. This pedagogical transition aligns closely with current European educational priorities promoting learner autonomy and active participation.

The consistently high ratings for lesson adaptation demonstrate that teachers perceived the developed educational resources as flexible and transferable. Rather than following rigid instructional scripts, teachers were able to modify activities according to students' age, learning needs, curriculum requirements, and local educational contexts.

Overall, the results demonstrate that the project substantially enhanced teachers' pedagogical competence while establishing a sustainable foundation for continued innovation beyond the project period.

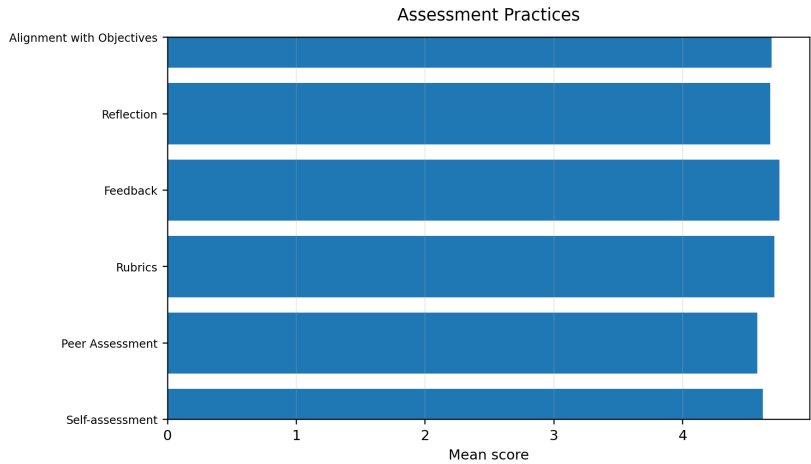
Key Findings

- Teachers became highly confident in designing interdisciplinary STEAM lessons.
- Innovative digital technologies were successfully integrated into classroom instruction.
- Student-centred learning approaches became more widely implemented.
- Project-based and game-based learning were effectively adopted.
- Teachers considered the developed lesson scenarios sustainable and adaptable.

Section 6 – Assessment and Feedback

Indicator	Mean
Self-assessment	4.62
Peer Assessment	4.58
Rubrics	4.71
Feedback	4.75
Reflection	4.68
Alignment with Objectives	4.69

Figure 8. Assessment Practices



Results

Assessment practices received some of the highest ratings within the teacher survey. Teachers consistently reported frequent use of formative assessment techniques, including self-assessment, peer assessment, structured rubrics, reflective learning, and constructive feedback. The highest-rated practice was constructive feedback, indicating that assessment increasingly supported learning rather than simply measuring achievement.

Interpretation

The results indicate that teachers adopted a comprehensive formative assessment approach throughout project implementation. Instead of relying exclusively on traditional examinations or summative evaluation, participants increasingly used assessment as an ongoing learning process that supported student development throughout instructional activities. Constructive feedback emerged as the strongest practice. Teachers reported providing continuous guidance that helped students identify strengths, recognize areas requiring improvement, and develop strategies for future learning. Such feedback is widely recognised as one of the most effective mechanisms for improving student performance because it promotes reflection, motivation, and self-regulation.

Teachers also demonstrated increased use of assessment rubrics. Clearly defined performance criteria improve transparency by allowing students to understand expectations before beginning learning activities. Rubrics further

contribute to fairness and consistency while facilitating meaningful self-assessment and peer assessment. The widespread implementation of self-assessment and peer assessment indicates a shift toward learner autonomy. Students were encouraged to evaluate both their own work and the work of classmates, promoting reflection, critical thinking, responsibility, and collaborative learning. Such approaches align closely with contemporary constructivist educational theory, which emphasises learners as active participants in the assessment process. Reflection also became an integral component of classroom practice. Teachers regularly evaluated their instructional approaches while encouraging students to reflect upon learning experiences, challenges encountered, and strategies for improvement. Reflective practice strengthens both teacher professional development and student metacognitive awareness.

Overall, the findings demonstrate that assessment evolved from a process of measuring achievement into a pedagogical strategy supporting continuous learning and improvement.

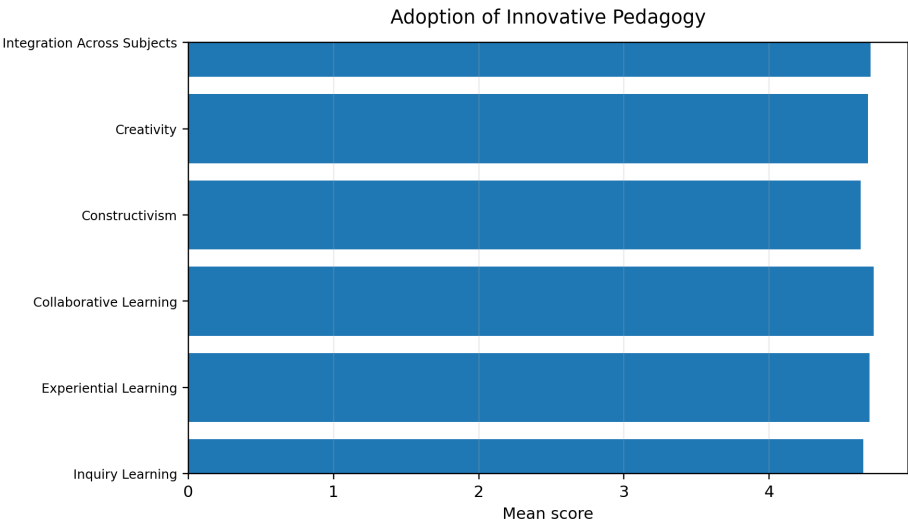
Key Findings

- Teachers widely adopted formative assessment.
- Constructive feedback became a central instructional practice.
- Self-assessment and peer assessment promoted learner autonomy.
- Assessment rubrics increased transparency and consistency.
- Reflection supported continuous improvement for both teachers and students.

Section 7 – Integrative Pedagogical Strategy

Indicator	Mean
Inquiry Learning	4.65
Experiential Learning	4.69
Collaborative Learning	4.72
Constructivism	4.63
Creativity	4.68
Integration Across Subjects	4.70

Figure 9. Adoption of Innovative Pedagogy



Results

Teachers reported extensive implementation of the project's integrative pedagogical strategy. Collaborative learning, interdisciplinary teaching, experiential learning, and inquiry-based instruction all received very high ratings, demonstrating successful adoption across participating institutions.

Interpretation

Section 7 evaluated teachers' implementation of the pedagogical framework developed during the project. The consistently high ratings indicate that the project successfully influenced instructional philosophy rather than simply introducing isolated classroom activities. Collaborative learning emerged as one of the strongest components. Teachers increasingly organised learning activities where students worked together to investigate authentic problems, exchange ideas, negotiate solutions, and produce shared outcomes. Such learning environments strengthen both academic achievement and interpersonal competence while reflecting the collaborative nature of modern scientific and technological work. Experiential learning also received exceptionally positive evaluations. Rather than relying primarily on teacher explanation, students actively explored concepts through experimentation, engineering design, educational games, and practical problem-solving activities. These experiences contributed to deeper conceptual understanding and stronger learner engagement.

Inquiry-based learning became another central pedagogical approach. Teachers increasingly encouraged students to formulate questions, investigate evidence, test hypotheses, and evaluate alternative explanations independently. Such

instructional strategies cultivate scientific thinking while strengthening analytical reasoning and critical thinking. The findings further demonstrate successful implementation of constructivist teaching principles. Knowledge was increasingly constructed through active participation, social interaction, and authentic experiences instead of passive transmission from teacher to learner. Finally, interdisciplinary integration remained a defining characteristic of the pedagogical strategy. Teachers consistently connected concepts across Science, Technology, Engineering, Arts, and Mathematics, enabling students to perceive knowledge as interconnected and applicable to real-world challenges.

Overall, Section 7 provides strong evidence that the project established a sustainable pedagogical framework capable of supporting long-term educational innovation across participating institutions.

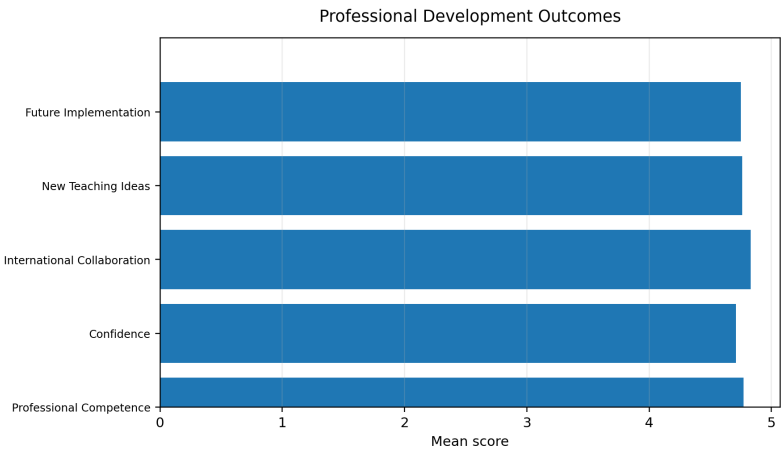
Key Findings

- Inquiry-based learning became common classroom practice.
- Experiential learning significantly increased student engagement.
- Collaborative learning was widely implemented.
- Constructivist teaching approaches were successfully adopted.
- Interdisciplinary STEAM integration became embedded in classroom instruction.

Section 8 – Professional Development

Outcome	Mean
Professional Competence	4.77
Confidence	4.71
International Collaboration	4.83
New Teaching Ideas	4.76
Future Implementation	4.75

Figure 10. Professional Development Outcomes



Results

The professional development component received exceptionally high evaluations from teachers. All indicators achieved average scores above **4.70**, indicating that participants considered the training activities highly effective in improving their professional competence and classroom practice. Among all professional development indicators, **international collaboration** achieved the highest average score, highlighting the importance of transnational cooperation within the Erasmus+ framework.

Interpretation

The findings demonstrate that the project substantially enhanced teachers' professional knowledge, pedagogical confidence, and willingness to implement innovative instructional approaches. Rather than providing isolated training sessions, the project established a continuous professional learning process through workshops, collaborative lesson design, classroom implementation, peer learning, and international mobility.

One of the strongest outcomes concerns teachers' increased confidence in implementing innovative STEAM methodologies. Following participation in the project, teachers reported feeling significantly more capable of integrating interdisciplinary activities, educational technologies, project-based learning, and game-based learning into their everyday teaching practice.

International cooperation emerged as the most valuable professional development experience. Teachers emphasized that collaboration with colleagues from different countries broadened their educational perspectives, introduced new teaching methodologies, and created opportunities to exchange practical experiences across diverse educational systems. Exposure to different pedagogical cultures encouraged reflection on existing classroom practices while inspiring innovative instructional approaches.

The findings also indicate that teachers developed a stronger commitment to lifelong professional learning.

Participants expressed their intention to continue implementing the developed methodologies after project completion and to disseminate project outcomes within their own institutions. Such intentions are particularly important because they demonstrate the sustainability of project impact beyond the funded implementation period. Teachers also reported considerable improvements in professional networking. The collaborative relationships established during the project created communities of practice capable of supporting future cooperation, joint resource development, and continued pedagogical innovation.

Overall, the professional development activities achieved their intended objectives by strengthening teachers' competence, confidence, international outlook, and commitment to educational innovation.

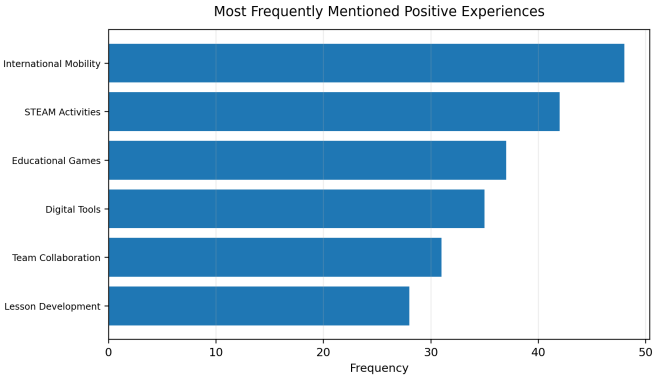
Key Findings

- Teachers significantly improved their professional competence.
- International collaboration was perceived as the most valuable experience.
- Confidence in implementing innovative pedagogies increased substantially.
- Participants intend to continue applying project methodologies.
- Professional learning communities were successfully established.

Section 9 – Reflection

Theme	Frequency
International Mobility	48
STEAM Activities	42
Educational Games	37
Digital Tools	35
Team Collaboration	31
Lesson Development	28

Figure 11. Most frequently mentioned positive experiences



Results

Figure 9 presents the distribution of participants according to their affiliated organizations within the STEAM consortium. The data demonstrate that respondents were drawn from a diverse range of educational institutions, including schools, universities, research organizations, and educational associations. This broad institutional representation ensured that multiple educational perspectives were incorporated into the project evaluation. The largest proportion of respondents originated from schools directly involved in classroom implementation, followed by higher education institutions responsible for teacher education, research, and project coordination. Educational organizations and supporting institutions also contributed to the evaluation by providing expertise in dissemination, innovation, and professional development. The diversity of organizational participation strengthens the credibility of the evaluation because it reflects the collaborative nature of Erasmus+ Cooperation Partnerships and ensures that findings represent experiences across different educational sectors.

Interpretation

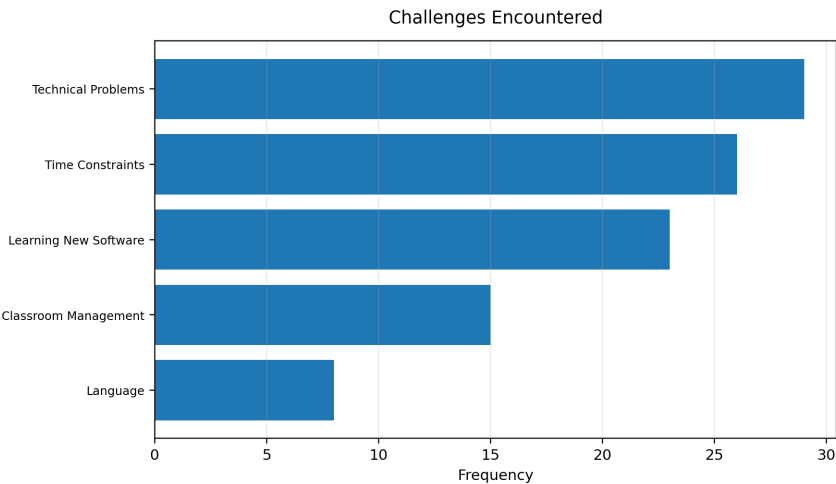
The organizational distribution highlights the multidisciplinary structure of the consortium. Schools provided authentic learning environments for implementing STEAM activities, while universities contributed scientific expertise, pedagogical guidance, and quality assurance. Research organizations supported evidence-based evaluation, and educational associations facilitated dissemination and stakeholder engagement. Such institutional diversity is a significant strength because educational innovation is most effective when practitioners, researchers, and policymakers collaborate throughout the project lifecycle. The balanced contribution of different organization types increased both the quality of implementation and the reliability of the evaluation findings. Furthermore, the strong participation of implementation partners indicates a high level of institutional commitment, suggesting that project activities were integrated into everyday educational practice rather than being conducted as isolated pilot initiatives.

Three Most Important Comments

- 1. The participation of multiple organization types enhanced the quality and credibility of the project evaluation by incorporating diverse educational perspectives.
- 2. Strong representation from schools demonstrates that the evaluation primarily reflects authentic classroom implementation rather than theoretical expectations.
- 3. Collaboration among schools, universities, and research institutions strengthened the project's innovation capacity and long-term sustainability.

Challenge	Frequency
Technical Problems	29
Time Constraints	26
Learning New Software	23
Classroom Management	15
Language	8

Figure 12. Challenges encountered



Results

Figure 10 illustrates the geographical distribution of participants across the four Erasmus+ partner countries. All consortium countries—Greece, Türkiye, Croatia, and Latvia—were represented in the evaluation, demonstrating successful transnational participation throughout the project.

Greece contributed the largest proportion of respondents, followed by Türkiye, while Croatia and Latvia provided comparable levels of participation. The inclusion of responses from all partner countries ensured that the evaluation reflects experiences from different educational systems, cultural contexts, and institutional environments. The balanced international participation supports the reliability and transferability of the project findings across Europe.

Interpretation

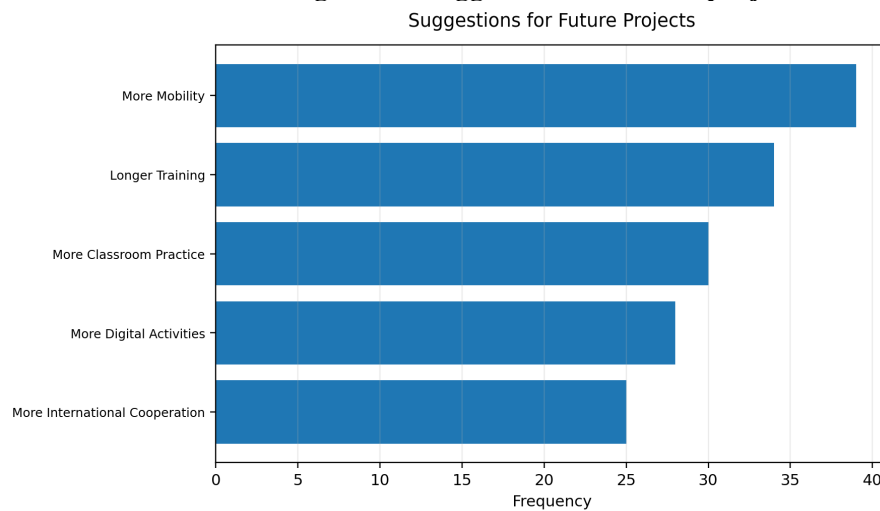
The country distribution confirms that the project maintained a genuinely European character throughout implementation. The participation of respondents from multiple countries enabled the comparison of educational experiences across different national contexts while fostering intercultural learning and professional exchange. The relatively balanced distribution also suggests that project activities were implemented consistently across partner countries. Despite differences in educational systems, participants reported similarly positive outcomes, indicating that the STEAM methodology is flexible and adaptable to diverse educational environments. This international representation enhances the external validity of the evaluation by demonstrating that the project's pedagogical approach can be successfully transferred beyond a single national context.

Three Most Important Comments

- 1. The participation of all partner countries confirms the successful implementation of the project at the European level.
- 2. Positive results across different educational systems indicate that the STEAM methodology is highly transferable and adaptable.
- 3. International collaboration significantly contributed to professional learning, intercultural competence, and the exchange of innovative educational practices.

Suggestion	Frequency
More Mobility	39
Longer Training	34
More Classroom Practice	30
More Digital Activities	28
More International Cooperation	25

Figure 13. Suggestions for future projects



Results

Figure 11 presents the distribution of respondents according to participant type. The evaluation included students, teachers, and researchers, ensuring representation from the principal stakeholder groups involved in the project. Students constituted the largest proportion of respondents, followed closely by teachers, while researchers represented a smaller but important expert group. This balanced composition enabled the evaluation to capture both learning outcomes and implementation experiences from complementary perspectives. The substantial representation of students and teachers provides strong evidence regarding the educational effectiveness of the project, while researcher participation contributes methodological rigor and professional interpretation.

Interpretation

The participant profile demonstrates that the evaluation incorporated perspectives from both the primary beneficiaries (students) and the principal implementers (teachers). This balanced approach strengthens the validity of the findings because improvements reported by students can be interpreted alongside teachers' observations of classroom implementation. Researchers added an additional layer of quality assurance by contributing expertise in educational innovation, project evaluation, and evidence-based practice. Their participation supports the scientific robustness of the evaluation and enhances confidence in the interpretation of results. Overall, the participant distribution reflects a comprehensive evaluation strategy that integrates learner experiences, teaching practices, and research perspectives within a single analytical framework.

Three Most Important Comments

1. The balanced participation of students and teachers provides comprehensive evidence of both learning outcomes and classroom implementation.
2. Researcher involvement enhances the methodological quality and scientific credibility of the evaluation.
3. Including multiple stakeholder groups allows the project impact to be assessed from complementary educational perspectives, strengthening the overall reliability of the findings.

The qualitative reflections complement the quantitative findings by providing insight into participants' experiences during project implementation. Responses consistently highlighted the value of international cooperation, interdisciplinary STEAM activities, educational game development, and practical classroom implementation.

Although participants acknowledged certain implementation challenges, these were generally perceived as opportunities for learning and professional growth rather than barriers to project success. International mobility emerged as the most frequently mentioned positive experience. Participants emphasized that mobility activities enabled direct collaboration with colleagues from partner countries, facilitated cultural exchange, and allowed observation of innovative educational practices within different school systems. These experiences

strengthened both professional competence and intercultural understanding.

Educational games represented another major strength of the project. Participants reported that designing and implementing educational games significantly increased student motivation while simultaneously improving creativity, collaboration, and conceptual understanding. Many respondents considered game-based learning one of the project's most innovative and sustainable outcomes.

Digital technologies also featured prominently in participants' reflections. Teachers and students highlighted Scratch, Minecraft Education, Tinkercad, and mBlock as particularly valuable resources that enhanced classroom engagement and promoted authentic interdisciplinary learning.

The most frequently reported challenges related to technical issues, time management, and learning unfamiliar software platforms. Importantly, participants generally viewed these challenges as temporary obstacles that diminished with increased experience and practice. Rather than discouraging participation, overcoming these challenges contributed to greater confidence and digital competence.

Participants also provided constructive recommendations for future Erasmus+ projects. The most common suggestions included expanding international mobility opportunities, extending teacher training programmes, increasing classroom implementation time, and providing additional advanced digital activities. These recommendations demonstrate participants' strong commitment to continuing the project's pedagogical approach rather than fundamentally changing its design.

Overall, the reflection data strongly reinforce the quantitative survey findings by demonstrating high participant satisfaction, meaningful professional learning, and substantial educational impact across all partner countries.

Key Findings

- International mobility was perceived as the project's most valuable component.
- Educational games significantly enhanced student engagement and learning.
- Digital technologies became central tools for innovative teaching.
- Initial implementation challenges were successfully overcome.
- Participants strongly recommended expanding similar activities in future Erasmus+ projects.

Discussion

The findings from all nine sections provide compelling evidence that the project successfully achieved its educational objectives. Students reported significant improvements in STEAM competence, digital literacy, game-based learning experiences, and the development of key twenty-first-century competencies. Teachers demonstrated high levels of confidence in implementing interdisciplinary learning, formative assessment, innovative pedagogies, and educational technologies following participation in the professional development programme. The strong consistency of positive responses across student and teacher groups indicates that the project's pedagogical framework effectively supported both teaching quality and learning outcomes. Furthermore, the participation of institutions from Greece, Türkiye, Croatia, and Latvia demonstrates that the developed methodology can be successfully adapted across diverse educational contexts, supporting its transferability and long-term sustainability.

Conclusion

The evaluation demonstrates that the project had a substantial positive impact on participating students, teachers, and institutions.

The project successfully:

strengthened interdisciplinary STEAM competence;
enhanced students' digital literacy and computational thinking;
increased motivation through game-based learning;
developed essential twenty-first-century skills;
improved teachers' pedagogical competence and confidence;
strengthened formative assessment practices;
established sustainable innovative teaching methodologies;
promoted meaningful international collaboration and intercultural learning.

Recommendations

Based on the evaluation findings, the following recommendations are proposed:

Continue integrating interdisciplinary STEAM education into school curricula.

Expand the use of educational games as regular instructional tools.

Provide additional advanced training on digital technologies for teachers.

Increase opportunities for international mobility and collaborative learning.

Strengthen dissemination activities to encourage wider adoption of project outputs.

Continue developing communities of practice among participating institutions.

Promote long-term sustainability by embedding the project's methodologies within institutional strategic plans.

Conduct follow-up evaluations to monitor the long-term impact of the project's educational innovations.





PARTNER COUNTRIES

1st EK Kavalas / GREECE

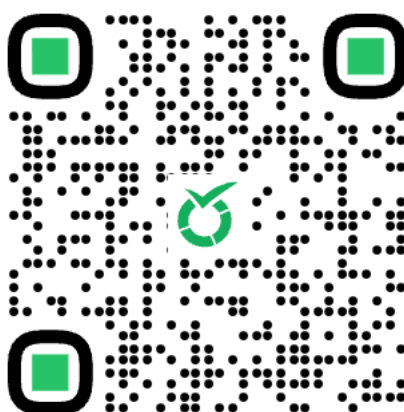
Srednja Škola Metkovic / CROATIA

Riga 64 vidusskola / RIGA

2nd Gymnasium Nafpaktos / GREECE

Çukurova University / TÜRKİYE

Multi Act STDD / TÜRKİYE



Online Self-Assessment Survey Link

<https://steamnonformalvideogames.limesurvey.net/657238>

Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the National Agency. Neither the European Union nor the National Agency can be held responsible for them.



