



Needs Analysis

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

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. Further, in the EU some 15.5% of people live in overcrowded homes which include students from the most disadvantaged backgrounds. As a result, many young people have problems finding stable and satisfying employment and are more at risk of poverty and social exclusion. However, the pandemic has highlighted how digital technologies can be used to compliment traditional pedagogical methods leading to a consideration of if and how they can be used to reduce the rate of early school leaving across Europe.

The literature review underpinning this needs analysis concluded that it is imperative for European education institutions to implement strategies to reduce the rate of early school leaving across the continent. Research noted that early school leaving is directly associated with poor outcomes at an individual and societal level. Increasing basic skills in literacy, numeracy and digital skills is a key concern of the European Union as low proficiency of basic skills has obvious limitations on educational and economic outcomes. Therefore, the European Commission has committed to increasing digital proficiency and capacity in educational institutions to address the imbalance and measure how effectively teachers harness ICT in teaching and learning.

Consequently, and as a direct result of this research 2 key questions emerged forming the basis of this needs analysis from the perspective of the student and the teacher. These surveys, in the form of online questionnaires sought to:

- establish the current level of digital competence in both teachers and learners
- identify the gaps between the status quo and the required new digital skills and competences

Further, the needs analysis sought to understand the support that students receive at home and in school, their use of technology for educational purposes, their future career aspirations and attitude towards leaving school early. The responses will be analysed and compared to

identify gaps and/or anomalies and inform the content of the online digital learning environment.

2.0 Survey Findings: Students

2.1 Demographics

A total of 285 responses were received to the AI4ESL student survey. 97.5% (278) of responses were fairly evenly distributed across the main four participant countries: Serbia 30.2%; Greece 29.1%; Finland 19.6%; Spain 18.6%. The remaining 2.5% (7 responses) were from 4 countries: Malta; Northern Ireland; Ukraine; Basque region, Spain.

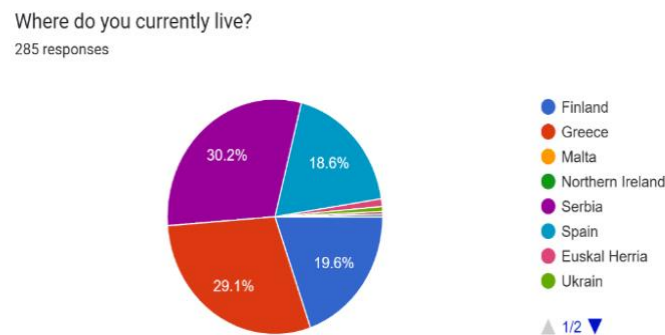


Figure 1

Interestingly, respondents state originating from one of 44 different countries across Europe, Africa, South America and Asia with over two thirds of respondents (68.1%) regarding themselves as indigenous. 31.9% (91) stated that they are originally from a different country with the majority stating that country to be Albania.

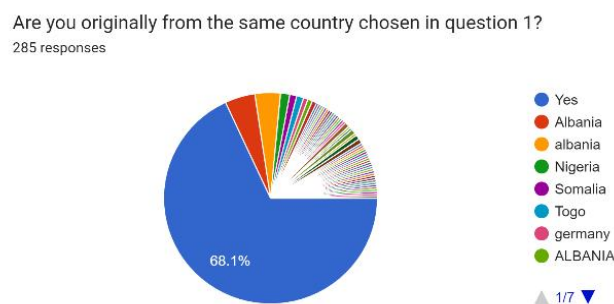


Figure 2

56.5% of respondents were female, 41.4% male with 2.1% preferring not to say. Respondents' age is evenly distributed across the selected survey age range of 11–15-year-olds as noted below. With 98.6% currently attending school.

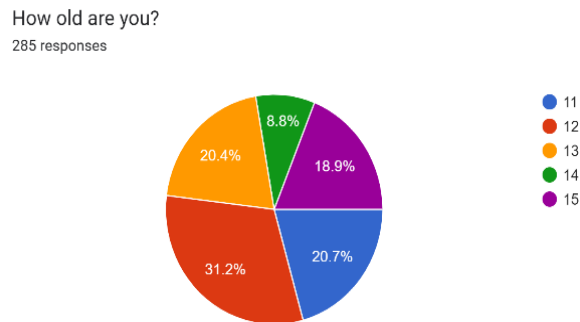


Figure 3

2.2 Support at home/family

The first group of questions asked students to rate their agreement with statements relating to the support they receive from home/family. In all instances, students either strongly agree or agree that:

- they are supported at home with homework
- parents/guardians take an interest in their school experiences
- parents/guardians believe that education is important to success and the community
- are encouraged attend and to do well at school
- have access to the required school materials
- have a quiet place at home to work and study

Of most note and reflecting the respondent profile 37.9% (108) stated that they speak a different language at home compared to school with 32.6% (93) strongly disagreeing.

2.3 Support at school

Similarly, students responded positively to questions around feeling part of the school community, believing school is important, being keen to do well and having support from their teacher. Whilst almost 40% of respondents speak a different language at home, the overwhelming majority 67.3% (192) understand the language the teacher uses. Worryingly,

4.5% (13) students disagree or strongly disagree with the statement. However, when it comes to teachers differentiating school and homework there is a fairly even distribution with 52.2% (149) agreeing/strongly agreeing and 34.7% (99) disagreeing/strongly disagreeing.

2.4 Literacy and Numeracy

When 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) claim to learn media literacy at school.

2.5 Infrastructure and equipment

Similarly, the majority of respondents either agree/strongly agree with statements relating to their use and availability of technology:

- I like to complete tasks using technology (81%)
- I feel I have a good understanding of how to use technology (83.8%)
- I find technology useful for learning (89.8%)
- I have access to internet at school (84.9%)
- There are computers/tablets for use at school (89.5%)
- I know how to use a computer/tablet (93%)
- Support is available when needed (88.8%)
- Teachers use apps and software in class (84.5%)
- I have access to internet at home (95.4%)
- I have access to computers/tablets outside school (92.9%)
- Someone will help me at home, if needed (82.5%)

2.6 Future Aspirations

When asked about future aspirations, the majority of students strongly agree that they want to do well in school and go to university. Further, they also strongly agree that trying hard at

school will help them go to college/university and secure a good job. Students also strongly agree that learning is important for a good life.

2.7 Use of Technology

The students were then asked a series of questions relating to their use of technology. Once again, the overwhelming response was positive with the majority of students stating that they use technology in school and at home every day as noted below.

- Use technology at school for school-related work (49.8%)
- Use technology at home for school-related work (55.4%)
- Use technology outside school for learning activities not related to school (56.8%)
- Use technology at home for fun activities (78.6%)
- Take part in activities outside school in which no technology is used (54.7%)
- Access digital devices at home (78.6%)

2.8 Open-ended Questions

The final section was comprised of 2 open-ended questions. The responses are noted below.

Question 1: What would you like to become when you grow up?

Answer 1:

Professional	Doctor, teacher, pilot, lawyer, vet, psychologist, banker, nurse, engineer, police service, ICT, businessman, architect, astronaut, builder, surgeon, fireman, dermatologist, chemist
Vocational	Hairdresser, mechanic, chef
Arts	Musician, actress, fashion designer, painter, journalist, photographer, writer
Sport	Football player, basketball player, boxer, athlete
Other	Farmer

Question 2: If someone leaves school before they are 18 years old, what sort of jobs or training do you think they could do?

Answer 2: Waiter, garbage collector, driver, maid, baker, dancer, professional sports player, farmer, retail assistant, hairdresser, cook, babysitter, car wash, bartender, cashier, janitor, builder, fast food, baker

3.0 Survey Findings: Teachers

3.1 Demographics

A grand total of 39 responses were recorded by the AI4ESL teacher survey. Serbia came out on top with 17 participants (43.6%), followed by Greece with 10 (25.6%), Spain with 6 (15.4%), Finland with 5 (12.8%) and finally, Pais Vasco/Basque Country with 1 participant (2.8%). Northern Ireland and Spain, respectively, did not record any registrations.

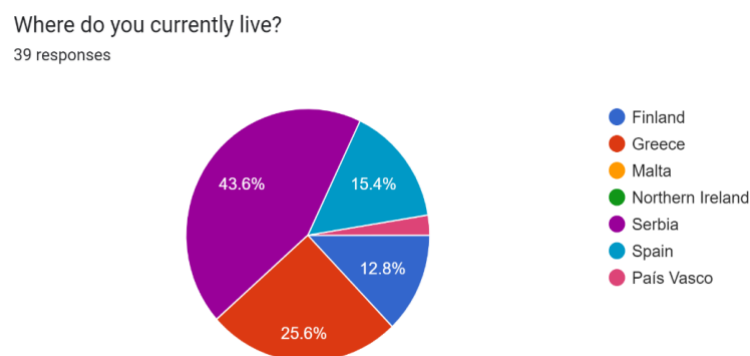


Figure 4

Of the total 39 responses, 28 participants (71.8%) identified as female and 9 (23.1%) as male. 1 participant (2.6%) preferred not to state which gender he/she belonged to and finally, 1 participant regarded themselves as an undefined gender.

What gender do you identify as?
39 responses

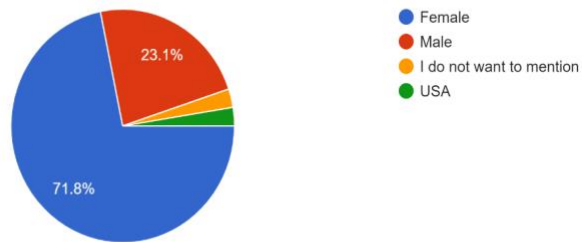


Figure 5

The 41-50 age bracket was the highest with 15 participants (38.5%), followed by the 51+ group with 12 (30.8%), the 31-40 demographic with 8 (20.5%) and lastly, the 21-30 with 4 participants (10.3%). There was not any participation recorded within the 20 and under years old spectrum.

How old are you?
39 responses

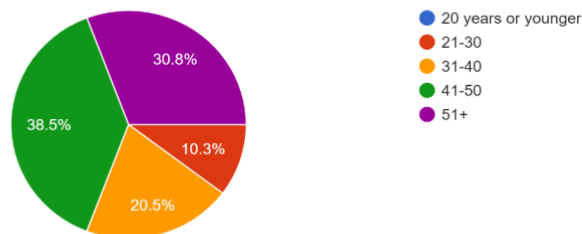


Figure 6

36 of the participants (92.3%) are currently teaching in a formal school setting. The remaining 3 participants (7.9%) respectively, answered this question with “International English School”, “Consultant of school” and “Germany”, which would require further explanation to define these options as in the non-formal or informal classification.

Do you currently teach in a formal school setting?
39 responses

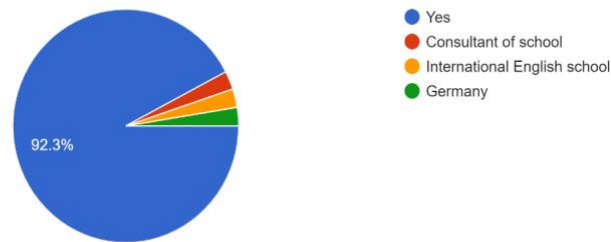


Figure 7

3.2 Reflections on the education ecosystem

- 92.3% of participants taught pupils stemming from a wide variety of different cultural and linguistic backgrounds.
- 44.44% of participants felt that their pupils were receiving substantial support at home.
- 71.8% drew a correlation between student support at home and their academic performance.
- 82.1% felt that their school was offering notable support to disadvantaged students.
- 76.9% are of the opinion they incorporate curricular differentiation according to student needs and abilities.
- 48.7% encounter difficulties personalising the lessons on a regular basis.
- 82.1% expressed confidence in utilising technology in the classroom
- 89.7% are open-minded with regards to implementing digital technologies for their own pedagogic practices
- 71.2% actively create resources to support their teaching in a digitalised learning environment
- 61.5% use virtual learning environments with their students
- 61.5% perceive digital technologies as an asset in tailoring the learning materials to the individual students.
- 38.5% draw on didactical applications driven by A.I.

- 82.1% experience a rise in student engagement and motivation when digital technologies are embedded within the tasks
- 69.2% are guided by a school/district/country-wide digital education strategy
- 74.4% work in an educational institution with its own/district/country-wide strategy to counterweigh early school leaving.
- 82.1% felt they receive substantial support/encouragement from their respective school leaders to progress with digital pedagogies.
- 89.7% have accessibility to required digital devices at their institution
- 58.9% reported accessibility to school-owned and managed digital devices for their students to take home.
- 43.6% regard their pupils as not displaying any aspirations for the future.
- 51.3% postulate that their students' aspirations are disjointed from their realistic capabilities

3.3 Self-reflections on own digital approach

- 12 of the participants (30.8%) framed themselves as embodying early adopter attributes when they can extract transparent long-term benefits for their own teaching and learning.
- 10 (25.6%) interpreted their approach as progressing in alignment with the status quo of their institution/colleagues.
- 7 (17.9%) reflected on their approach as being more sceptical, resulting in the implementation of digital technologies to be lagging behind the majority of other teaching staff.
- 5 (12.8%) ranked their application as innovative in comparison to colleagues
- 5 (12.8%) omitted a self-evaluation of their own digital strategy.

Which best describes your approach to using digital technologies for teaching and learning?
Choose One.
39 responses



Figure 8

3.4 Reflections on negative impact factors

- A deficit of essential preparation time (43.6%) and funding (38.5%) were the top 2 factors, deemed to have a negative impact upon the holistic implementation of digital technologies.
- Joint third place was attributed to the circumstances of inadequate educator digital proficiency levels and substandard connectivity and speed issues (33.3%).
- Additional infrastructural deficiencies were on the basis of insufficient capacity of equipment to cater for both the teacher and the students (25.6%), and as a contributing or foreshadowing component, the shortage of available space to expand the existing repertoire of digital devices (20.1%).
- The digital competencies of the learners were equally under the spotlight of potential components (23.1%).
- Insignificant or no technical support systems to help progress educators' digital skills, were also perceived as a cause (10.3%).
- 3 of the "other" reasons link in with student digital competencies being subpar, especially within a culturally and linguistically diverse classroom.
- 1 of the "other" reasons discredits the default factor choices of the question and another 1 suggests, the claim of the posed question is not correct.



Is teaching with digital technologies in your school negatively affected by the following factors?
Choose one or more.
39 responses

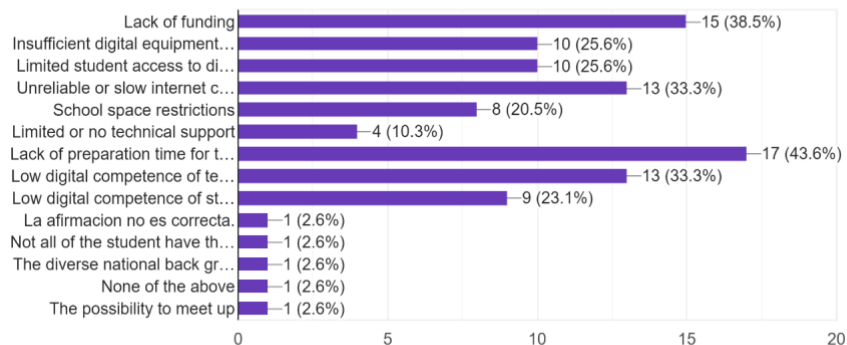


Figure 9

3.5 Reflections on the benefits

What are the student-centric advantages and justifications in providing students with personalised and adaptive learning technologies to efficiently and effectively target their individualised pain points and needs. Summarised, the 39 participants touched upon various arguments for greater advocacy and implementation of the abovementioned approaches. Some answers were more explicit and specific in their relation to particular themes, whereas others resembled more underpinning chain reactions, prerequisites and fuzzy borders:

- Leaving less/disadvantaged students behind as the rate of curricular progression is more flexible to cater to individual academic struggles and learning environment preferences (41.03%)
- Considerable boosts to student motivation/participation/interest as a result of departing from a one-size-fits-all approach and advocating active consideration of the student voice and consumption patterns (28.21%)
- Improves retention of knowledge and students display more positive attitudes towards learning as a whole (23.08%)
- Subsequently, these potential dispositional changes can lead to a greater extent of academic achievement (30.77%)



- Demonstrated higher rates of inclusion and a sense of belonging within a diverse classroom setting (17.95%)
- 1 critical voice recommends a co-existence of pedagogy between face-to-face and screen-based acquisition of learning and skills (2.56%)

3.6 Reflections on drawbacks

Where lie the challenges in providing students with personalised and adaptive learning technologies. In conclusion, the 39 participants address problem areas they have encountered in their field of educational knowledge transmission, which akin to the previous question, encompasses some overlapping into more than 1 specific theme and can be seen as belonging to a chain-reaction.

- Essential time (43.59%) and associated workload of curricular adaption (30.77%) to be invested in order to ramp up the aforementioned approaches, as more profound insights into students' learner identities are required
- Inadequate support and pedagogic materials to sustain a holistic digital approach, accentuating the need for countermeasures, such as, continuous staff development initiatives and best practice training in regular upskilling intervals (20.51%)
- Sufficient spatial and staff-related allocation resources, as personalisation presupposes a greater 1:1 ratio between teacher and student, which is not compatible with the traditional curriculum progression (7.69%)
- Deficits in student learning environments, consisting of accessibility to devices, reliable internet connectivity and familial support systems at home, for instance, also pose an issue in hindering a fully-fledged transition to emerging personalisation methods (2.56%)
- Monetary challenges also received an explicit mention (2.56%)

4.0 Conclusion

On the 5-point Likert scale regarding “support at home”, the participating students predominantly selected “strongly agree” or “agree”, whereas the participating teacher percentage of those 2 choices only summed up to 44.44% when referring to substantial support systems. Teachers don’t possess unrestricted access to the family environment in its entirety and “support” can come in various facades, emotionally expressed, for instance, which the survey did not differentiate between.

67.3% of pupil’s feedback was positive in regard to comprehending the language spoken in class. The resulting disadvantage for the non-apprehending participants could be counterbalanced through the introduction of digital technologies, which would be able to offer learning materials in the native language and assist in acquiring the target language. Linguistic adoption, however, is alone not the crux for early school leaving prevention, but a feeling of social inclusion, the social-economic background, for instance. The survey responses concerning school community affiliation were positively significant and investigation into the latter factor did not form part of the survey.

52.9% of the student participants held the view not to cover media literacy at school. This more modern and sophisticated area of critical analysis – importance features in the updated EU framework DigComp 2.2 - necessitates deeper insights of the respective educator, which in turn requires substantial preparation and funding investments. These prerequisites, however, are in the top 3 of factors hindering progress of implementing digital technologies. The teacher role comprises one’s own digital capabilities bestowed with essential content knowledge and from a pedagogic standpoint and fusion, the competency to guide and facilitate learners to acquiring such expertise as well (Skantz-Åberg et al., 2022 ; Joshi, Neupane and Joshi, 2021).

76.9% of teachers shared the opinion of actively differentiating the curriculum to best accommodate student needs and capabilities, however only 52.2% of students shared this sentiment. This statistic correlates with the 48.7% teachers perceive due to the intricacies of

creating such targeted learning materials regularly. Furthermore, the 61.5% representing teachers' active utilisation of virtual learning environments for classwork and 38.5% implementing artificial intelligence driven technologies also touch upon the abovementioned discrepancy between teacher and student outlook on the theme of adaptive teaching executed on a consistent basis. This could potentially be explained that what was once considered a golden approach of media diversification, is now taken for granted and has dramatically lost appeal in its engaging "sizzle factor". This could be the explanation for how an 84.5% positive student response of software and app usage in class still doesn't translate into a higher score of perceived active curricular differentiation.

A further interpretation encompasses the notion that students already largely excel in the implemented digital technology examples at school, thus evoking deficiencies of targeted needs. If the students' digital proficiencies surpass that of the teacher, then communication tools like active listening or curricular modifications like co-creation, should form the basis for necessary dialogues. Research (Hall, 2022) has elucidated on the post-corona era as representing an opportunity to argue the case for alternative teaching methods between both parties, therefore shifting the hitherto status quo to reflect on the induced changes in the pedagogic and knowledge acquisition landscape. Ramirez-Montoya et al. (2021) recommend that the collective teacher profile undergo a radical technology-inclined alteration in terms of its professional development persona to aim for greater alignment to the upcoming student profiles who are "by default" more digitally native than previous generations.

Personalisation does go beyond traditional approaches of pedagogics in terms of student academic and social-emotional support, nevertheless, "hyper-personalisation" - interpreted as a fully-fledged 1-to-1 engagement foundation - is still incrementally emerging. A.I. is becoming more and more advanced in its applicability for tailoring educational inputs to students, producing predictive analytics and consequently, leveraging mitigation measures to assist the learner.



It equally cannot be negated that the survey participants stem from a wide variety of countries and regions. Conducted research (Cabrera, 2020) has accentuated how the Corona Pandemic has made digital inequalities come exceedingly to the forefront of public discussion. They are no longer just a cleft between Northern and Southern Europe, but also how on a smaller scale, regional – and even district-wide - fluctuations are more widespread than previously thought. On the topic of geographies, 69.2% of teachers answered positively as having an overarching digital education strategy framework to consult and for 74.4% one which has specialised guidance on counterweighing early school leaving.

Whereas the numbers in the student category “infrastructure and equipment” turned out very positive, indicating a prominent connectivity coverage, ownership ratio and accessibility quotient, only 58.9% of teachers highlighted that their institutions possessed digital devices which could be borrowed. There is also a discernible disconnect when analysing future aspirations from students’ own perspective versus the viewpoint from teachers. The students largely valued their educational path as means to flourishing later in the vocational world and in addition exhibited realistic expectations as how early school leaving and disengagement impact upon obtainable employment hierarchies, compared to the 40-50% teacher-based evaluation. The latter emphasises how they feel students are not adequately futureproofing themselves for their post-educational journey and are displaying a noticeable disjoint between desired jobs and required academic qualifications.

What about the contemporary rise of alternative eligibility pathways and criteria, micro-credentials and stackable credentials, for example? Are the rising trends of such qualifications being made transparent, as each student’s make-up is unique and they should be signposted to various sources informing them of the diverse options. The survey findings in their entirety touch upon research calls undergone by Tzafilkou, Perifanou and Economides (2022) or Castaño Muñoz et al., (2021) to examine how strong the link is between students’ digital affinity in the recreational sphere and in the academic sphere, which in turn, is converted into greater achievements.

Key findings:

- Future aspirations discrepancy: Students appeared to have a clear vision of their educational path and knowledge of the necessary qualifications to fulfil it, whereas 40-50% of teachers displayed scepticism.
- The vast majority of teachers (76.9%) identified themselves as active curricular differentiators, whereas only 52.2% of students advocate this percentage.
- Only 38.5% of teachers implemented A.I. powered technologies: A more widespread utilisation could assist in diminishing the top 2 drawbacks of boosting personalisation measures, the absence of essential time and the individual students' complexities.
- There emerged an anomaly regarding student support at home, as a mere 44.4% of teachers perceived the level to be substantial, compared to the overwhelmingly positive student response rate.

