

Erasmus+ Programme
Key Action 210: Small-scale Partnerships in Adult Education



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AGREEMENT NUMBER – 2021-1-CY01-KA210-ADU-000033993

Abacus: Immersive data science education

The Curriculum

The Curriculum

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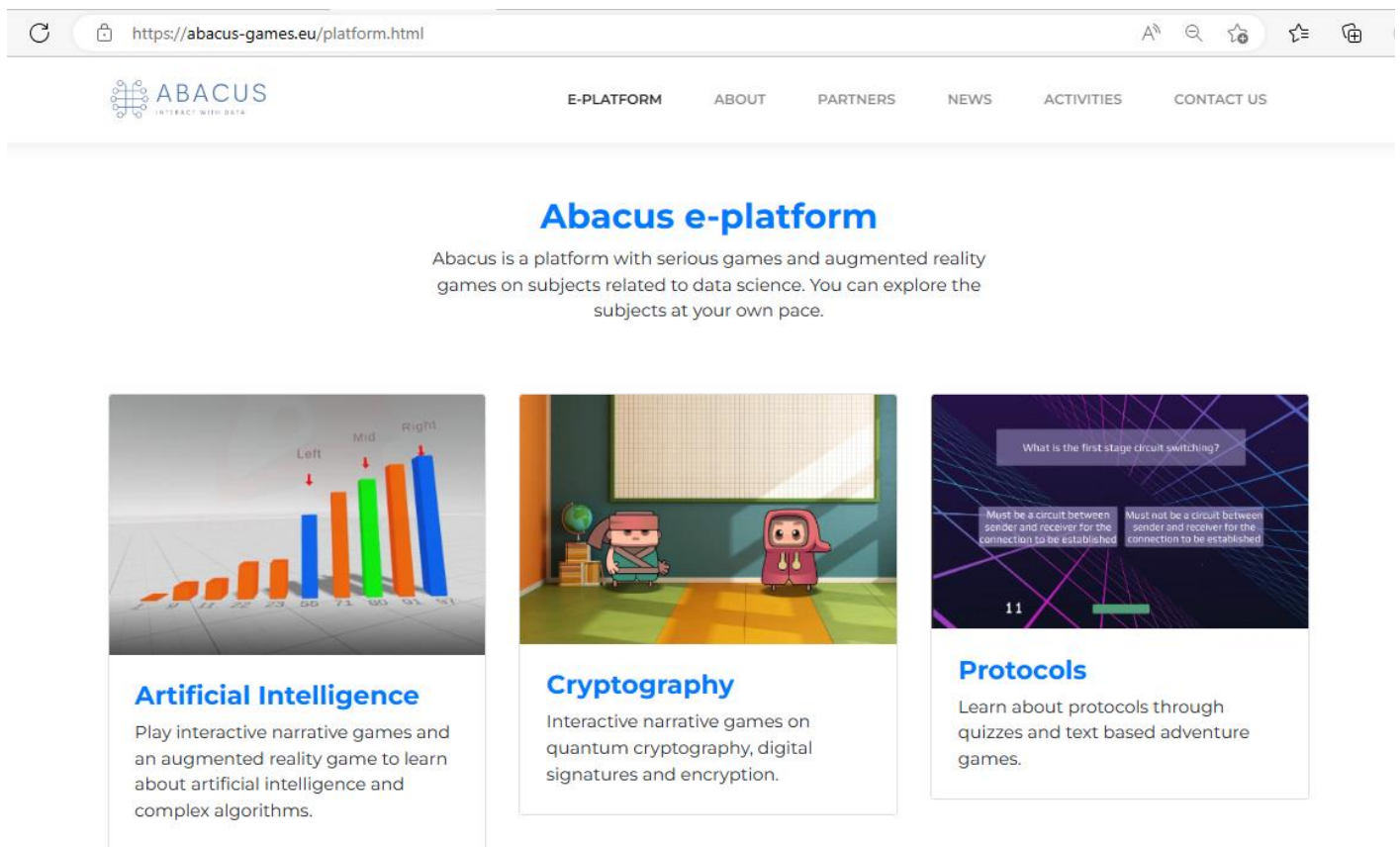
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The Curriculum

I. Introduction

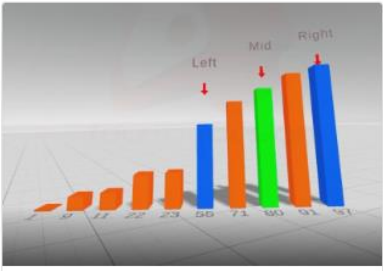
The Abacus e-learning platform is an innovative educational solution designed to provide interactive and engaging activities for data science education. This report aims to provide an overview of the curriculum developed for the platform, highlighting its structure, content, and key features.

The curriculum of the Abacus e-learning platform is designed to offer a comprehensive learning experience in data science. It consists of a series of carefully crafted modules, each focusing on specific topics and concepts. The curriculum is structured to cater to learners with varying levels of knowledge and experience in data science, providing a clear progression path from foundational to advanced concepts.




Abacus e-platform

Abacus is a platform with serious games and augmented reality games on subjects related to data science. You can explore the subjects at your own pace.



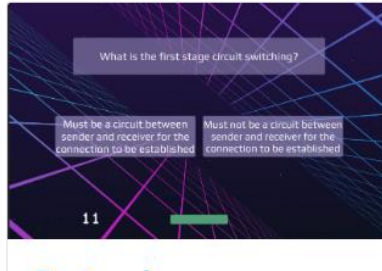
Artificial Intelligence

Play interactive narrative games and an augmented reality game to learn about artificial intelligence and complex algorithms.



Cryptography

Interactive narrative games on quantum cryptography, digital signatures and encryption.



Protocols

Learn about protocols through quizzes and text based adventure games.



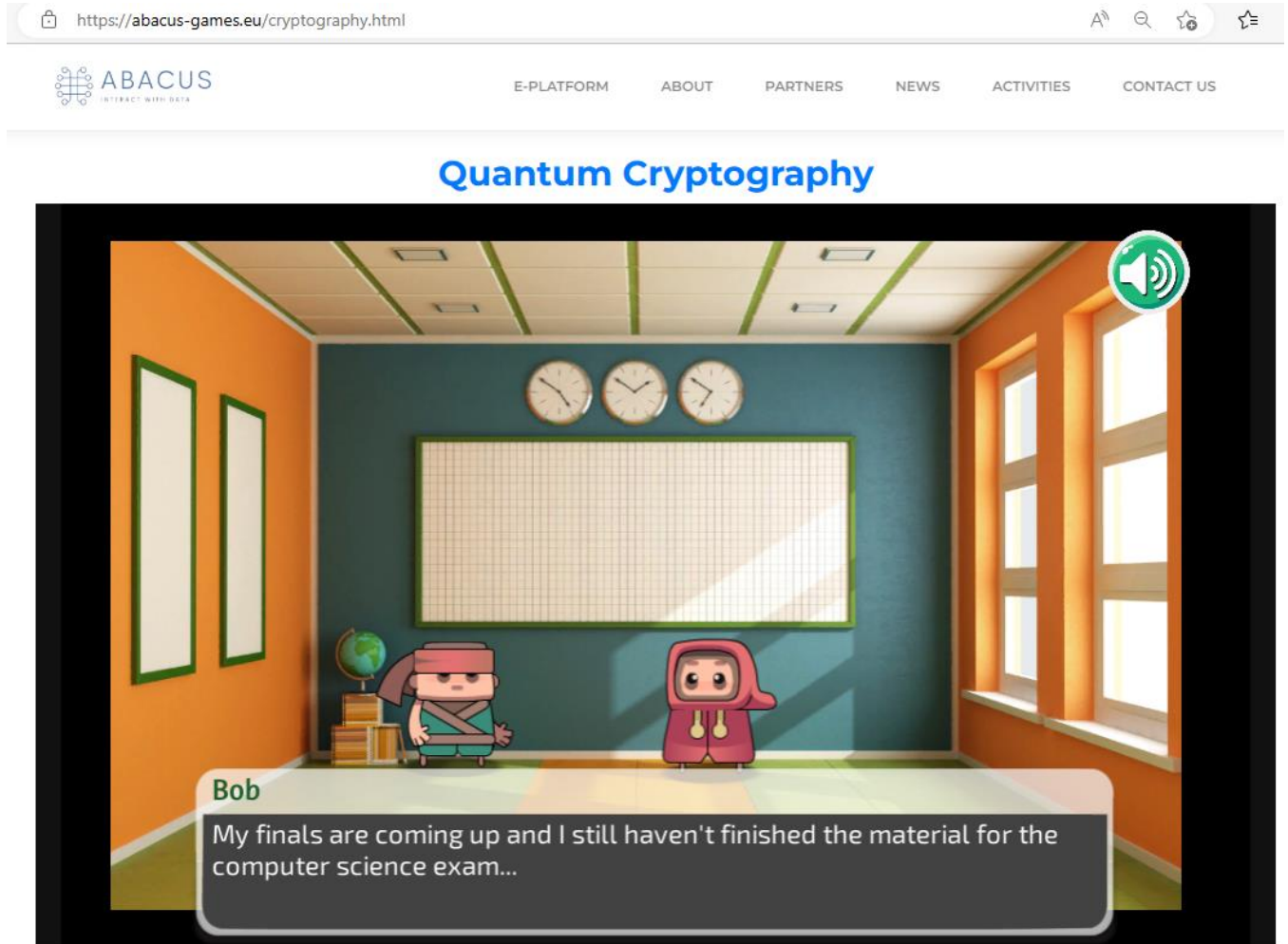
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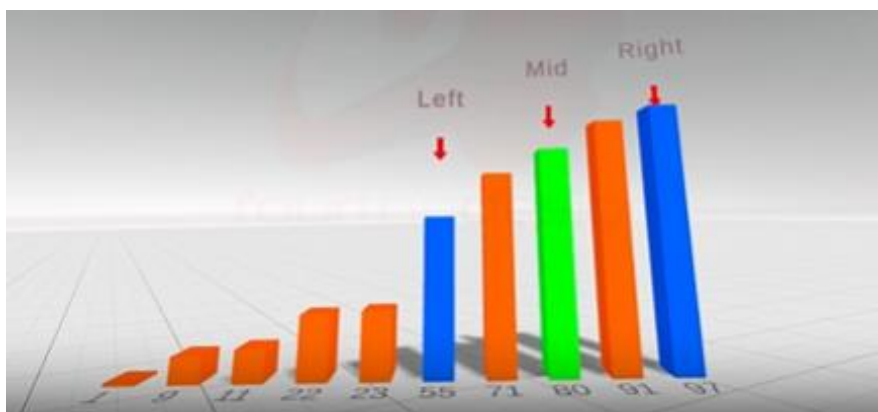
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II. Key Features

Interactive Activities and Games: The curriculum incorporates interactive activities and games to promote active learning and enhance user engagement. These activities allow learners to apply their knowledge, solve problems, and make data-driven decisions in a fun and interactive manner.

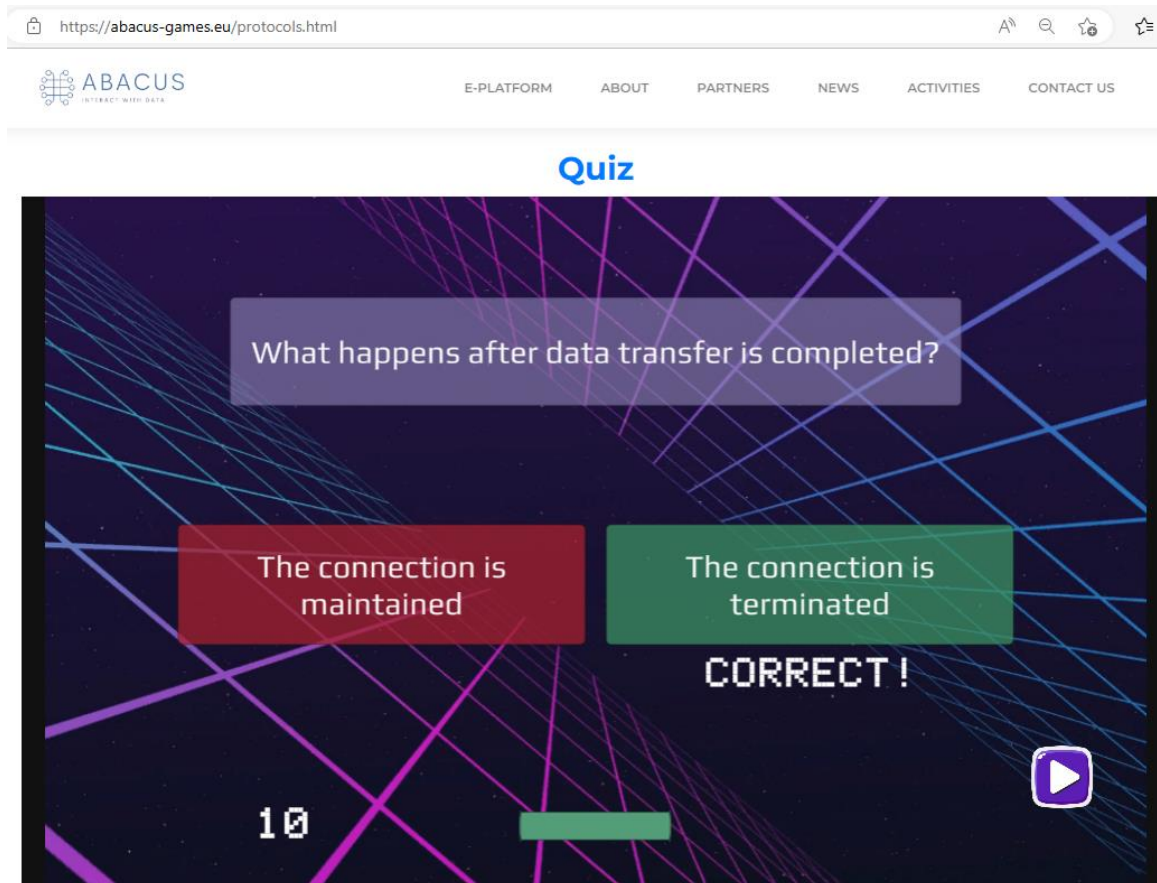


Real-World Case Studies: To bridge the gap between theory and practice, the curriculum includes real-world case studies. Learners are exposed to practical applications of data science in various domains, enabling them to understand the relevance and impact of data analysis in different industries.



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Personalized Learning Paths: The curriculum offers personalized learning paths based on learners' individual goals, knowledge levels, and preferences. Learners can choose their own learning pace and explore topics of interest within the data science domain, fostering a learner-centric approach.



III. The content

The Abacus e-learning platform offers a diverse curriculum designed to provide interactive and comprehensive education in various fields. This report focuses on three key sections: AI, Cryptography, and Computer Communication Protocols. Each section explores essential topics and concepts within these domains.

I. AI Section

The AI section of the Abacus curriculum delves into the fascinating world of Artificial Intelligence, covering the following topics:

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Path Finding Algorithms: Learners are introduced to various path-finding algorithms, such as Dijkstra's algorithm and A* algorithm. They gain an understanding of how these algorithms are used to solve complex problems, including route planning, graph traversal, and optimization.

Binary Search: This topic explores the binary search algorithm, a fundamental searching technique in computer science. Learners discover how binary search operates on sorted data, enabling efficient search operations with a logarithmic time complexity.

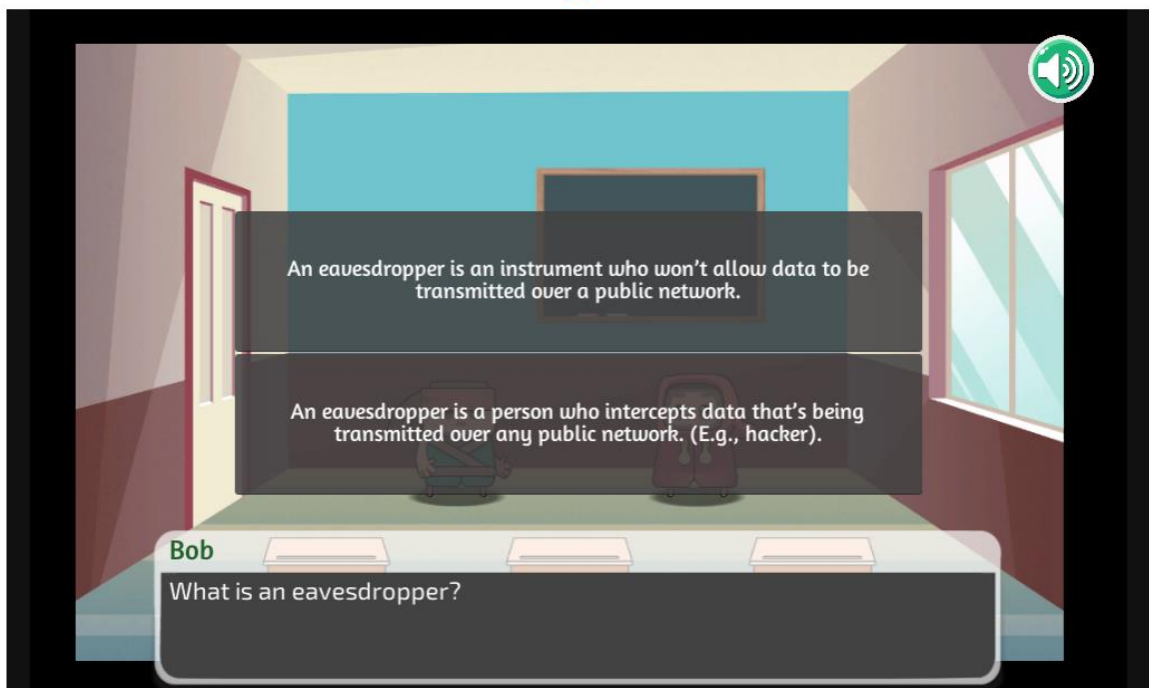
II. Cryptography Section

The Cryptography section of the curriculum focuses on the principles and techniques employed to secure information and protect data integrity. The following topics are covered:

Quantum Cryptography: Learners explore the cutting-edge field of quantum cryptography, which leverages the principles of quantum mechanics to provide secure communication channels. Concepts such as quantum key distribution and quantum-resistant encryption algorithms are introduced.

Encryption: This topic delves into various encryption techniques, including symmetric and asymmetric encryption algorithms. Learners gain an understanding of encryption principles, encryption modes, and the importance of key management in secure communication.

Encryption



An eavesdropper is an instrument who won't allow data to be transmitted over a public network.


An eavesdropper is a person who intercepts data that's being transmitted over any public network. (E.g., hacker).

Bob
What is an eavesdropper?

The Curriculum

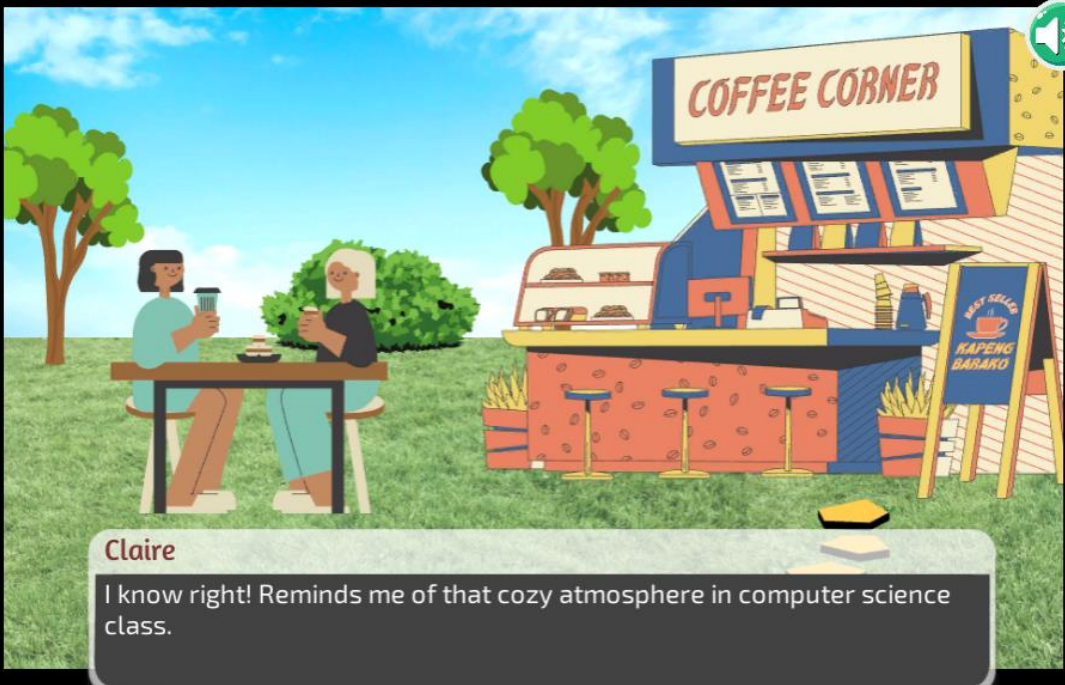
Digital Signatures: The concept of digital signatures is explored, highlighting their role in ensuring message authenticity and non-repudiation. Learners learn about cryptographic hash functions, public-key infrastructure, and the process of generating and verifying digital signatures.

<https://abacus-games.eu/cryptography.html>

 **ABACUS**
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Digital Signatures



Claire
I know right! Reminds me of that cozy atmosphere in computer science class.

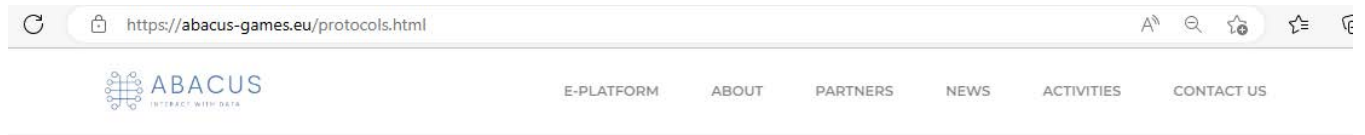
III. Computer Communication Protocols Section

The Computer Communication Protocols section focuses on the fundamental protocols used in computer networks and communication systems. The curriculum covers:

Introduction to Protocols: Learners are introduced to the concept of protocols and their significance in facilitating communication between networked devices. They gain knowledge about the layered architecture of protocols, including the OSI (Open Systems Interconnection) model and the TCP/IP protocol suite.

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Common Protocols: This topic explores widely used protocols, such as HTTP (Hypertext Transfer Protocol), FTP (File Transfer Protocol), DNS (Domain Name System), and SMTP (Simple Mail Transfer Protocol). Learners understand the functionalities, features, and applications of these protocols in computer communications.



Text-based adventure

The trio has no time to protest. A new window is opened, and shows an office space full of computers, notebooks and post-it notes. The AI makes a noise to alert the 2 workers of its presence, the 2 workers acknowledge it.

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IV. Conclusion

The curriculum of the Abacus e-learning platform encompasses a diverse range of topics within the fields of AI, Cryptography, and Computer Communication Protocols. By engaging with the interactive and comprehensive content provided, learners can develop a strong foundation in these areas. The platform's emphasis on practical applications, real-world examples, and hands-on activities ensures a stimulating learning experience. Whether exploring path-finding algorithms, quantum cryptography, or common network protocols, the Abacus curriculum equips learners with valuable knowledge and skills in these essential domains.

For a detailed exploration of the curriculum content and resources, I recommend visiting the Abacus e-learning platform directly at <https://abacus-games.eu/platform.html>.

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Abacus: Immersive data science education

Activity 1: User Requirements

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I. Introduction

The aim of the Abacus project is to develop an interactive, self-paced data literacy platform to educate adults on data science and complex algorithms, using augmented reality and serious games.

Digital solutions offer the opportunity of making data science accessible to all individuals that have access to a computer or smart device, regardless of ethnicity, socio-economic status and geographical location, religion, abilities or gender.

The purpose of Activity 1 (User Needs and Curriculum Development) is to design the material that will be offered by the Abacus intervention. However, in order to design the appropriate material, another major part of this activity is to collect the user requirements and identify the needs of the target group.

In this report we will look at the process of collecting the user requirements for Abacus, including a user survey and its results.

II. Target Group and User Survey

The target group of the project is young adults and adults over 18 years old of any gender, race, nationality and socioeconomic background.

In order to collect the user requirements for Abacus from the target groups, a user survey was developed in English. All the project's partners participated in the design of the survey questions, according to their expertise.

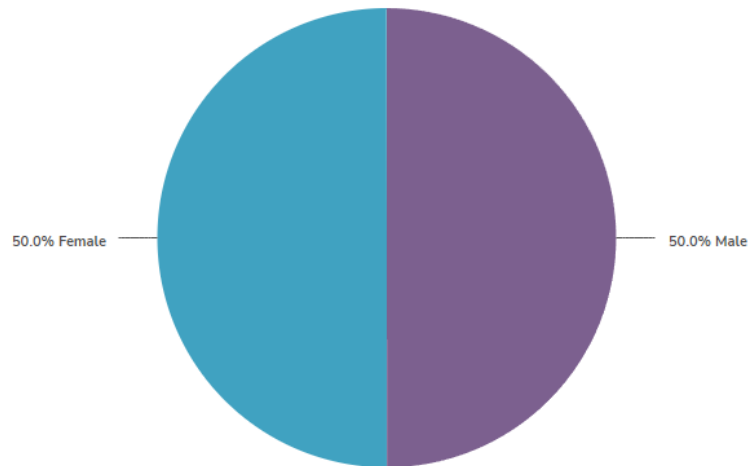
The partners disseminated the survey to the groups they work with, and there was a focus to young adults that are university students at the American University of Cyprus.

Among others, the user survey gave the project's consortium insights on the following:

- Demographics of the target group
- Interest in serious games
- The kind of devices they use and have access to
- Their interest in trying out serious games on data science and the game genres they prefer

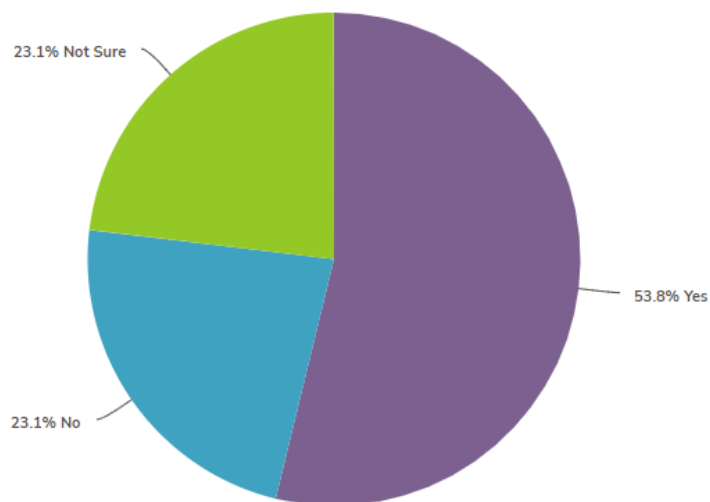
III. User Survey Results

1. What is your gender identification?



Value	Percent
Male	50.0%
Female	50.0%

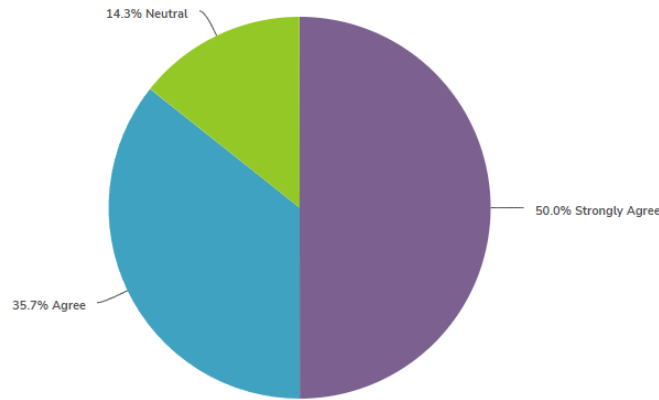
2. Have you ever played a serious game? (for example educational or language learning game)



Value	Percent
Yes	53.8%
No	23.1%
Not Sure	23.1%

Around half of the participants have played a serious game in the past.

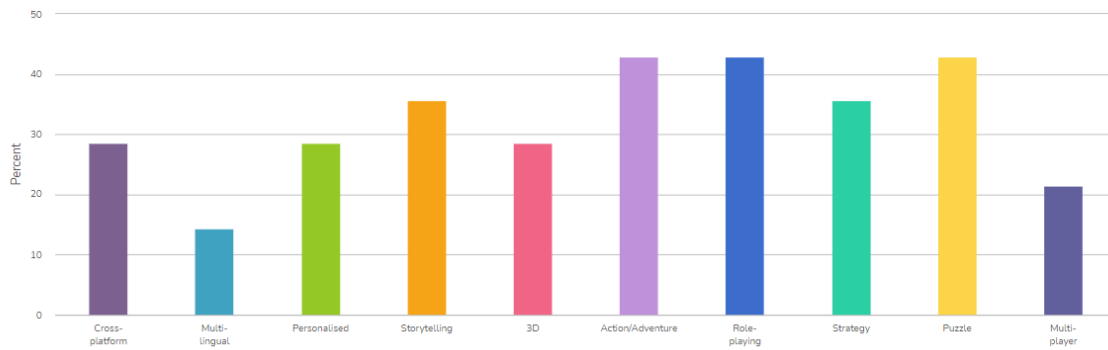
3. I would benefit from playing a serious game on data science



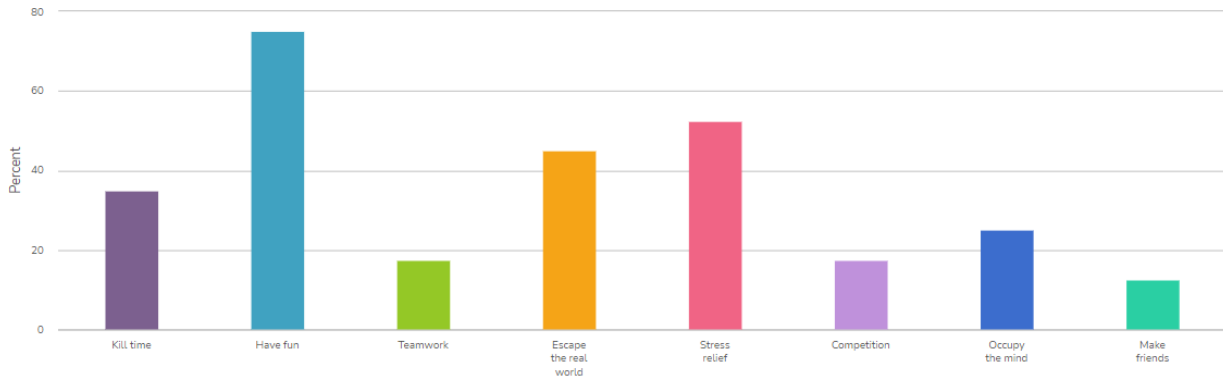
Value	Percent
Strongly Agree	50.0%
Agree	35.7%
Neutral	14.3%

Most participants think they would benefit from a serious game on data science.

4. Please select any specific requirements/preferences you would have from a serious game on data science.

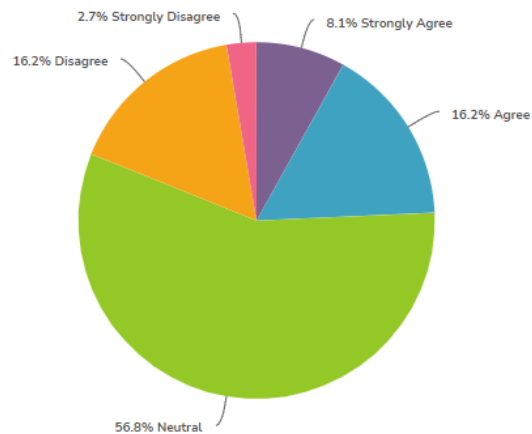


Value	Percent
Cross-platform	28.6%
Multi-lingual	14.3%
Personalised	28.6%
Storytelling	35.7%
3D	28.6%
Action/Adventure	42.9%
Role-playing	42.9%
Strategy	35.7%
Puzzle	42.9%
Multi-player	21.4%

5. Why do you play video games?


Value	Percent
Kill time	35.0%
Have fun	75.0%
Teamwork	17.5%
Escape the real world	45.0%
Stress relief	52.5%
Competition	17.5%
Occupy the mind	25.0%
Make friends	12.5%

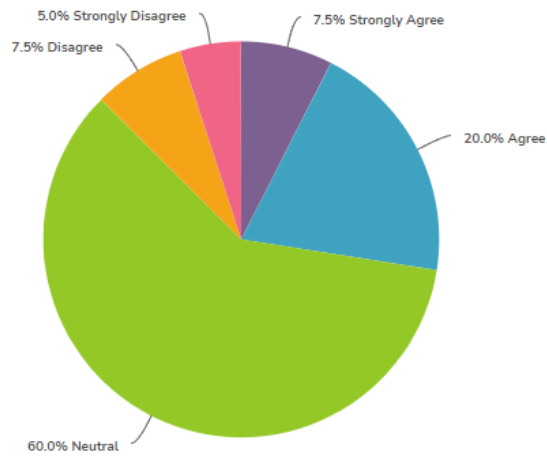
Most participants play games to have fun, escape the real world, and for stress relief.

6. I would be interested in trying out a serious game on data science.


Value	Percent
Strongly Agree	8.1%
Agree	16.2%
Neutral	56.8%
Disagree	16.2%
Strongly Disagree	2.7%

Most participants are neutral or agree that they would be interested to try out a serious game on data science, as many of them have not played serious games in the past.

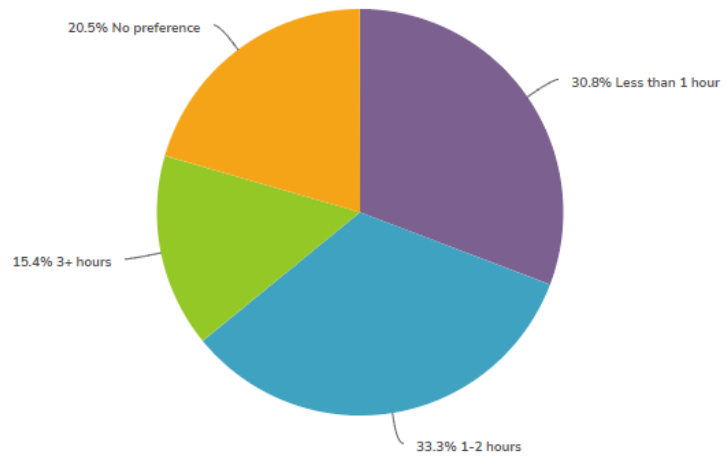
7. I would benefit from playing a serious game on data science.



Value	Percent
Strongly Agree	7.5%
Agree	20.0%
Neutral	60.0%
Disagree	7.5%
Strongly Disagree	5.0%

Most participants are neutral or agree that they would benefit from playing a serious game on data science, as many of them have not played serious games in the past.

8. How many hours of gameplay in total would you prefer for a serious game on data science?



Value	Percent
Less than 1 hour	30.8%
1-2 hours	33.3%
3+ hours	15.4%
No preference	20.5%

Discussion

Based on the user survey results and the feedback received from the target group, the following user requirements have been identified for the Abacus project:

Content:

- The content of the platform should be engaging and interactive, using multimedia (e.g., videos, animations, and infographics) to explain complex concepts in an easy-to-understand manner.
- The platform should include real-world examples and case studies to help users relate the concepts to practical applications.
- The content should be relevant to different levels of users, from beginners to advanced, and should cover a wide range of topics in data science and complex algorithms.

Accessibility:

- The platform should be easily accessible on different devices, including desktop computers, laptops, and mobile devices, to allow for flexibility in learning.
- The platform should be available 24/7, allowing users to learn at their own pace and at a time that is convenient for them.
- The platform should be user-friendly and easy to navigate, with clear instructions and guidance on how to use the different features.

Gamification:

- The platform should incorporate gamification elements to make learning more engaging and enjoyable.
- The game elements should be designed to reinforce learning outcomes and encourage users to complete different levels and challenges.
- The platform should offer incentives for users to keep learning, such as certificates and badges.

Feedback and Support:

- The platform should provide feedback on user progress and performance to help users track their learning and identify areas for improvement.
- The platform should include a support system to address user questions and concerns in a timely manner.
- The platform should offer opportunities for peer-to-peer interaction and collaboration to enhance the learning experience.

IV. Conclusion

The user requirements report has identified the key requirements for the Abacus project based on the feedback received from the target group. The identified requirements will be used to design the material and platform for the Abacus intervention. The project team will continue to engage with the target group to ensure that the developed platform meets their needs and expectations.