

Supplementary Materials

Developing a serious game with the help of Causal Loop Diagrams to decrease the vulnerability of students and citizens to Disinformation

ABSTRACT

This study addresses the significant challenge of disinformation in democratic societies, particularly among young people and individuals who use social media for information and news. Disinformation can be well-designed and emotionally charged, making it difficult for even academically trained individuals to detect. A lack of media and information literacy (MIL) negatively impacts democracy as individuals less critical of misleading information may form their opinions and attitudes based on false information. Educational interventions such as inoculation games and lateral reading strategies have been shown to improve MIL. However, there is a need for effective and engaging interventions that support navigation in complex issues and promote multiperspectivity.

To address this challenge, this research project aims to develop a serious game that promotes MIL among students, drawing on previous empirical findings and focus group discussions. The game will involve an iterative and user-centered design process based on state-of-the-art MIL research and principles of multiperspectivity. The pedagogic framing is based on situated learning and transformative play, aiming to temporarily transform one's identity by taking advantage of the fictional and participatory properties of enactment afforded by play. The serious game will implement causal loop diagrams (CLDs) to represent and enact the larger mechanics of disinformation in democratic societies, fostering deeper understanding of causality and higher levels of autonomous agency for citizen navigation and participation. The results of this project are a development of one CLD presenting and explaining the problems and sources that are linked to disinformation. Additionally, six CLDs have been developed to describe the motor and technics of disinformation spreading. The game will be tested for user engagement, gameplay experience, and learning capacity in classrooms. This study explores a solution to the problem of disinformation in democratic societies by utilizing digital tools and principles of MIL and multiperspectivity. The serious game aims to foster critical thinking and counteract the challenges posed by disinformation, contributing to the development of a more informed and democratic society.

BACKGROUND

The work presented here is part of the SEGAD project funded by the Swedish Ministry of Psychological defence. The project began in 2022 and is currently in progress. The project team consists of four universities in close collaboration. Our research aims to investigate *How CLDs can aid the development of Serious Education Games generally and games about Against Disinformation as a particular casestudy.*

Disinformation, and an ongoing "information disorder" (Wardle & Derakhshan, 2017), has made it increasingly complex and laborious to navigate information on issues such as migration, war, climate change, vaccines, and political candidates for whom to vote. The term disinformation includes deliberate disinformation and propaganda as well as unknowingly biased and misleading information. A larger spectrum of disinformation via newsfeeds with videos, images and texts has made it more difficult to separate credible information from biased and false news (e.g. Breakstone et al., 2021; Nygren & Guath, 2022). The ability of citizens to search and evaluate news items in digital environments, often labelled *media and information literacy* (MIL), is today described in both theory and practice as a critical component in safeguarding democracies (e.g. Carlsson, 2019). Educational research has highlighted specific

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interventions which may promote key aspects of MIL (Axelsson, Guath, & Nygren, 2021; McGrew, 2020; Roozenbeek & van der Linden, 2019). However, there is a lack of research investigating how to best support citizens navigate more subtle forms of disinformation, convincing AI-manipulated images and deepfake videos (Ecker et al., 2022). How to support in education key aspects like actively open-minded thinking, has to date not been investigated (Roozenbeek et al., 2022). To safeguard democracy, it is essential to foster critical thinking and MIL through training and educating, and to make focused efforts among those who are more vulnerable to disinformation.

In recent years, multiperspectivity has been presented as a cognitive tool “to identify, reconstruct, and coordinate different perspectives that are relevant for understanding a topic or problem” (Bermudez, 2015, p. 109). Multiperspectivity entails self-reflection about different viewpoints on controversial issues. It can support the critical and constructive inquiry of contested or unfamiliar views. There are strong beliefs in the power of multiperspectivity to “open up the echo chamber” (Sandahl, 2020) and to counter nationalism, militarism, conflicts, misogyny and stereotypes (Stradling, 2003).

PROBLEM STATEMENT, PURPOSE, AND AIM

Game mechanics representing and enacting CLDs for players to explore the larger mechanics of disinformation in democratic societies aims to foster deeper understanding of causality and higher levels autonomous agency for citizen navigation and participation.

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Problem: The significant challenge of disinformation in democratic societies

Focus: Study addresses: particularly young people in vocational educations and individuals who rely on social media for news

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Hypothesis: Fostering media and information literacy (MIL) and Inoculation against disinformation can be made more effective with experience-based learning achieved by emotionally charged consequential action in a safe and inconsequential space of a fictional game world.

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Goal: To protect citizens from deception of disinformation and foster greater (MIL) and inoculation with a game-based educational intervention which offers a systemic understanding of disinformation through the implementation of CLDs and memorable insights sustained through gameplay.

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Foundation of Application

The disinformation CLD'S and the current Serious game is based on the previous results.

Researchers in the design and development group for the serious game against disinformation have:

Researchers in the group have (1) investigated challenges in teenagers' newsfeeds in collaboration with teachers and students (Nygren, Brounéus, & Svensson, 2019), (2) identified a lack of critical thinking among students (Nygren & Guath, 2019), (3) identified a digital divide between Swedish students in vocational and theoretical programmes (Nygren & Guath, 2022), (4) identified how assessments of digital news is a complex process (Nygren, Wiksten Folkeryd, Liberg, & Guath, 2020), (5) identified how digital skills and attitudes may be linked to the lived social and material world (Danby, Evaldsson, Melander, & Aarsand, 2018; Melander Bowden, 2019), (6) designed interventions with significant impact on students'