



# **GAMIFICATION IN CYBERSECURITY EDUCATION AND THE ENHANCEMENT OF PROFESSIONAL SKILLS. INSIGHTS FROM THE CYBER SAPERE INITIATIVE IN ITALIAN HIGHER EDUCATION INSTITUTIONS.**

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# OVERVIEW



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# INTRODUCTION



Targeted attacks against academia have increased in recent years, highlighting vulnerabilities that are not exclusively technological but also involve the behaviors of individuals and organizational shortcomings. In this context, cybersecurity training becomes essential. Academia is not only responsible for preparing future cybersecurity professionals, but must also ensure that students, researchers, and administrative and technical staff adopt behaviors appropriate to managing cyber risk.

# OBJECTIVES



- ❑ Examine the "Cyber Sapere" initiative, promoted by the Italian Ministry of Universities and Research.
- ❑ Assess how much more effective gamified approaches are compared to traditional models in promoting behavioral change, contributing to skills development, and supporting the alignment of academic institutions with national and European cybersecurity strategies.
- ❑ Offer a systematic analysis and empirical evidence on a model that could potentially be replicated in complex settings.

# RESEARCH QUESTIONS



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*Can gamification improve cybersecurity training effectiveness compared with traditional educational approaches, while also supporting upskilling and reskilling processes within academic institutions?*

# Literature Review

## ❑ Current Challenges in Cybersecurity Education

- ❑ Barruga, M.B. «SYSTEMATIC REVIEW OF CYBERSECURITY FRAMEWORKS FOR HIGHER EDUCATION INSTITUTIONS: CHARACTERISTICS, COMPONENTS, AND CHALLENGES», Int. J. Appl. Math., 2025, vol. 38, fasc. 4S, pp. 1180–1198.

## ❑ The Role of Gamification

- ❑ Amjad K., Ishaq K., Nawaz N. A., Rosdi, F., Dogar A. B., e Khan F. A., «Unlocking Cybersecurity: A Game-Changing Framework for Training and Awareness—A Systematic Review», Hum. Behav. Emerg. Technol., vol. 2025, fasc. 1, 2025.

## ❑ Skills Development and Lifelong Learning

- ❑ Micozzi, P., Montefusco, S. (2025). Digitalization of Services and the Creation of New Barriers: Upskilling and Reskilling as a Way to Mitigate the Digital Divide. In Firenze Pixel, The Future of Education Conference Proceedings 2025. Filodiritto Publisher. 561-567

# RESEARCH DESIGN



This study aims to integrate **quantitative** and **qualitative** evidence to assess the effectiveness of the "**Cyber Sapere**" **program**. This approach makes it possible to document all **measurable data** regarding participation and user performance, as well as qualitative elements, such as the way the training experience is perceived by participants and any changes in their behavior.

# DATA COLLECTION & ANALYSIS

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## Data Collection

Data were collected through platform metrics, training performance results, satisfaction surveys, and direct participant feedback

## Data Analysis

The analysis focused on three dimensions:

- Behavioral impact
- Skills development
- Strategic alignment and replicability

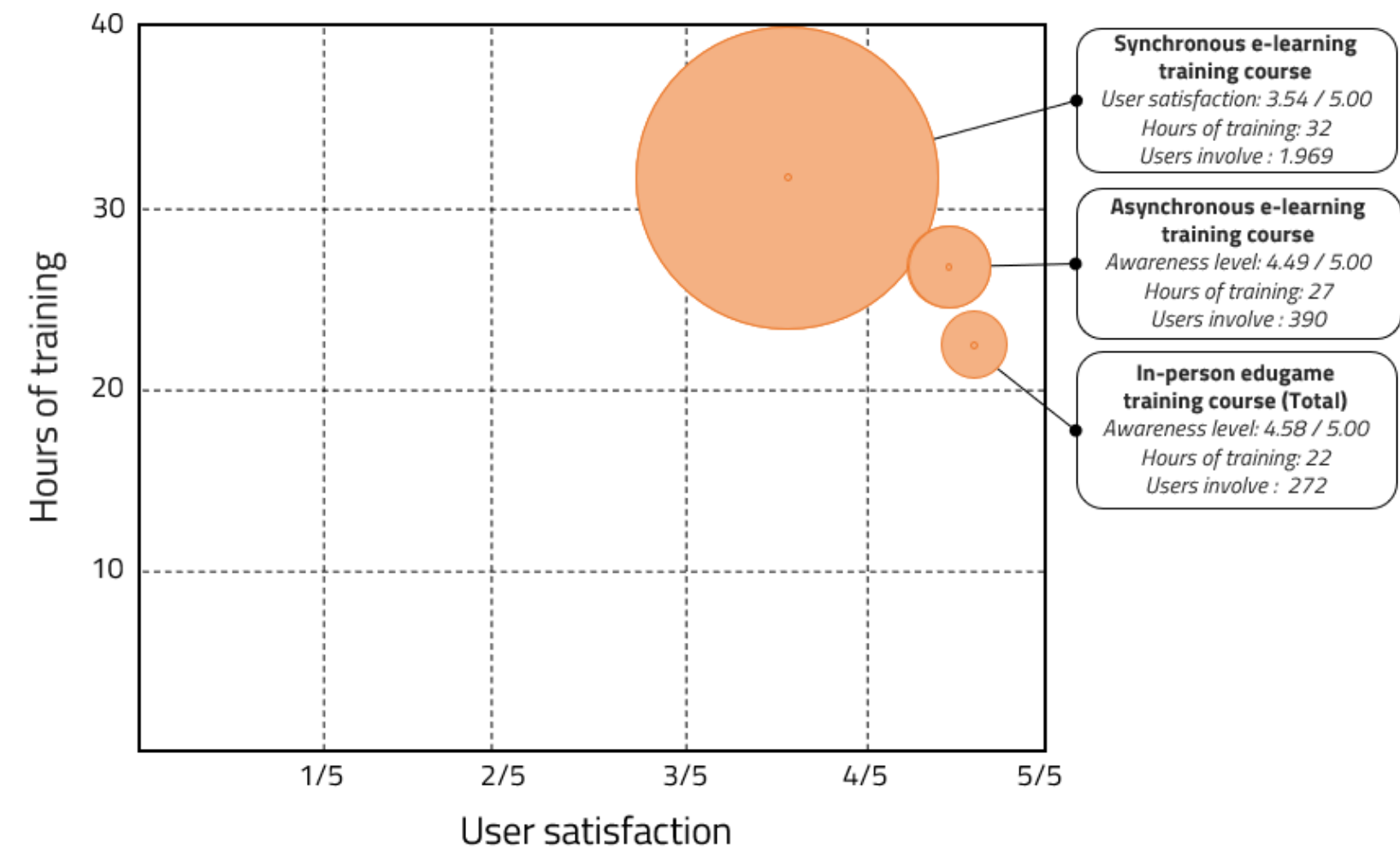
# KEY FINDINGS



- ❑ The in-person edugaming sessions achieved the highest satisfaction levels, with an average score of approximately 4.6 out of 5. This exceeded synchronous e-learning by about 30% and slightly outperformed asynchronous learning as well.
- ❑ Participants consistently reported that the gamified format was more engaging, more interactive, and more effective at facilitating learning. Institutions that hosted these sessions also expressed interest in replicating the approach in future training initiatives.
- ❑ These findings align with broader research on experiential learning, which suggests that active participation improves motivation and facilitates the understanding of complex concepts.

# DISCUSSION

The results support the hypothesis that participants prefer edugaming-based training, suggesting that experiential and game-based approaches can significantly enhance cybersecurity education in higher education institutions.



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# CONCLUSION




The **Cyber Sapere** experience demonstrates that cybersecurity education cannot rely exclusively on traditional instructional methods. **Effective cybersecurity posture** is not only about technology, it is about **people, behaviors, and continuous learning**. When training becomes engaging, immersive, and relevant to real-world challenges, institutions are better positioned to build a sustainable culture of cybersecurity.

# RECOMMENDATIONS



- Develop scalable e-learning edugaming solutions.
- Introduce continuous cybersecurity maturity assessments.
- Promote institution-wide cybersecurity awareness and culture.
- Ensure continuous, pervasive, and long-term training programs.

*Cyber resilience is not achieved through technology alone, but through continuous learning, behavioral change, and a strong cybersecurity culture.*



# THANK YOU

F O R T H E A T T E N T I O N

## Q&A

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