Recommendations

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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AI4ESL

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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 Digital Learning Platform powered by Artificial Intelligence (AI), student and teacher evaluation surveys were conducted to assess the quality of the content, impact of the content on them and instructional design to determine satisfaction levels with the Platform. The results of the research were then analysed and the conclusions presented in the Survey Response document and presented at the project team meeting in June 2024. Following on from the survey analysis, teachers were asked in a focus group forum to provide feedback and discuss recommendations for improvement and wider sustainability of the functionality of the app and platform and content. The results of the focus group are addressed in section 3 which, interestingly, strongly aligns with the recommendations suggested by students and teachers following the app testing survey.

2.0 Research Conclusions

The app results 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 highlighted several critical points that tie directly into the AI4ESL project's goals:

- The moderate to low scores in Media Literacy across countries highlighted a significant area for intervention. This aligned 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 suggested that personalised and adaptive learning could be beneficial. This supported the project's aim to develop

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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 emphasised 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 highlighted the need for the AI4ESL project's focus on inclusive and adaptive learning technologies.
- 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 underscored 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 could reduce early school leaving and improve educational outcomes across diverse European contexts. The survey report suggested that improvements 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 indicated other areas for development such as:

- Broadening the scope of the content matter, subject areas and assessment

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- Including translation into other European languages
- Introducing video and games content to “future-proof” the platform and to enhance student interaction and engagement
- Introducing further monitoring and tracking tools to support teachers in identifying at-risk students
- Introducing a parental portal to help parents support their students in engaging with the content
- Introducing tools and training material to support teachers and parents

3.0 Observations from Focus Group

Suggestions for improvements as indicated in section 2 were identified through the post-testing survey and are worthy of further research and analysis. Further, IO2 task 2.6 focusses on the compilation of a Recommendations Document based on the design, development and evaluation of the AI-powered platform for tackling learning disadvantage, early school leaving and low proficiency in basic skills. To complete further research and gain qualitative feedback for inclusion in this document, the project team formed a focus group to discuss the questions below and record their observations for future improvements and developments. The group were asked to consider five key questions:

- What specific features of the AI platform were most effective in addressing learning disadvantage, and what are your recommendations on how these can be enhanced?
- How did the platform support students at risk of early school leaving in their learning experience using the app? What improvements or additions would you recommend based on the evaluation results?
- What were the main challenges encountered in the deployment and utilisation of the AI platform (especially those on the ground - encountered by the schools and the NGOs), and what solutions would you recommend to overcome these challenges?
- In terms of user interface and experience, how can the feedback received from both students and educators be translated into actionable recommendations?
- What are the scalability potentials or limitations observed in the AI platform? What can you recommend to address these for broader application?

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Question 1a

What specific features of the AI platform were most effective in addressing learning disadvantage?

- The platform could be adapted to support individual learners
- Allows teachers to specialise and focus on high/low achievers – minimises the "one size fits all" approach
- Enables teacher to add tasks to stretch and challenge high achievers and provide targeted, additional support for less able learners
- The app is a move away from the traditional way of learning
- The app brings the learning environment to the learner whether at home/school
- The "prompt" feature on the app is very good and helps to personalise the learning
- Enables deeper understanding using engaging 1-1 activities
- Real time monitoring is useful as it enables the teacher to track progress, identify learners struggling with the content and facilitates early intervention strategies
- The app helps the teacher to identify the specific element/task that is proving difficult for learners and provide early intervention

Question 1b

How can the ideas noted in Q1a be enhanced or improved – what would you recommend?

- The teacher could merge subject areas into a case study/role play/project approach to measure outcomes across a range of disciplines
- The app could help to incorporate employability skills into the learning
- Provide access to the answers so that students could guide their own learning
- AI can analyse the task results to identify weaker areas and report to the teacher who could then apply intervention strategies to improve learner outcomes

Question 2a

Learners reported that the app reduced the likelihood of them leaving school early. How do you think the app could be used to reduce the likelihood of learners leaving school early?

- The app is an interactive method for learners to catch up on work and revision
- The technology, in itself, could improve engagement in class

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- The app is easy to use and interact with, even for less able learners
- It is an exciting way to learn and makes learning more interesting
- The technology is a step away from traditional learning, facilitates a change in teaching methodology and a new approach to lesson planning
- There is an element of competition by nature of using the app which could encourage learners to perform at a higher standard

Question 2b

What improvements or additions can be recommended based on the evaluation results?

- The app could be adapted to the learners' interests and hobbies to frame tasks and quizzes making it more relevant as it would reflect their lives outside school
- Encourage peer learning – stronger students could peer learn with weaker students and increase outcomes for learners

Question 3a

What were the main challenges encountered in the deployment and utilisation of the AI platform (especially those on the ground - encountered by the schools and the NGOs)?

- Currently the app is only available in English causing understanding issues for students with English as a second (or even) third language
- Accessibility challenges for learners with special educational needs

Question 3b

What solutions would you recommend to overcome the challenges noted in Q3a?

- Include a variety of language options, possible including sign language
- Incorporate a games element which is more visual thereby minimising the requirement for reading instructions/questions (dyslexia)
- Include text or voice notes for those with sight issues
- Incorporate a Chatbot to answer frequently asked questions (first line of intervention) but then include a direct access option to the teacher when required to answer more complex issues
- Basque government is developing a Chatbot that will link with the school register and advise parent if the learner is not in school to monitor attendance and track work
- Suitable for distance learners or those that are unable to travel into school

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- Engage parents – support with additional material when tasks become more complex

Question 4

In terms of the user interface and experience, how can the feedback received from both learners and teachers be translated into actionable recommendations?

- Utilise external feedback from other professionals such as psychologists to advise on colour, font, styles, accessibility etc
- Personalise the whole app to individual learners with name, school, images etc
- Provide learners with access to their task grades so that they can self-improve – this would be motivational and engaging
- Facility to text the teacher through the app when additional help required
- Include an element of class competition by incorporating a league table to track student progress

Question 5

What are the scalability potentials or limitations observed in the AI platform to support broader application and sustainability of the app?

- May need to calculate a fee to licence the app to facilitate further developments such as translation and additional features/tasks/subjects
- Include more subjects such as science
- Translating into other languages may cause issues for mobile application due to restricted character length
- Countries across Europe have different educational requirements so it may be difficult to scale a generic app
- Teach the teacher requirement to support those teachers that are less tech savvy
- Policy level change required – Educational Policy and adoption of new technologies in the classroom

4.0 Focus Group Conclusions

In conclusion, this type of app/mobile technology is evidently popular with both learners and teachers and could go some way to support the efforts to reduce the levels of disengagement in the classroom and incidence of learners leaving school before the required legal age.

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However, there are specific challenges to overcome, not least from governments across Europe in setting an Educational Policy that adequately reflects the changing landscape in relation to utilising technology as a method of delivering lessons and improving learner outcomes. Further, the issues surrounding scalability and accessibility cannot be ignored, particularly in relation to the cost of development. Whilst smaller independent schools may have sufficient funds to support bespoke development, wider uptake would be dependent upon education policy makers incorporating the app as a core teaching platform alongside other existing educational systems.

5.0 Recommendations for Future Development

The project team discussed the observations noted in section 3.0 and conducted further research into the benefits and drawbacks of utilising AI powered technology to help drive student engagement, personalisation, improve outcomes for learners and prevent early school leaving. Using Artificial Intelligence to replicate “real-life” work scenarios on the app would engage students in their learning and provide a platform to cover curricula in a project-based manner. This may go some way to encouraging those students taking a manual or vocational path to remain in school rather than leaving school early. The project research noted, “students have indicated that they believe staying in school leads to more desirable careers”, believing that early school leavers are likely to have entry-level or non-academic careers. Remaining in school will also raise student expectations, drive skills development, literacy, numeracy and help learners to overcome the challenges that contribute to school dropout.

Outlined below are the key priority recommendations identified by the partners that are essential to further developing the AI-powered app to a level where it can be embedded in mainstream education, leading to reduced levels of learner attrition across Europe:

- Integration of existing educational materials
- Teacher training support
- Personalisation and adaptive learning environment
- Student motivation and engagement

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- Adaptability and cultural relevance
- Collaborative and group learning
- Parental involvement and engagement
- Accessibility and language
- Compliance
- Teacher-student communication
- Collaborative approach to app design and development

5.1 Integration of existing educational materials

- Develop a content upload feature that allows teachers to input their current or new lesson plans, tasks and assessments contextualised to individual teacher needs
- Create AI-powered tools to automatically adapt the materials to personalised learning paths, reducing teacher intervention
- Develop template designs for common educational resources that can be easily customised for specific subjects, skill levels and ability

5.2 Teacher training and support

- Develop and implement comprehensive training programmes for teachers on how to teach within the digital learning environment and maximise the benefits
- Develop training on the effective and ethical use of AI tools ensuring that they understand how AI can enhance the teaching and learning experience and improve student engagement and outcomes
- Develop guidance on using the app for personalisation to support at-risk learners and those with different learning abilities and interests

5.3 Personalisation and adaptive learning environment

- Build self-evaluation tools for learners to assess their progress, reflect on their learning, encourage autonomous learning and responsibility
- Build a mechanism for teachers to provide 1-1 feedback that identifies areas of weakness and directs the learner to further tasks
- Build the capability to personalise the app to different cultures, languages and country priorities

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- Build the capability for the AI to signpost learners to extension or revision tasks, other external material or guidance

5.4 Student motivation and engagement

- Design the app to focus on self-competition where learners are encouraged to improve their own scores or “compete” against their peers
- Incorporate gamified elements such as badges, leaderboards and rewards to motivate learners to achieve their best
- Broaden the scope of the adaptive challenges that are appropriate to each learner’s level
- Build the capability to use AI to track learner progress and adapt the difficulty of tasks in real time, preventing disengagement

5.5 Adaptability and cultural relevance

- Build the capability to adapt to multiple learning styles within the app
- Build the capability for the AI to identify individual learner interests and tailor the learning content to include topics that they can identify with such as sport, hobbies etc

5.6 Collaborative and group learning

- Develop a group work feature where students can collaborate on projects, assignments or challenges
- Develop the capability to incorporate real-world problem-solving activities (project-based learning) to enable learners to apply learned knowledge to the world of work

5.7 Parental involvement and engagement

- Develop a parental platform within the app which allows parents to monitor learner progress, interact with the teacher, access results and feedback and receive suggestions from the teacher on how to support their child
- Student trackers could be embedded to monitor attendance and participation, providing a holistic view of learner performance
- Provide resources to parents that suggest supplementary activities or materials to assist their child

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5.8 Accessibility and language

- Build the capability to provide multilingual support, including sign language
- Ensure the app includes accessibility features such as font size, colour, audio options etc in line with legislation
- Build a chatbot feature to help learners with questions and provide detailed explanations and an “ask the teacher” feature where the AI would direct the learner to direct teacher interaction where the chatbot is unable to help

5.9 Compliance

- Ensure the app adheres to all relevant legislation such as GDPR, data protection and privacy, safeguarding, accessibility, use of IT etc

5.10 Teacher-student communication

- Incorporate a messaging feature to allow students to contact the teacher where the AI chatbot was unable to help
- Build the capability to track and monitor interactions to maintain professionalism and adhere to safeguarding legislation

5.11 Collaborative approach to app design and development

- Establish a collaborative project team involving all stakeholders such as teachers, learners, parents, educational institutions, assessment and awarding bodies, inspection bodies
- Build the capability to gather continuous evaluation and feedback to support continuous improvement and development in terms of functionality, engagement and learner outcomes

6.0 Conclusions

It is evident from the pilot phase feedback from both learners and teachers that the use of AI-powered, adaptive learning technology in the classroom is beneficial in improving engagement, student interaction and learner outcomes. Indeed, 93% of learners believe that technology should be utilised more often in school, 76% of learners believe the app encourages learners to remain in school for longer and 100% of teachers stated that the app

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was effective in monitoring and assessing learner progress. However, this project is only the initial development, phase I proof of concept of a longer-term app development project. To create a fully functioning AI-powered adaptive learning tool that can be adopted by different educational stakeholders will require a multi-phase project approach incorporating the recommendations outlined in section 5.0 above. Ultimately, investment in such technologies will result in improved engagement, learner outcomes and a reduction in the numbers of learners leaving school early.

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