



Evaluation

Artificial Intelligence for Early School Leaving

PROGRAMME: ERASMUS+

KEY ACTION: COOPERATION PARTNERSHIPS IN SCHOOL EDUCATION

REFERENCE NO: 2021-1-MT01-KA220-SCH-000024247

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Project Brief

The United Nations Children’s Fund (UNICEF) estimates that 617 million children and adolescents around the world are unable to reach minimum proficiency levels in reading and mathematics, even though two-thirds of them are in school. Such low levels of academic attainment put students at a learning disadvantage and hence at a higher risk of leaving school early. Early school leaving is associated with a wide range of economic and social disadvantages. Those who leave school early are more likely to come from non-working households, vulnerable groups and minority or migrant backgrounds. The main focus for this project is to address the needs of the groups identified above, particularly Roma communities, asylum seekers, immigrants and those from rural areas by addressing the barriers they face in accessing high-quality learning environments.

In response to addressing the needs identified above, the project’s objectives are:

- to identify the needs of students and teachers regarding personalised and adaptive learning, with an emphasis on learning disadvantage
- to design and develop a Digital Learning Platform powered by Artificial Intelligence (AI) aimed at tackling learning disadvantage, early school leaving and low proficiency in basic skills
- to populate the AI-powered Digital Learning Platform with literacy (including media literacy) and numeracy content
- to pilot the content of the AI-powered Digital Learning Platform with students and teachers
- to analyse the quality and impact of the AI-powered Digital Learning Platform through a summative evaluation of the content and instructional design underpinning the system
- to write a short recommendations document on AI for early school leaving

In terms of the project’s expected impact, it is envisaged that the results will yield a high-quality AI-powered Digital Learning Platform, based on the needs and requirements of students from disadvantaged groups with fewer opportunities. It is also expected that the Platform will give teachers access to the monitoring, identification and prevention of students at risk of leaving school early. Further, teachers will be better equipped to manage the shift towards digital education and a personalised, higher-order approach to teaching, which is inclusive and equitable. In addition, the resulting digital teaching and learning ecosystem will ensure continuous access to adaptive, personalised content which will address the longer-term challenges associated with marginalisation, diversity and inclusion.



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1.0 Introduction

Following on from the initial stage of the project which included the design, development and piloting phase of the AI-powered Digital Learning Platform, student evaluation surveys have been conducted to assess the quality of the content, impact of the content and instructional design on them and satisfaction levels of the Platform. Feedback from these surveys will directly impact future continuous improvement in programme design and further roll out. A range of both qualitative and quantitative data was collected from a range of sources including registration forms, end of section data: numeracy, literacy and media literacy, along with general feedback on technology use in school and if such technology would encourage students to stay in school rather than leave early. Each data set will be analysed in the below report.

2.0 Registration Forms

A total of 509 individual registrations forms were completed spread evenly across the four participating countries: Greece (138) 27%; Finland (126) 25%; Serbia (124) 24%; and Spain (121) 24%. However, only 482 survey responses were completed so the following statistics are based on a cohort of 482 students: Spain (130) 27%; Finland (123) 25.5%; Serbia (115) 23.9%; and Greece (114) 23.7%.

2.1 Age Profile

Registered respondents were all in the 11–15-year age range, representing the secondary school age profile and the age profile where students begin to lose interest in learning and are therefore, most vulnerable to leaving school early. The highest proportion of respondents are in the 11–13-year age range and arguably at the stage where early digital interventions could reduce the risk of leaving school early. Respondent age profile: age 12 (144) 29.9%; age 13 (119) 24.7%; age 11 (98) 20.3%; age 14 (70) 14.5%; age 15 (51) 10.6%.

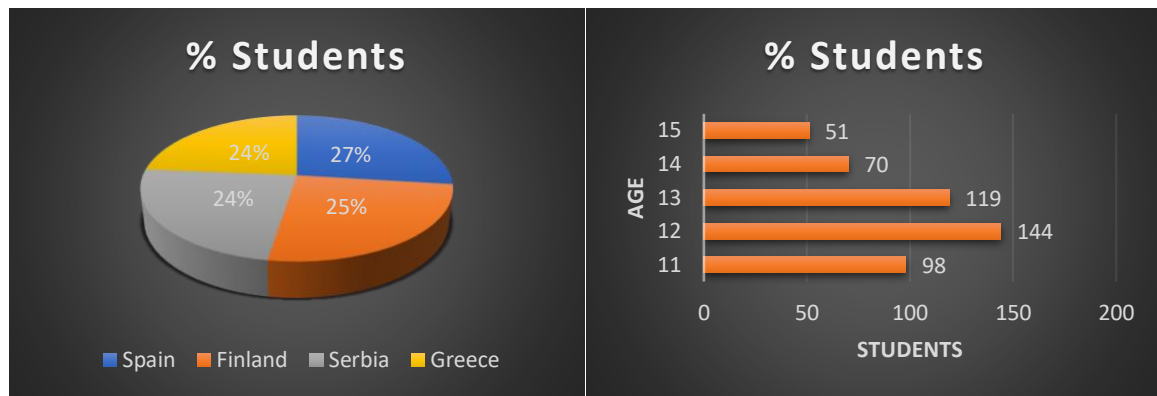


Figure 1

3.0 Global Context

The AI4ESL Literature Review noted that the 2018 Programme for International Student Assessment (PISA) results showed that more than one in five pupils in the EU has insufficient proficiency in reading, mathematics or science. PISA (2018) noted underachievement rates at 21.7% in reading, 22.4% in mathematics and 21.6% in science. Further, a significant number of young people in Europe, 9.7 %, do not attain an upper secondary level of education and, as a result, lack the basic competences and qualifications sought by the labour market. As a result, many young people have problems finding stable and satisfying employment and are more at risk of poverty and social exclusion.

3.1 Average Performance Trends

To provide a global context to our app survey results and aid comparative analysis this report referenced average performance trends as researched by Our World In Data ([About - Our World in Data](#)). Our World In Data notes average performance trends for mathematics and reading for the four countries participating in this project as below. (Comparative data for media literacy is not available).

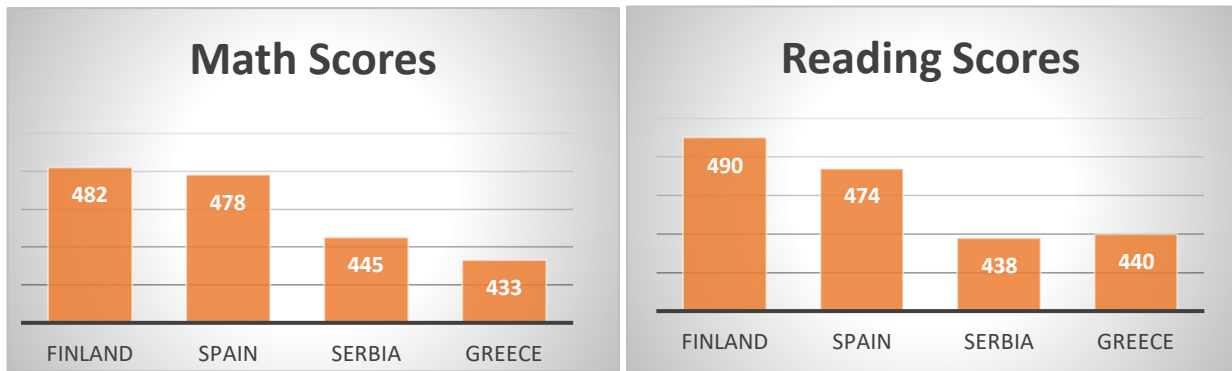


Figure 2

In terms of the four countries participating in this project, the participant average performance for mathematics, literacy and media literacy are noted below.

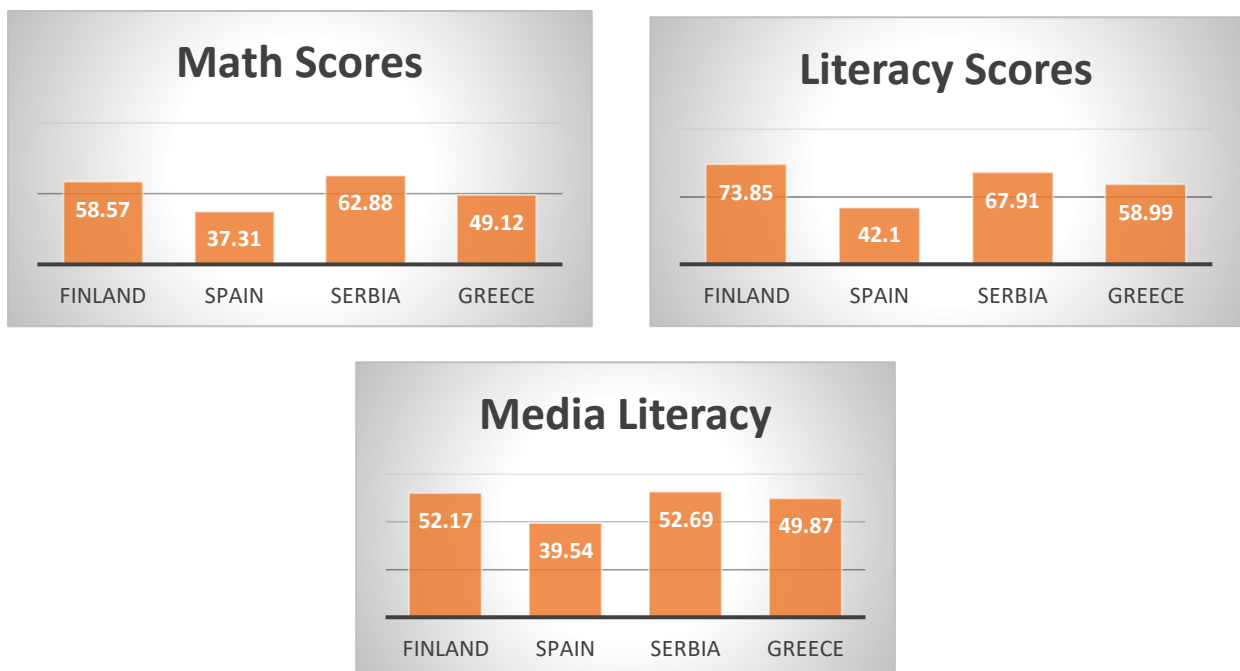


Figure 3

3.2 Country vs. Global Comparisons

OECD statistics compared to the outworkings of the project data highlight key discrepancies which will be discussed further in this report.

- Finland and Spain rank highest in OECD statistics for maths and reading, however project data indicates that Finland and Serbia rank highest for mathematics and literacy
- Serbia ranks lowest for reading in OECD statistics but shows strong performance for literacy
- Greece ranks higher than Serbia for OECD reading but slightly lower for literacy
- Serbia ranks third in maths in OECD statistics but achieved highest overall ranking in project responses
- Media literacy across Finland, Serbia and Greece show similar average scores with Spain lagging behind

3.3 Adolescent Out of School Rate Comparison

The main purpose of this project is to use digital technology to help identify the reasons for students leaving school early. The chart below shows the share of adolescents who are not in secondary education. This has been overlaid on the app survey scores to determine the effect of lower school attendance across the age group testing the digital platform. Adolescent out of school rate 2020: Greece 3.38%; Serbia 2.79%; Spain 0.42%; Finland 0.33%.

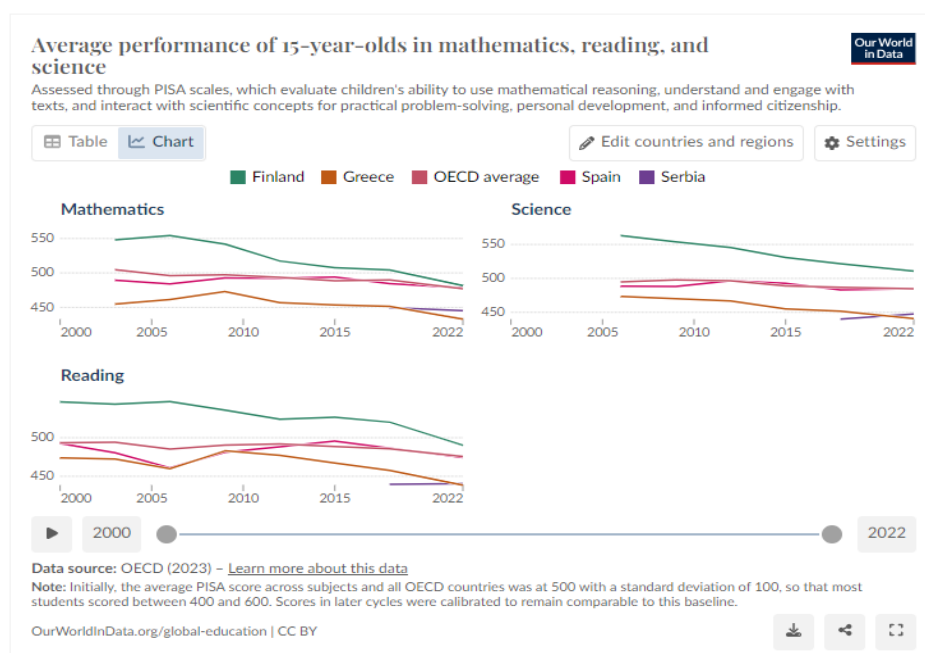


Figure 4

3.4 Summary Comparison

Finland: Consistently high performance in both the app's scores and OECD scores, showing strong educational outcomes. The low adolescent out of school rate further highlights the effectiveness of its educational system.

Serbia: Generally, performs better in the app's subject-specific scores than in OECD scores, which might indicate different strengths that the OECD scores do not fully capture. A higher adolescent out of school rate suggests areas for educational engagement improvement.

Greece: Performs moderately in both sets but shows some variance with better OECD Reading performance compared to the app's English Literacy. The highest out of school rate among these countries points to significant challenges in ensuring school attendance.

Spain: Consistent lower performance in the app's scores but relatively better in OECD mathematics, suggesting specific competencies might be more developed than the app scores indicate. The low out of school rate indicates good educational engagement despite lower scores in certain subjects.

This comparison suggests that while the app scores and OECD scores align in terms of overall rankings for the highest and lowest performers (Finland and Spain, respectively), the middle-ranking countries (Serbia and Greece) display some variation between specific subject strengths and overall educational competencies as measured by the OECD. This disparity could be due to increasing cultural diversity within the student population and/or being restricted to using English within the app as opposed to their own first language.

4.0 App Evaluation

Students completed an end of section survey which aimed to capture their feedback on completion of each section, it is intended this information will relate to any future improvements or considerations for future planning. These insights will provide a direct correlation between user perceptions and programme development moving forward. A set of 6 questions were asked per section relating to the quality, impact and satisfaction at the end of each section, these were:

- the questions and exercises are relevant to what I want to learn



- the layout of the lessons is easy to follow and understand
- the images and videos help me to understand the topics better
- this section has improved my maths/literacy/media literacy skills
- I feel more confident in my numeracy/literacy/media literacy skills
- I am completely satisfied with the numeracy/literacy/media literacy content of the app

Students were then asked to provide general feedback on the use of technology at school as a method of reducing the incidence of early school leaving, these were:

- Do you think technology should be used more often in school to help students to complete their exams and Leaving Certificate?
- Do you think using this app would encourage students to stay in school to complete their exams and Leaving Certificate?
- Would you recommend this app to your friends?
- How would you rate the app overall?
- What could we do to make this app better for you?

Student rating suggests a strong agreement with the overall content and design of the app being rated 4 or 5 (out of 5). In fact, on average, 76.8% of participants rated the app 4 stars or more (out of 5). There were very few candidates rating the app at 2 or 1 stars (5.6%) which is encouraging. Importantly, 93.4% of respondents believe that technology should be used in school to help with their studies, 75.9% believe that the app would encourage students to stay longer in school, and overall, 88.8% would recommend the app to their friends. Feedback for each section can be found below.

4.1 Numeracy Section

All students were asked the same set of questions which are listed below, and responses are summarised under each question.

Please rate the quality of the numeracy section.

The quizzes are relevant to what I want to learn.

- 435 (90%) of respondents agree or strongly agree that the quizzes are relevant to what they learn

The layout of the quizzes is easy to follow and understand.

- 424 (88%) of respondents agree or strongly agree that the layout of the quizzes is easy to follow and understand

The quizzes helped me to better understand the topics.

- 408 (85%) of respondents agree or strongly agree that the quizzes helped the students to better understand the topic

Please rate the impact of the numeracy section.

The section has improved my maths skills.

- 384 (80%) of respondents agree or strongly agree that the quizzes have improved maths skills

I feel more confident in maths.

- 374 (77.5%) of respondents agree or strongly agree that they feel more confident in maths

Please rate your satisfaction with the numeracy section.

I am completely satisfied with the maths content on the app.

- 402 (83%) of respondents agree or strongly that they are completely satisfied with the maths section of the app



Figure 5

4.2 Literacy Section

All students were asked the same set of questions which are listed below, and responses are summarised under each question.

Please rate the quality of the literacy section.

The quizzes are relevant to what I want to learn.

- 418 (87%) of respondents agree or strongly agree that the quizzes are relevant to what they learn

The layout of the quizzes is easy to follow and understand.

- 427 (88.5%) of respondents agree or strongly agree that the layout of the quizzes is easy to follow and understand

The quizzes helped me to better understand the topics.

- 413 (86%) of respondents agree or strongly agree that the quizzes helped the students to better understand the topic

Please rate the impact of the literacy section.

The section has improved my literacy skills.

- 400 (83%) of respondents agree or strongly agree that the quizzes have improved maths skills

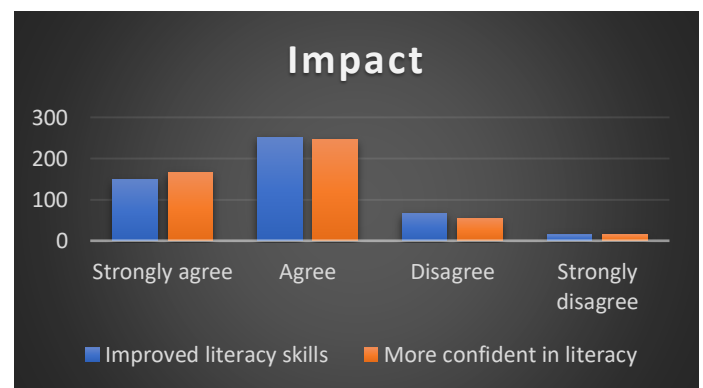
I feel more confident in literacy skills.

- 411 (85%) of respondents agree or strongly agree that they feel more confident in maths

Please rate your satisfaction with the literacy section.

I am completely satisfied with the literacy content on the app.

- 429 (89%) of respondents agree or strongly that they are completely satisfied with the maths section of the app



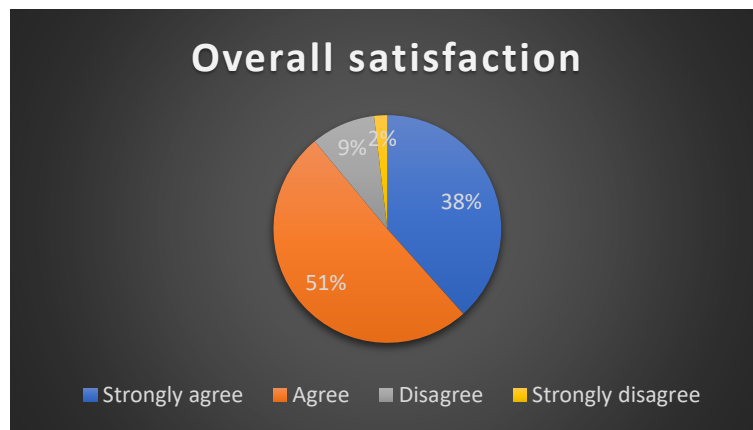


Figure 6

4.3 Media Literacy Section

All students were asked the same set of questions which are listed below, and responses are summarised under each question.

Please rate the quality of the media literacy section.

The quizzes are relevant to what I want to learn.

- 424 (88%) of respondents agree or strongly agree that the quizzes are relevant to what they learn

The layout of the quizzes is easy to follow and understand.

- 415 (86%) of respondents agree or strongly agree that the layout of the quizzes is easy to follow and understand

The quizzes helped me to better understand the topics.

- 410 (85%) of respondents agree or strongly agree that the quizzes helped the students to better understand the topic

Please rate the impact of the media literacy section.

The section has improved my media literacy skills.

- 419 (87%) of respondents agree or strongly agree that the quizzes have improved maths skills

I feel more confident in media literacy skills.

- 407 (84%) of respondents agree or strongly agree that they feel more confident in maths

Please rate your satisfaction with the media literacy section.

I am completely satisfied with the media literacy content on the app.

- 423 (88%) of respondents agree or strongly that they are completely satisfied with the maths section of the app



Figure 7

4.4 General Observations

The final section included questions relating to technology in general, the app specifically and suggestions for improvements.

- 450 (93%) of respondents agreed that technology should be used in school more often to help with their studies
- 366 (76%) of respondents agreed that the app would encourage students to stay in school longer and not leave school early
- 428 (89%) of respondents would recommend the app to friends

The students were then asked to rate the app overall. 370 (77%) of students rated the app as 4 or 5 stars out of 5 with only 8 respondents (1.7%) rating the app as 1 out of 5.

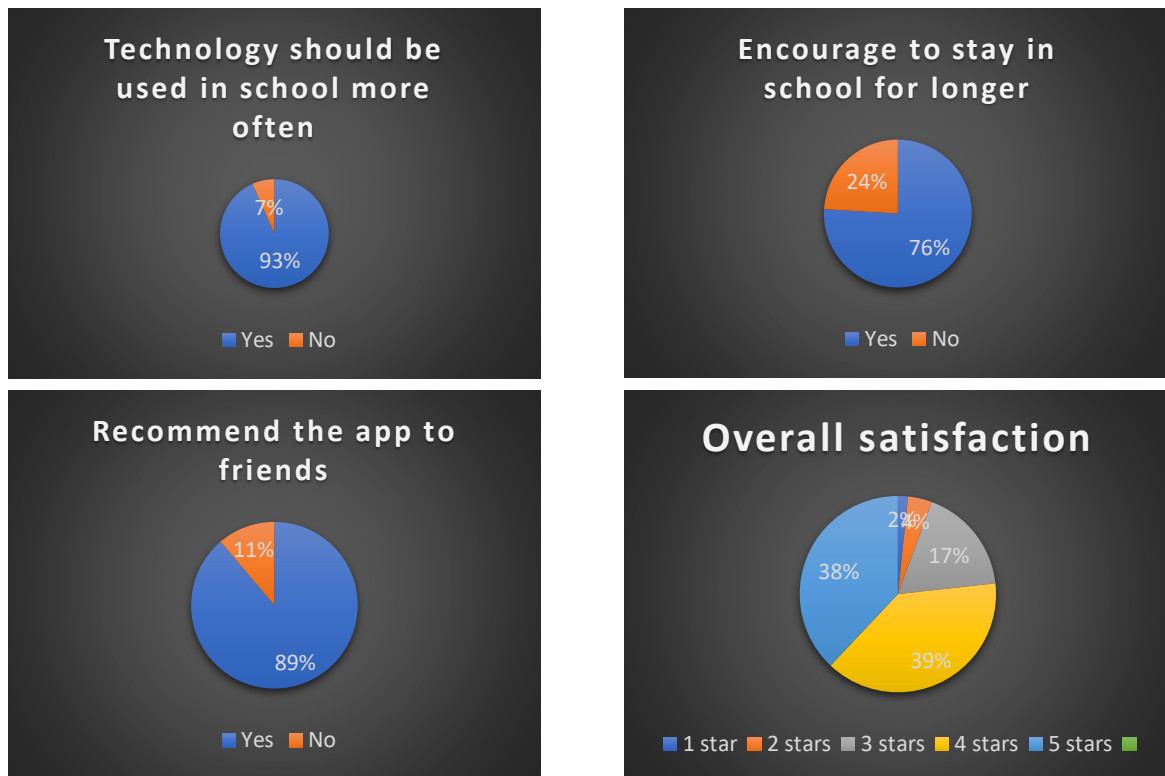


Figure 8

The recommendations provided by the students were varied however there were some clear commonalities across the data set.

- Inclusion of video and music to aid understanding and add interest
- Available in different languages not just English (common language for Erasmus+ projects)
- Inclusion of additional questions to reinforce learning or facilitate different levels of skill
- Interactivity through the use of games which are commonly used across this age group
- Broaden the scope of the app through the addition of more core subjects

5.0 Country Comparisons

This section compares Maths, Literacy and Media Literacy app scores against global performance trends (see Section 3 above) and “out-of-school” statistics for each participating country.

5.1 Serbia

Observations

- Serbia exhibits solid performance in English Literacy and Maths through the app scores, suggesting effective learning or teaching interventions through the app.
- Despite strong individual scores, Media Literacy lags behind, highlighting an area where additional resources and focus could be beneficial.
- There is a discrepancy between app scores and global test scores, with app scores generally higher. This might indicate that the app is effectively addressing some educational needs that traditional methods or wider assessments do not capture.

Adolescent Out-of-School Statistics

- With 2.55% of adolescents out of school, Serbia faces significant challenges in keeping students engaged in the educational system. This rate is higher than some other European countries, pointing to systemic issues or socio-economic factors affecting student retention.

AI4ESL Project Implications for Serbia

- Given the lower scores in Media Literacy, there is a clear need for targeted programs that enhance critical thinking and digital engagement.
- The AI4ESL project could develop specific modules that focus on improving understanding and skills in navigating and critically assessing media content.
- The relative strength in English and Maths could be leveraged to support weaker areas. For example, integrating language skills into media literacy education could make the learning process more comprehensive and interconnected.
- With a significant percentage of adolescents out of school, targeted interventions to re-engage dropouts or at-risk students are crucial. The AI4ESL project could include features that cater to the needs of students who might be at risk of dropping out, such as flexible learning schedules, personalised learning paths, and engagement tracking.

Digital Tools and Resources

- To combat the lower engagement levels that may lead to higher dropout rates, the AI4ESL platform should prioritise the development of highly interactive and engaging content that resonates with students' interests and learning styles.

- Incorporating tools that facilitate parental and community engagement could help address socio-economic factors contributing to educational challenges. This might include features for parents to track progress, receive updates, and participate in the educational journey of their children.

5.2 Finland

Observations

- Finland shows the highest scores across all subjects amongst the participating countries, particularly excelling in English Literacy.
- Media Literacy, while the highest among the countries, still presents room for improvement relative to other subjects.

Adolescent Out-of-School Statistics

- With only 0.33% of adolescents out of school, Finland demonstrates effective educational engagement and retention strategies.

AI4ESL Project Implications for Finland

- Use Finland's success to test new AI4ESL features and modules, setting a benchmark for other countries.
- Despite high scores, focus on innovative methods to further enhance media literacy through tailored digital content.

Digital Tools and Resources

- Implement sophisticated analytics tools to fine-tune educational content and personalise learning experiences further.
- Establish platforms for Finnish students to share successful strategies with peers from other countries, fostering a collaborative learning environment.

5.3 Greece

Observations

- Both Maths and Media Literacy scores are low, indicating substantial areas for intervention.

- Scores are below the OECD average, with particular difficulties in Maths and Media Literacy.

Adolescent Out-of-School Statistics

- At 3.38%, the rate suggests significant challenges in retaining students within the educational system.

AI4ESL Project Implications for Greece

- Intensify support in Maths and Media Literacy through the AI4ESL app with personalised learning trajectories.
- Target at-risk students with programs designed to re-engage them with the educational system, using community-based approaches.

Digital Tools and Resources

- Tailor educational materials to be culturally relevant and available in Greek to increase engagement.
- Provide extensive resources for teachers and tools for parents to support educational activities at home.

5.4 Spain

Observations

- Spain shows the lowest scores in all subjects among the reviewed countries, indicating critical areas for educational improvement.
- Both Maths and Media Literacy require urgent attention to raise performance levels.

AI4ESL Project Implications for Spain

- Implement comprehensive reforms using AI technologies to address fundamental challenges across all subjects.
- Improve accessibility to quality education for all students, with a particular focus on enhancing digital literacy to boost overall educational outcomes.

Digital Tools and Resources

- Develop highly interactive and personalised learning experiences tailored to meet the specific needs of Spanish students.

- Integrate features that enhance parental involvement and community support in educational processes.

6.0 Teacher Survey Responses

Eighteen teachers participated in the survey. Most respondents were English, Maths or ICT teachers drawn from across the participant countries and aged in range from 26 – 55+ with up to 30+ years teaching experience. Overall responses were very positive with no question scoring less than 3 out of 5. Results are presented in average ratings (out of 5) due to the small sample size and positive responses.

- The content is relevant to the subjects' curricula – 4.4
- The layout of the quizzes is easy to follow and understand – 4.4
- The quizzes help the students to understand the subject content better – 4.5
- The level of difficulty of the quizzes is adequate to the different students' abilities – 4.3
- Based on my observations, the app helps improve the students' knowledge of the subject matter – 4.4
- Has there been a noticeable change in students' motivation towards learning since they started using the app? – 4.1
- Has there been a noticeable change in students' confidence in the subject material during and after using the app? – 4.1
- To what extent have the students' Maths skills improved using the app? – 3.8
- To what extent have the students' Media Literacy skills improved using the app? – 4.0
- To what extent have the students' Digital Literacy skills improved using the app? – 4.4
- The app helps me to personalise my approach to meet the needs of individual students – 4.2
- Based on my observations, the app helps in reducing early school leaving – 4.0
- How would you rate the app overall? – 4.4

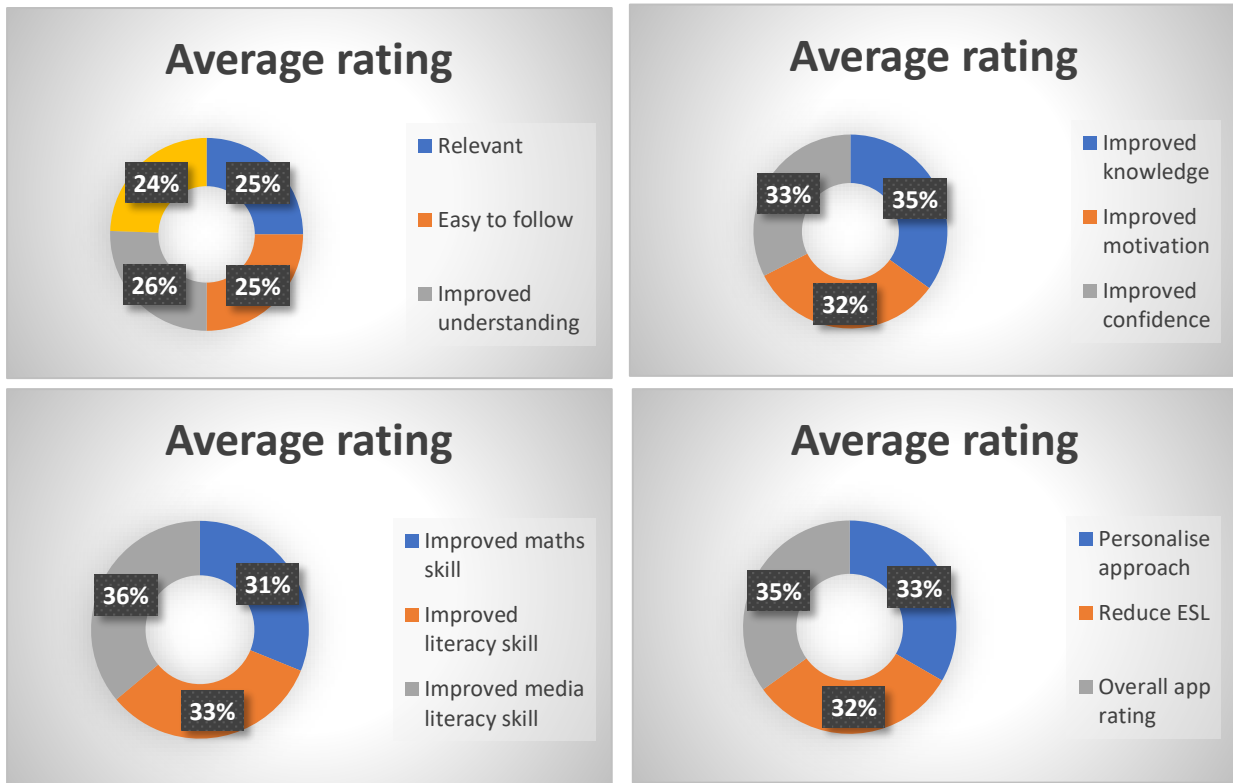


Figure 9

Further, 100% of respondents believe that the app is an effective tool in monitoring and assessing student progress and would recommend the app to colleagues. The app received consistently high ratings across all teaching experience groups, especially for ease of use and relevance. Teachers with the most experience (30+ years) generally gave the highest ratings, indicating strong satisfaction with the app. Although still positive, the ratings for reducing early school leaving were slightly lower, particularly from teachers with 21-25 years of experience. These trends suggest the app is well-received across different levels of teaching experience, with minor reservations in specific areas.

The survey indicates strong positive feedback from educators on the AI4ESL app's effectiveness in supporting curriculum relevance, ease of use, and student understanding. The app is also seen as a valuable tool for monitoring and assessment, contributing to the reduction of early school leaving.

7.0 Conclusions

The app results have consistently found media literacy to have the lowest score achieved. This aligns with the survey results from IO1. When students were surveyed about literacy and numeracy, the majority of students felt confident with spelling, using similes, reading, and understanding, written communication, counting, basic number functions, problem-solving and sourcing online material. However, only 52.9% (151) claimed to learn media literacy at school. While media literacy has the lowest achieved scores students indicated that the app had a significant impact on their media literacy skills and that it aided in improving their media literacy knowledge, increased their confidence and was a superior quality section of the app. The AI Digital Platform survey results highlight several critical points that tie directly into the AI4ESL project's goals:

- The moderate to low scores in Media Literacy across countries highlight a significant area for intervention. This aligns with the project's goal to increase digital competence, as media literacy is a crucial component of digital skills.
- The variation in scores between subjects and countries suggests that personalised and adaptive learning could be beneficial. This supports the project's aim to develop an AI-powered digital learning platform that can adapt to the individual needs of students, potentially improving scores by focusing on areas of weakness.
- The varying performance and teacher distribution among countries emphasises the need for equitable resource distribution and access to quality education. The project's focus on ensuring educational inclusion irrespective of geographic or demographic factors is crucial here. The discrepancies in educational outcomes and access among the surveyed countries highlight the need for the AI4ESL project's focus on inclusive and adaptive learning technologies. Particularly, the AI platform could tailor content and pedagogical approaches to meet the diverse needs reflected in the PISA scores and the number of adolescents not in school.
- Given the challenges in maths and reading proficiency in countries like Greece and Serbia, integrating digital technologies that offer personalised learning experiences in these subjects could help bridge the gaps. The project's goal to enhance digital literacy and numeracy is directly aligned with addressing these deficiencies.

- The data underscores the importance of engaging educational strategies that can prevent early school leaving, especially in countries with higher rates of school non-attendance. The AI-driven platform could provide interactive and engaging content that resonates with students' needs, potentially reducing dropout rates.
- Suggestions from the survey on the app, such as incorporating videos, changing languages, and adding interactive elements like games, could be especially effective in contexts where students are struggling with engagement or where traditional teaching methods are not meeting learning needs.

In summary, the AI4ESL project demonstrates significant potential to transform educational outcomes through targeted digital interventions. By addressing specific weaknesses in media literacy and maths, leveraging strengths in English literacy, and implementing engaging digital solutions, the project can reduce early school leaving and improve educational outcomes across diverse European contexts. These efforts should be continuously refined and adapted based on comprehensive data analysis and feedback from all stakeholders involved. Further, the feedback from student and teacher surveys indicates further areas for development which could be incorporated into future Erasmus+ KA2 projects:

- Broaden the scope of the content matter, subject areas and assessment
- Include translation into other European languages
- Introduce video and games content to “future-proof” the platform and to enhance student interaction and engagement
- Introduce further monitoring and tracking tools to support teachers in identifying at-risk students
- Introduce a parental portal to help parents support their students in engaging with the content
- Introduce tools and training material to support teachers and parents

