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**AIUCD 2021**

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Versione PROVVISORIA del contributo presentato al Convegno Annuale

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# MUTANT: MULTImodAI, TrAcked aNd parTecipated e-learning

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## ABSTRACT

MULTImodAI, TrAcked aNd parTecipated e-learning (MUTANT) is a concept prototype for optimize skills acquisition *via* e-learning platforms taking advance from three essential psychological assumptions: multimodal learning to enhance sense of presence; eye-tracking to detect fatigue/cognitive load; interactive learning to encourage participated decision making.

## KEYWORDS

E-learning, eye-tracking, multimodal integration, participated learning

## 1. INTRODUCTION

E-learning the unique alternative to guarantee the continuation of educational services due to COVID-19 pandemic restrictions. However, it has some limitations: it requires motivation and time management abilities to face absence of personal relations and remoteness; it is not effective when hands-on practical exercises are required (Arkorful and Abaidoo, 2015); it leads to excessive fatigue during demanding and complex teaching (Pimenta et al., 2020).

The implementation of MUTANT could overcome these limitations, since it is anchored to strong assumptions.

## 2. BEHIND MUTANT

1. Multimodal. The enhancement of external perception *via* multimodal integration is important for cognition and thinking (Anastopoulou et al., 2011). Skills acquisition could be optimized adopting embodiment-based learning (e.g by integrating haptic feedbacks), since individuals experience a higher control of supplementary sensory information as their own, thus increasing the sense of agency (Caspar et al., 2015).

2. Tracked. Accumulating evidences indicate that eye tracking is a reliable method to detect signs of cognitive load and fatigue, that often prevent skills acquisition (El Haddioui, 2019). Parallely, it provides a real-time feedback to the user. Individuals could be trained to detected signs of “nonoptimal state” by receiving, initially, feedbacks signaling a state of fatigue/overload. For enhancing self-control and state awareness, individuals will recognize nonoptimal state without being informed by feedbacks.

3. Participated. A virtual environment in which individuals could manipulate the same object by receiving tactile feedback could augment the sense of group presence. Individuals will be also stimulated with group decision-making learning tasks, in which superordinate goals will be reached after a process of exchange and integrate information.

MUTANT will take advantage from internet-based learning to allow small groups to interact real-time via haptic interface in conjunction with visual/auditory one, while subjects wear non-intrusive glasses for eye-tracker. Educator (i.e., teacher) will supervise the entire sessions promoting activities which stimulates group decision-making.

MUTANT will optimize intellectual and perceptual-motor skills during e-learning sessions, offering the opportunity to minimize side effects related to the absence of physical environment, thus guarantying an optimal learning process.

## **ACKNOWLEDGEMENTS**

Progetti di Ricerca di Ateneo 2020-2021 - Servizi pubblici e piattaforme digitali. Categorie giuridiche, processi, garanzie (PRA\_2020\_73)

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