



GSGS'23

8TH INTERNATIONAL CONFERENCE ON GAMIFICATION & SERIOUS GAMES

HEALTH

TRAINING

CULTURE

SOCIETY

EDUCATION

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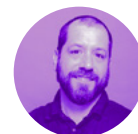
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MONDAY, JUNE 26 PRE-CONFERENCE ACTIVITIES

WORKSHOP SERIOUS GAMES

- 09:00 – 12:00 **Concept & design**
- 13:00 – 18:00 **Practical session**
- 18:00 – 20:00 **Aperitif & Networking**

TUESDAY, JUNE 27 PRE-CONFERENCE ACTIVITIES

WORKSHOP GAMIFICATION

- 09:00 – 12:00 **Concept & design**
- 13:00 – 18:00 **Practical session**
- 18:00 – 20:00 **Aperitif & Networking**

WEDNESDAY, JUNE 28 PRE-CONFERENCE ACTIVITIES

NETWORKING

- 09:00 – 12:30 **Face2face Speed dating**
- 12:30 – 14:00 **Lunch**
- 14:00 – 15:00 **Roundtable #1**
- 15:00 – 16:00 **Roundtable #2**
- 16:00 – 17:00 **Roundtable #3**
- 18:00 – 20:00 **Aperitif & Networking**

THURSDAY, JUNE 29

Welcome & Coffee

9:00 – 9:30

Conference Speech

Brigitte Bachelard | Executive Director of the HE-Arc
University of Applied Sciences & Arts Western | Switzerland

Overview of the GSGS conference**Let's chat with AI about ludification- related vocabulary**

Stéphane Gobron | HE-Arc | University of Applied
Sciences and Arts Western Switzerland

SESSION A HEALTH

CHAIR SYLVAIN CARDIN | EM + EPFL | LAUSANNE, SWITZERLAND

09:40 – 09:55

1 A Serious Game for the Assessment of Social Apathy

Fabio Solari | University of Genoa | Italy

09:55 – 10:10

2 Herzfroh2.0: Sexuality Education through a Narrative Serious Game

Ariana Huwiler | Hochschule Luzern Informatik | Switzerland

10:10 – 10:25

3 Happy Heart: A Game about Healthy Lifestyles for Nepalese Teenagers

Hua Bai | Univerity of Skövde | Sweden

10:25 – 10:40

4 Human emotions and learning life-saving skills in Gamification and VR

Vincent Lemaire | Vrescuer s.à.r.l | Switzerland

Coffee break

11:00 – 11:45

5 Keynote Speaker 1**Ethical and Pedagogical Reflections around SGs in Therapeutic Education of Adult Patients**

Jean-Denis Aubry, Emmanuel Rusch | University of Tours | France

SESSION B HEALTH

CHAIR LUCIEN BAPTISTE | HE-ARC SANTÉ, HES-SO | NEUCHÂTEL, SWITZERLAND

- 11:50 – 12:05 **6** Covid Vaccine Game for Teens
Ashish Amresh | Northern Arizona University | USA
- 12:05 – 12:20 **7** Co-creation of SGs to Acquire a Professional Skill
Sarah Dini | HESTS HES-SO Valais | Switzerland
- 12:20 – 12:35 **8** Glasgow Coma Scale Simulator
Yassin Aziz Rekik | HEPIA HES-SO Geneva | Switzerland
- 12:35 – 12:50 **9** Gamifying the End-of-life Project with 3D Rendering
Stéphane Gobron | HE-Arc Engineering | Switzerland
- 12:50 – 13:00 GSGS'23 official conference picture
- 13:00 – 14:10 Lunch & Demo testings
- 14:15 - 15:00 **10** Keynote Speaker 2
Paradigm Shift in Citizen Science: Videogame Payer Helping Researcher
Attila Szantner | MMOS - Swiss | McGill University | Canada
Jérôme Waldispühl | McGill University | Canada

SESSION C CULTURE, SOCIETY, TOURISM

CHAIR ANTOINE WIDMER | HEG, HES-SO VALAIS-WALLIS | SIERRE, SWITZERLAND

- 15:00 – 15:15 **11** Geome, from Design to Subjective Experience in a Museum
Simon Morard | University of Geneva | Switzerland
- 15:15 – 15:30 **12** Time Travellers
Mariia Gulkova | HEAD Geneva | Switzerland
- 15:30 – 15:45 **13** Lausanne 1830: “Histoires de Registre”
Yannick Rochat | University of Lausanne | Switzerland
- 15:45 – 16:00 **14** In My Time of Loss
Narges Hamidi Madani | HEAD Geneva | Switzerland
- 16:00 – 16:15 **15** AL2049, a Playful Museum's Visit to Grasp the Issues of Complexity
Simon Morard | University of Geneva | Switzerland

Coffee Break

- 16:45 – 17:30 **16** Keynote Speaker 3
The Power of Gamification: Lowering Barriers to Technical Learning and Increasing Diversity in the Tech Sector
Federica Nocerino | Women in Games, community partner of Women in Tech and GrUSP | Belgium / Italy
- 19:00 – 22:00 Social Event

FRIDAY, JUNE 30

Coffee & Croissant

SESSION D EDUCATION

CHAIR NABIL OUERHANI | HE-ARC INGÉNIERIE, HES-SO | NEUCHÂTEL, SWITZERLAND

09:30 – 09:45 **17** Intelligame

Aurélien Héritier | HES-SO Master | Switzerland

09:45 – 10:00 **18** Learning Java Loops and Control Structures by Moving a Ladybird

Elzbieta Pustulka | FHNW, School of Business | Switzerland

10:00 – 10:15 **19** Learnie

Cedric Larouziere | BCCL Gmbh | Switzerland

10:15 – 10:30 **20** The Biases of Artificial Intelligence

Biljana Petreska Von Ritter-Zahony | HEP Vaud | Switzerland

Coffee Break

10:50 – 11:40 **21** Keynote Speaker 4

The Role of Gamification in the Emerging Thinking Economy

Pietro Michelucci | Human Computation Institute | USA

SESSION E POLITICS, ECONOMY, ENVIRONNEMENT

CHAIR ERIC SANCHEZ | TECFA, UNIGE | GENEVA, SWITZERLAND

11:45 – 12:00 **22** How to Kill your Island

Thomas Robert | HES-SO Master | Switzerland

12:00 – 12:15 **23** Bard

Faustine Périllaud | HEAD Geneva | Switzerland

12:15 – 12:30 **24** Powerplay

Jérôme Castella | Watted | Switzerland

12:30 – 12:45 **25** EcoGestes

Dominique Bollinger | Ecosquad | Switzerland

12:45 – 13:00 GSGS'23 additional conference picture

13:00 – 14:00 Lunch & Demo testings

14:00 – 14:45 **26** Keynote Speaker 5

Designing Effective Serious Games

Dominique Jaccard | HES-SO/HEIG-VD | Switzerland

SESSION F TRAINING

CHAIR MICHAEL PERRET | HEG ARC - HES-SO, NEUCHÂTEL | SWITZERLAND

- 14:50 – 15:05 **27** Driving Test Theory Learner
Simon Cirilli | HES-SO Master | Switzerland
- 15:05 – 15:20 **28** The Negotiator
Pierre-Benjamin Monaco | HES-SO Master | Switzerland
- 15:20 – 15:35 **29** Exergame Cloud Platform -Decoupling Input Devices from Games
Patrick Joos | Ostschweizer Fachhochschule | Switzerland
- 15:35 – 15:50 **30** Enhancing Gamification within an Online Brainstorming Tool
Sergio Lopez | HES-SO Master | Switzerland

Coffee Break

- 16:10 – 17:00 **31** Keynote Speaker 6
The Design Process of the Rotbeesten?! (Rotten Beasts?!)
Doris Boschma | University of Technology Delft | Netherlands
- 17:00 – 17:15 Trophees
- 17:15 – 17:30 Closing speeches
Stéphane Gobron | HE-Arc | University of Applied
Sciences and Arts Western Switzerland

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OVERVIEW OF THE GSGS CONFERENCE

Stephane Gobron
HE-Arc | Neuchâtel

The GSGS conference has evolved from a half-day in 2016 to a full week this year, with over 50 interventions: workshops, project presentations with 25 short speeches, 8 keynote speakers, and demos. All these interactions will present topics at the heart of current events: ethics, soft skills, healthcare, aging, AI, ecology, and environment

A FULL WEEK OF EVENTS

Firstly, two days, Monday June 26 and Tuesday June 27, 2023, will be devoted to workshops, the first on serious games and the second on gamification. The idea here is twofold: to enable participants to distinguish between these two major families of applications, and to come up with a topic, a problem, discuss it and reflect together on development solutions, and leave with concrete ideas. Wednesday June 28 is dedicated to a day of networking: in the morning, speed-dating to get to know each other, and “private” roundtables in the afternoon. During previous years, these “classic” roundtables consisted of six or seven people discussing a topical issue in an amphitheater. While this was an interesting solution, it was not so appropriate since the audience were not really able to participate. This year’s solution first proposes that topics to be chosen, not imposed, and second, direct interaction is possible in a more human-sized space. Finally, as usual, two days will be devoted to the presentation of conference proceedings on Thursday June 19 and Friday June 30, 2023. This year, we’ll be lucky enough to have six major presentations during these last two days and the main design topic was the game of Tetris – see following illustration figure 1 – the first computer science serious game?

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Transcending classical 2D Tetris as an immersed 3D gamified simulation – a nod to the GSGS'23 theme.

FRUIT OF TERRIFIC COLLABORATION

The work accomplished was the fruit of close collaboration between mainly four institutes, in particular the Haute École Arc of Neuchatel (HE-Arc, CH) for administration and general management, the Haute École du Paysage, d'Ingénierie et d'Architecture (hepia, CH) for the conference program, the Haute École d'Art et de Design of Geneva (HEAD, CH) for design and the Trophées, and the company Contreforme for editing the conference proceedings.

We would like to thank all our sponsors and financial and political supporters, and in particular the University of Applied Sciences and Arts Western Switzerland, the Swiss innovation and applied research support association “Innosuisse”, hepia and in particular HE-Arc, which alone accounts for the vast majority of direct funding and through paid hours.

FIRST ACT

On the following page, will offer, as we did in a previous edition, a reminder of the vocabulary involved. In this case, the idea is twofold: to test and observe artificial intelligence on this subject and introduce a family of projects that are much deployed but rather ill-defined.

ACKNOWLEDGEMENT

It should be noted that this subject is currently the subject of several forthcoming publications in close collaboration between the University of Tours (France) and HE-Arc / HES-SO.

We hope you enjoy reading the proceedings, viewing the speeches onsite or online. Many thanks for all your suggestions, help, comments, and commitment that make the GSGS an exceptional inter-professional bridge between universities and industry.

Stephane Gobron – General Chair

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GSGS'23 ENIGMA





LET'S CHAT WITH AI ABOUT LUDIFICATION- RELATED VOCABULARY

Stéphane Gobron

HE-Arc, University of Applied Sciences and Arts Western Switzerland

The vocabulary surrounding every concept relative to ludification is still rather confusing, and much worse, false beliefs are unfortunately still tenacious. To challenge our own beliefs, we asked ourselves the following question: “How can we compare our beliefs with the state of the art, with the general opinion on this vast subject?” If we compare ours with the definitions from international experts, we could rightly say that this is just a small sample of opinions. If we do the same with Wikipedia pages, the sample becomes much more trustworthy since, on average, several hundred experts worked for each article. Still, trust cannot be absolute as by essence, Wikipedia articles change over time. Fortunately, there is an opinion-free system perfectly neutral, and therefore free from the bias of education or local influence: latest conversational models of artificial intelligence – here, we used GPT Chat, see autogenerated illustration figure 1. Responses are solely based on a sequence of best-possible probabilities of occurrences within the “universal knowledge”; at least what can be considered close to it, given enormous amount of certified data available. Confidence and limitation of such software have already been tested in several fields (e.g., software^[1], law^[2], health^[3]) showing impressive results still with limitations; in our case, we do not ask for creativity but only knowledge, the confidence should therefore be much higher.

We feel it is important to reiterate firstly the importance of having a precise vocabulary, then, comparing gamification and serious games, and finally distinguishing them with gamified simulation (also referred as ludic simulation). Note that we have strongly reduced the text without modifying it, as a full paragraph was produced for each use case (i.e., numerous “[...]”).

Figure 1 – AI autogenerated picture [Fotor, <https://www.fotor.com/images/create>] respectively from left to right: A photorealistic illustration of a human asking advice to an AI concerning serious games; a concept art of a human chatting with an AI about gamification.



WHY HAVING A PRECISE VOCABULARY DEFINITION IS IMPORTANT?

Having a precise vocabulary definition is important on several aspects: effective communication [...]; clarity of thought [...]; avoiding miscommunication [...]; intellectual rigor [...]; professional and academic contexts [...]; legal and technical accuracy [...]; language learning [...]. Precise vocabulary definitions are important because they facilitate effective communication, clarity of thought, and critical thinking. They help avoid miscommunication, promote intellectual rigor, ensure accuracy in professional and academic contexts, and assist language learning.

TELL ME ABOUT GAMIFICATION

Gamification refers to the process of applying game elements and principles to non-game contexts to engage and motivate individuals. It involves using game design techniques to make tasks or activities more enjoyable, interactive, and rewarding, thereby encouraging participation, learning, and behavior change. The concept of gamification has gained significant attention in various fields, including education, business, healthcare, marketing, and personal development. By incorporating elements such as points, badges, leaderboards, challenges, levels, and rewards, gamification aims to tap into intrinsic motivations and create an immersive and engaging experience for users. Here are key aspects and benefits of gamification: increased engagement [...]; learning and skill development [...]; behavior change and motivation [...]; data collection and analysis [...]; enhanced productivity and teamwork [...]; customer engagement and loyalty [...]. It is important to note that gamification should be used thoughtfully, keeping in mind the target audience and desired outcomes. Simply adding game elements without proper consideration of user needs and preferences may lead to shallow engagement or even backfire. Effective gamification design requires a deep understanding of the target users, clear objectives, and alignment with the overall context and goals of the experience.

WHAT IS THE DIFFERENCE BETWEEN GAMIFICATION AND SERIOUS GAMES?

While gamification and serious games share similarities in their use of game elements, there are distinct differences between the two concepts: purpose [...]; immersion and complexity [...]; scope and duration [...]; and user engagement [...]. While gamification focuses on incorporating game elements into existing activities to enhance engagement and motivation, serious games are purpose-built games designed to achieve specific educational or training objectives. Serious games offer a deeper level of immersion, complexity, and focused learning experience compared to gamification.

From this point, we tried to challenge ChatGPT with a much less well-known concept, distinguishing the notion of Gamified Simulation from the ones of Serious Game and Gamification.

HAVE YOU EVER HEARD ABOUT A CONCEPT CALLED "GAMIFIED SIMULATION"?

Yes, I'm familiar with the concept of "Gamified Simulation." Gamified simulation refers to the combination of gamification techniques with simulation-based learning or training experiences. It involves incorporating game elements and mechanics into simulated environments to enhance engagement, motivation, and learning outcomes. Simulations are designed to replicate real-world scenarios, allowing individuals to practice skills, decision-making, and problem-solving in a safe and controlled environment. By introducing gamification elements such as points, levels, rewards, competition, and feedback, gamified simulations aim to make the learning experience more immersive, interactive, and enjoyable. Here are a few key characteristics and benefits of gamified simulations: Engagement and Motivation [...]; Skill Development and Application [...]; Feedback and Progress Tracking [...]; Risk-Free Environment [...]; Team Collaboration [...]; and Data Analytics [...]. Gamified simulations have found applications in various fields, including education, healthcare, business, and military training. They offer a compelling approach to combine the benefits of simulations and gamification, creating immersive and effective learning experiences.

*Gamified simulations
aim to make the learning
experience more immersive,
interactive, and enjoyable*



DISCUSSION

We observe that even if the distinction of Gamified Simulation in the field is on the edge of current state of the art, ChatGPT still starts with a strong positive affirmation “Yes, I’m familiar with the concept”. We observe that it focuses on the concept of simulation for distinction and associates it with the associated quest: simulate to learn something – which is fundamental in this case.

Unfortunately, the limitations of this type of automatic text generator become apparent. Firstly, it omits the essential distinction that simulations (a) do not apply game elements and principles to non-game contexts (i.e., not gamification); (b) they are not an integral part of time spent on professional activity, with consistency in the results induced (i.e., not a serious game). Secondly, it insists on the immersive aspect that computer-related simulations can have, which is not essential, omitting the coherence of interactions and the notion of presence.

CONCLUSION

We used ChatGPT in a quest to better define the vocabulary in the field of gamification, serious games and ludic simulations, and to draw possible limitations from it. First, we were amazed by the quality of the generated text. Not only the English and argumentation structure is following academic writing rules – even elegant ones making it easy to read^[5] – but the content is constant with the state of the art. Nevertheless, we must point out that ChatGPT and similar applications should not be trusted. ChatGPT may be an incredible source of conversational text generation, it is not a viable source of factual information and should be cited for this purpose in academic writing without a strong human intervention^[6]: its response only follows patterns, not facts, which can result into potential “consistent lies” – even if this concept should be applied if there was any kind of conscience. We conclude first, at the macro level, that while we will actually have to use such tools, the effort is not on the text production but on a meta level: double checking the rather convincing produced text and argumentation. Second, at the micro level, the argumentation was not only consistent with all what we have learned, but also underlined some aspects that we neglected in the past differentiating even more gamification, serious games, and gamified simulation^[7]. Further details are part of a larger study in collaboration with the University of Tours (France) currently in press^[8].

REFERENCES

- [1] Jalil, S., Rafi, S., LaToza, T. D., Moran, K., & Lam, W. (2023, April). "ChatGPT and software testing education: Promises & perils". In 2023 IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW) (pp. 4130-4137). IEEE.
- [2] Barth, F. (2023). "Evolving Law in AI's Hands?" – Preliminary Experiments, Thoughts and Observations on the Basis of Chat GPT., April 27.
- [3] Biswas, S. (2023). "ChatGPT and the future of medical writing". *Radiology*, 307(2), e223312.
- [4] Michaux, C. (2023). "Can Chat GPT Be Considered an Author? I Met with Chat GPT and Asked Some Questions About Philosophy of Art and Philosophy of Mind". Available at SSRN 4439607.
- [5] Sword, H. (2012). *Stylish academic writing*. Harvard University Press.
- [6] Homolak J. (2023). "Opportunities and risks of ChatGPT in medicine, science, and academic publishing: a modern Promethean dilemma". *Croat Med J.*, Feb 28;64(1):1-3.
- [7] Dubbels, B. (2013). "Gamification, serious games, ludic simulation, and other contentious categories". *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*, 5(2), 1-19.
- [8] Gobron, S., Aubry, J-D., & Rusch, E. (2023). "Distinguishing Serious Game, Gamified Simulation, and Gamification", in press.



SESSION A HEALTH

THURSDAY, JUNE 29
09:40 - 10:40

In today's dynamic landscape, where engagement and attention are vital for medical assessments, healthy practices, and therapeutical skill training, serious games and gamification offer intuitive and potent solutions. These innovative approaches provide an effective means to capture individuals' interests and achieve our goals. This session explores the broad applicability of serious games from enhancing patient care by identifying early symptoms to promoting sex education and healthy lifestyles, to literally saving life.



CHAIR : SYLVAIN CARDIN



FABIO SOLARI
A Serious Game for the Assessment of Social Apathy



ARIANA HUWILER
Herzfroh 2.0



HUA BAI
Happy Heart



VINCENT LEMAIRE
Human emotions and learning life-saving skills in Gamification and VR

1 | A SERIOUS GAME TO ASSESS SOCIAL APATHY: A PILOT STUDY

Fabio Solari¹, Rachid Guerchouche², Valeria Manera², Rosa Carlotta Sanges^{1,2}, Manuela Chessa¹

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KEYWORDS

Serious Games; Social Apathy; Mild Cognitive Impairment; Interactive Storytelling; Tablet

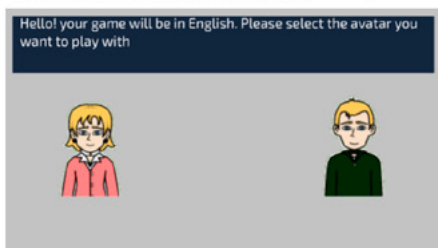
ABSTRACT

The longer average lifespan has dramatically increased the incidence of age-related dementia. Although widely acknowledged, not all patients receive an early diagnosis. The goal of this work is twofold: to develop a serious game for the early identification of one of dementia's most prevalent and early neuropsychiatric symptoms, apathy, and assess its feasibility and acceptance by patients and clinicians. We conducted a pilot study with ten patients and obtained encouraging results.

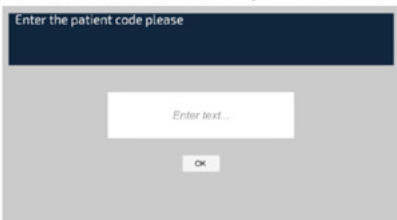
Start scene flowchart showing different kinds of blocks



Interface to choose an avatar



Interface to choose the patient's code



Patient's data saved in a file



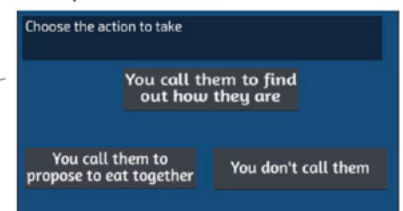
Example of a narrative part of the story



Example of a dialogue part of the story



Example of a choice





CONTEXT

The frequency of age-related disorders like dementia is dramatically rising because of the longer average lifetime. Alzheimer's disease (AD) is the most prevalent cause of dementia, but it can be brought on by a variety of other conditions; mild cognitive impairment (MCI) is a pre-dementia stage that frequently precedes dementia.

Dementia has been considered a global public health priority due to its enormous impact on individuals, families, and society^[1]. Early diagnosis of cognitive impairments is essential to improve disease treatment and control reversible causes. Even though the significance of an early diagnosis is well understood, more than half of instances of neurocognitive problems at an early stage go undetected.

Serious Games (SGs) are appropriate in this setting. A new paradigm of cognitive evaluation that demedicalizes screening links it to a pleasurable pastime and allows seniors to self-administer it in their preferred setting is possible with the use of serious games as a screening tool^[2, 3, 4].

Here, we aim to design and develop a serious game that will aid in the difficult process of diagnosing apathy, a neuropsychiatric symptom that can manifest very early in the development of a neurocognitive disorder: making its early detection a clinical and research priority^[5].

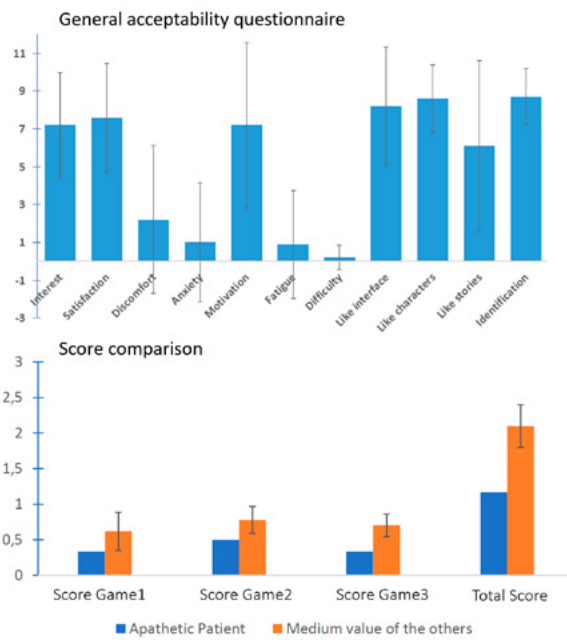
TARGETED ISSUE

A fundamental issue faced by our work is understanding whether patients and therapists accept the proposed SG as a diagnostic tool. From the clinicians' point of view, it is necessary to integrate the SG into traditional diagnostic protocols to help them to make an early diagnosis by easily using such a new tool. Thus, the SG needs a specific design to be able to detect the early aspects of apathy in MCI and provide a patient's score that can be used as a solid metric for apathy detection.

From the patients' point of view, the SG interface needs specific attention. The interface with the patient is designed to be as simple as possible since the game has, as a population target, users not accustomed to employing technology. The characters and environments of the proposed game are very basic, because if they were too rich, natural, or complex, they would distract the attention of the patient from the task to be performed. Moreover, the dialogues, the narrative parts and the menus are designed to be as large and simple as possible, compatible with the available space, and even the selection buttons in the menus are designed to be large but well-spaced, to avoid tapping by mistake the wrong button.

We designed a serious game for the early detection of mild cognitive impairment by exploiting the social interaction disorder, i.e., social apathy, as a cue for the possible development of a neurocognitive illness.





PROPOSED SOLUTION

We propose a game that allows patients to immerse in a series of social situations and to decide whether to interact with other people and how much. Psychologists of the Research Memory Centre, starting from the diagnostic criteria for apathy^[5], devised these social situations to identify loss of, or diminished engagement in social interactions: e.g., spontaneous social initiative, relationship with family members, verbal interaction.

With the aim of having the best solution to make the proposed SG as understandable as possible to patients and effective in detecting early apathy, we developed it with the following main characteristics:

- › A 2D tablet-designed application since elderly patients, not accustomed to using technology, could not tolerate 3D vision or head-mounted displays.
- › A starting scene where to enter the patient code and the language with which to play, to choose an avatar, and to give it a name (Fig.1, left). Finally, the game instructions are shown on the screen.
- › There are three different game situations with specific social interactions (Fig.2, left).
- › A sub-system to measure the patient's performance, based on the degree of apathy detected by the choices the patient makes (Fig.1, right).

For the game's development, we used Unity, Visual studio (scripts in C #), and Fungus: a free, open-source tool to create interactive storytelling games. For the pilot study, we used the tablet Galaxy Tab 3, SM-T820 (Android).

RELEVANT INNOVATION

The novelty of our approach is twofold. First, we designed a serious game for the early detection of mild cognitive impairment by exploiting the social interaction disorder, i.e., social apathy, as a cue for the possible development of a neurocognitive illness. Thus, we devised specific storytelling that provides social situations which enabled us to effectively analyze the patients' behavior. Moreover, we paid specific attention to the patients' identification with the game stories to allow them to behave as they do in real life, thus obtaining reliable game outcomes.

Secondly, we developed the serious game by employing very simple, but engaging graphics, so that patients can focus on the tasks and enjoy the social situations. Specifically, we decided to develop the SG using 2D graphics to simplify the patients' interaction with the game through a standard tablet. This avoids the use of head-mounted displays that might not be easily accepted by patients, though this will be further investigated. Moreover, since the game is played on a tablet, this eases the use of the proposed SG in several contexts, from the clinician's room to the patient's home, by increasing the possibility of reaching a large number of people, which is fundamental for early detection of cognitive decline in the population.

PROJECT OUTCOMES & RESULTS

All participants underwent a standard clinical assessment: the clinical evaluation revealed that 7 patients had MCI and 3 had Subjective Cognitive Decline. Out of the 10 patients, one was apathetic (2 M; 8 F average age: 74.6 years; SD: 5.379; age range= 64-83).



The game lasted about 10 minutes. Then, participants were administered self-report questionnaires to evaluate their experience: specifically, participants were presented with 10 points Likert scale. Moreover, a score was computed based on the patient's social interactions in the game.

The questionnaire results (Fig.2, right) show high levels of interest, satisfaction, and motivation. The level of discomfort, anxiety, fatigue, and difficulty is very low. We noted that the proposed SG not only satisfied patients by not causing discomfort but also enjoyed as a game itself. Moreover, a high score on the identification parameter is essential since, to diagnose apathy, it is necessary that patients identify with the avatars and make the choices that they would make in daily-life situations.

The SG scores correlate with the clinical Apathy Motivation Index for two game situations: this is important since it is an indicator of its possible use as a clinical tool. Moreover, results (Fig.2, right) show that the apathetic patient scored below average in all 3 game situations (the total score of the apathetic patient was lower by 31% than the average of the scores of the non-aphathetic patients).

CONCLUSION

We propose a SG designed for an early detection of the social apathy in the users who play it. We carried out a pilot study on the population target: 10 patients suffering from early-stage neurocognitive disorders. The results are encouraging: the patients were able to play with the proposed SG and they provided positive feedback through a questionnaire. Moreover, the game scores show a good correlation with a clinical metric and the apathetic participant had a lower score than the other ones.

PERSPECTIVES & NEEDS

First, we plan to conduct a study by considering more participants to validate the proposed serious game. Then, we will expand the game situations both in terms of storytelling and kind of social interactions to better check the different aspects of social apathy. We will also consider different graphical aspects of the game to better adapt it to the needs of the patients.

ACKNOWLEDGEMENT

This work has been partially supported by the Interreg Alcotra project CLIP E-Santé/Silver Economy (n. 793). RCS was supported by an Erasmus+ fellowship.

REFERENCES

- [1] Zygouris, S., P. Iliadou, E. Lazarou, et al. "Detection of mild cognitive impairment in an at-risk group of older adults: can a novel self-administered serious game-based screening test improve diagnostic accuracy?" *Journal of Alzheimer's Disease* 78, no. 1: 405-412, 2020.
- [2] Manera, V., E. Chapoulie, J. Bourgeois, et al. "A feasibility study with image-based rendered virtual reality in patients with mild cognitive impairment and dementia." *PloS One* 11, no. 3: e0151487, 2016.
- [3] Chessa, M., C. Bassano, E. Gusai, A.E. Martis, and F. Solari. "Human-computer interaction approaches for the assessment and the practice of the cognitive capabilities of elderly people." In *Proceedings of the European Conference on Computer Vision (ECCV) Workshops*, pp. 1-17. 2018.
- [4] Chessa, M., C. Bassano, and F. Solari. "A WebGL Virtual Reality Exergame for Assessing the Cognitive Capabilities of Elderly People: A Study About Digital Autonomy for Web-Based Applications." In *International Conference on Pattern Recognition*, pp. 163-170. Springer, Cham, 2021.
- [5] Robert, P., K.L. Lancôt, L. Agüera-Ortiz, et al. "Is it time to revise the diagnostic criteria for apathy in brain disorders? The 2018 international consensus group." *European Psychiatry* 54: 71-76, 2018.

2 | HERZFROH 2.0: SEXUALITY EDUCATION THROUGH A NARRATIVE SERIOUS GAME

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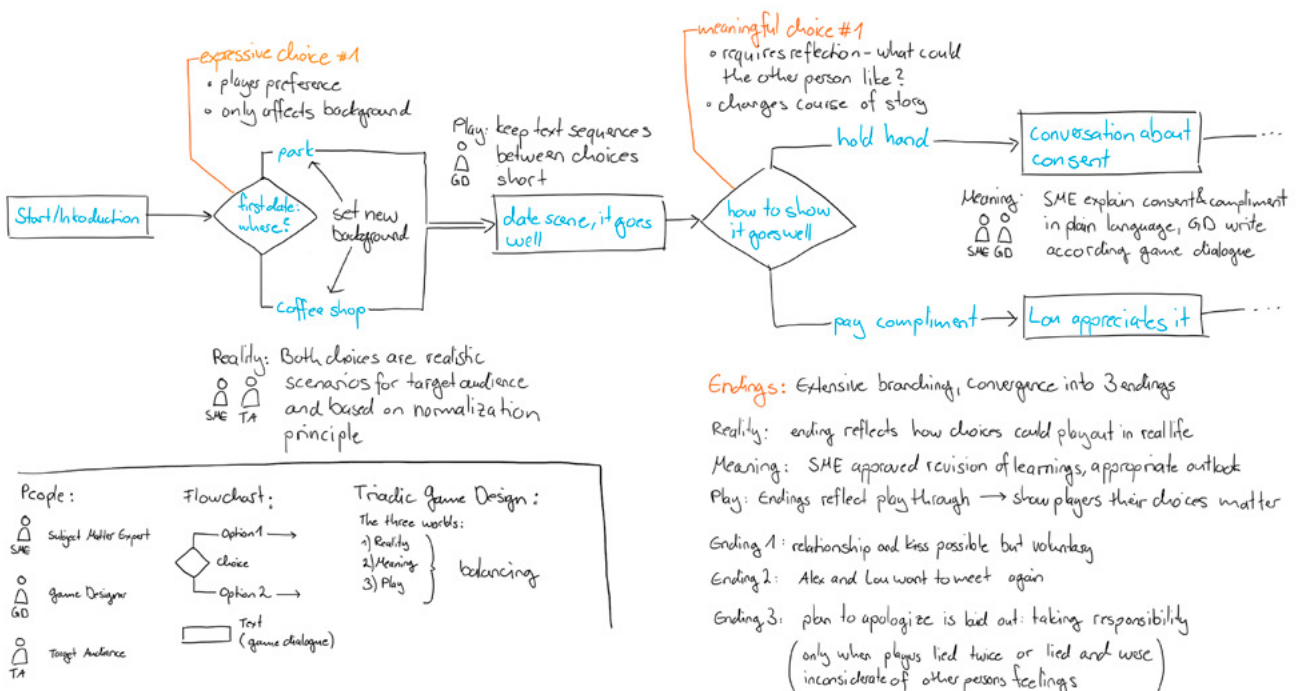
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KEYWORDS

Serious game, health, education, sexuality, intellectual disability

ABSTRACT

Sexuality education is a crucial element in ensuring the mental and physical well-being of teenagers and young adults. "Herzfröh 2.0" is a collection of educational materials targeted towards people of this age group with an intellectual disability and their care givers. The materials are supplemented by a narrative serious game, which was designed in close collaboration with the target audience and subject matter experts. The developed prototype was successfully tested with the target audience.





CONTEXT

Until 2011, the department for disability and sexuality (CH: Fachstelle Behinderung & Sexualität) released a total of 17 sexuality education booklets under the title “Herzfroh”, targeted towards adults with intellectual disabilities and disseminators (e.g. teachers, care givers).

The term intellectual disability encompasses a range of different diagnoses, making for a diverse target audience with different needs.

The booklets were written and illustrated in accordance with plain language guidelines, allowing many people to benefit from the booklets without assistance.

The need for such materials was attested when two young adults were able to bring sexual abuse to the attention of their caregivers because of the sexuality education they had received through Herzfroh booklets. This eventually led to the conviction of the abuser who, over the course of 29 years, had abused over 100 people with disabilities^[1]. With the ongoing project Herzfroh 2.0 the booklets are updated, restructured, modernized and now target teenagers and young adults (formerly: adults) with moderate intellectual disabilities.

All information will additionally be available on a dedicated website. Our narrative serious game will supplement the material and engage the target audience in a new way. Both, website and game, use text-to-speech technology in addition to plain language, enabling more people to independently use the resources, hence contributing to equality of opportunity and social participation.

TARGETED ISSUE

Research has found that people with intellectual disabilities often have difficulties in making decisions^[2], and in their day-to-day life decision-making is often taken away from them, e.g. by care givers or their family deciding for them. Making decisions is a necessary part of autonomy, and our narrative serious game seeks to assist by providing a safe environment to make decisions and explore their consequences. The amount of information displayed to the players is grouped into elements of three, considering the limited attention scope that is present in some members of the target audience^[3].

The game is designed around the learning objectives of the corresponding booklet “Friendship and Love”. Boundaries and consent are part of a separate booklet but are nevertheless discussed in the game.

The specific objectives of the game are to learn about:

(1) the difference between friendship and love; (2) navigating these relationships and the various displays of affection that can come with them; (3) how to approach a person one is interested in; (4) different needs in a relationship and how to handle them; (5) and how to ask for consent and respect boundaries.

Regardless of whether players make optimal decisions (e.g. appropriately communicating their needs), the tone of the game always remains constructive. Reproval or harsh criticism could worsen the difficulties in decision-making (e.g. through fear of judgement) already prevalent in the target audience.

PROPOSED SOLUTION

Players find themselves in the role of Alex and decide whether Alex identifies as male, female, or diverse. The potential love interest in the story is Lou, and the player likewise selects Lou’s gender identity. Intentionally, this is purely an expressive choice and has no consequences for the story. Throughout the game no gender pronouns are used, as there are no well-established gender-neutral pronouns in German. Based on their choices, players can get closer to Lou and get to know them better. If the players want, they can hold Lou’s hand, start a relationship, and have Alex share the first kiss with Lou.

Close attention was paid to leaving all these steps in the control of the player and make them voluntary. The players can decide for or against the different expressions of physical intimacy mentioned above, or whether

“Herzfroh 2.0” is a collection of educational materials targeted towards people of this age group with an intellectual disability and their care givers.



Text (layout and content) in accordance with plain language guidelines

Background and characters fit situation in story
Here: both happy, in a coffee shop

Text

Choice 1


Choice 2

Division into group of 3

How can Alex show this?


Alex can pay Lou a compliment

Alex can hold Lou's hand



Read aloud (repeatable)

Diverse characters: players select gender identity



Character Illustrations by diegoballi.ch

they want to start a relationship. Players can also make up excuses or lie. In any case, their decisions influence the course of the story and the relation between Alex and Lou.

The choices were designed around the Taxonomy of Narrative Choices^[4] and for the purpose of the serious game were divided into meaningful (e.g. requiring reflection) and non-meaningful choices (e.g. purely expressive). Because of the aforementioned difficulties with decision making and the limited attention scope, there are only ever two options to choose from. An exception to this rule is the gender selection in the start with three options.

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RELEVANT INNOVATION

For our target group, slow-paced narrative games have great potential as it is “a genre where reflection predominates over action”^[5]. However, to the best of our knowledge, no educational narrative games for people with intellectual disabilities have been published yet. Likewise, no research exists on how to design (or not to design) such games.

Therefore, we had to construct the necessary knowledge ourselves which is reflected in our design process. We regularly conducted playtests with two user groups: (1) members of the target audience from a vocational school (run by Stiftung Brändi, a foundation dedicated to the inclusion of people with disabilities), and (2) educational specialists (trained adults with intellectual disabilities from the German Institute for Inclusive Education Kiel). This allowed us to gather qualitative data in the form of direct feedback as well as observations. Additionally, subject matter experts and game designers were involved in the story writing process. To make design decisions, we used Triadic Game Design^[6], which proposes three worlds: Reality (e.g. how does the target audience organize their leisure time), Meaning (e.g. conveying why mutual consent is crucial), and Play (e.g. ensuring that player choices control the story narrative). Balancing the three worlds ensured the resulting story is relevant for the target audience (Reality), provides adequate learning messages in all branches (Meaning), and is engaging to play (Play).

PROJECT OUTCOMES & RESULTS

The finished game is split into halves: text and choices on the left, illustrations on the right. Text is read aloud and can be repeated indefinitely. As existing solutions did not meet the accessibility and project requirements, the game was developed in the game engine Unity. The dialogue logic was created with the open-source writing tool Yarn Spinner.

Seven young adults (aged 17-18) of the target audience took part in a final playtest held in a class setting. This playtest strongly indicated the effectiveness of the design choices. During one-on-one interviews, players commented on their actions having noticeable consequences. When asked why they made certain decisions, they gave personal values or experiences as explanation. They also reflected on character behaviour they found unexpected. This involvement into the story was seen as confirmation that players related to the story and its characters, validating the design process.



Two of the participants in particular showed difficulties in making the decisions by themselves. Both then chose to receive assistance from their teacher, the class assistant, or the study's moderator. The assistance was purely of an encouraging nature: Participants were not told which choice to make. It is notable that none decided to quit, having been assured that they were free to do so without repercussions or judgement.

Therefore, while unsupervised play is suitable for some players, for others engaging with the game in a classroom setting might be preferable.

CONCLUSION

Players were engaged with the story, appreciated the choices they had to make, and were encouraged to reflect on them. Based on this overall positive feedback, the game will be published as part of the new Herzfroh 2.0 materials.

The gathered experience allowed us to formulate tentative guidelines on the design of narrative serious games for this target audience, i.e. alternating between meaningful and non-meaningful choices, and defining the game length by choices (7-9 in total), not play time.

PERSPECTIVES & NEEDS

Long-term studies are required to validate the current results. The target audience is diverse, and it is not possible to design the game to suit everyone equally. This must be considered when incorporating it in the Herzfroh 2.0 materials. Additionally, it would be ideal if more stories were written, thematically covering the remaining booklets.

The game currently only runs on desktop PCs. A native app for mobile phones would greatly increase its reach as they are more widespread within the target audience.

ACKNOWLEDGEMENTS

We thank our project partners Foundation Brändi and the Institute for Inclusive Education Kiel. The project was funded by BZgA and the ITC Digital Transformation of the Workplace programme of LUASA.

REFERENCES

- [1] "Club 8. Februar 2011", Schweizer Radio und Fernsehen: Der Club, Feb. 08, 2011. [Online]. Available: <https://www.srf.ch/play/tv/club/video/club-vom-08-02-2011?urn=urn:srf:video:99338bf9-c1be-48ee-9f93-df7046e626f2>
- [2] P. Standen, F. Rees, and D. Brown, "Effect of playing computer games on decision making in people with intellectual disabilities", *J. Assist. Technol.*, vol. 3, no. 2, pp. 4-12, Jul. 2009, doi: 10.1108/17549450200900011.
- [3] A. F. Zimpel, Ed., *Trisomie 21: was wir von Menschen mit Down-Syndrom lernen können; 2000 Personen und ihre neuropsychologischen Befunde*. Göttingen: Vandenhoeck & Ruprecht, 2016.
- [4] C. Fernández-Vara, "Taxonomy of Narrative Choices by Clara F-V", [clarafv.itch.io](https://clarafv.itch.io/taxonomy-of-narrative-choices), Apr. 17, 2019. <https://clarafv.itch.io/taxonomy-of-narrative-choices> (accessed Sep. 14, 2020).
- [5] J. Torrente, Á. del Blanco, P. Moreno-Ger, and B. Fernández-Manjón, "Designing Serious Games for Adult Students with Cognitive Disabilities", in *Neural Information Processing*, vol. 7666, T. Huang, Z. Zeng, C. Li, and C. S. Leung, Eds. Berlin, Heidelberg: Springer Berlin Heidelberg, 2012, pp. 603-610. doi: 10.1007/978-3-642-34478-7_73.
- [6] C. Hartevel, *Triadic Game Design*. London: Springer London, 2011. doi: 10.1007/978-1-84996-157-8.

3 | HAPPY HEART: A GAME ABOUT HEALTHY LIFESTYLES FOR NEPALESE TEENAGERS

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KEYWORDS

Game-based learning, attitude and behaviour change, cross-cultural serious games, health, Nepal

ABSTRACT

Today non-communicable diseases (NCD) are the main drivers of morbidity, disability, and mortality in low- and middle-income countries, and are expected to increase due to unhealthy lifestyles in the wake of ongoing societal changes. In Nepal, heart disease is the most common NCD, causing a majority of the country's hospitalizations.

Previous research found that this issue stems from a lack of information regarding nutrition and healthy activities. Our project initially mapped out the details of this knowledge gap by producing a Knowledge, Attitude, and Practice report based on field studies conducted in Nepal. Based on this report, we have created a mobile serious game - Happy Heart - that aims to fill the identified gaps by providing information, but also by presenting it in a way that we hope changes peoples' attitudes towards healthy lifestyles. The game presents four main challenges: identifying and categorizing food items based on nutrition, preparing healthy meals, and planning a healthy weekly calendar.

The project is a collaboration between the University of Skövde (Sweden), Kathmandu Medical College, and Patan Academy of Health Sciences (Nepal).

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HAPPY HEART



4 | HUMAN EMOTIONS AND LEARNING LIFE-SAVING SKILLS IN GAMIFICATION AND VR

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KEYWORDS

VR Expérience, Gamification, Training, First aid, Security

ABSTRACT

Let's imagine a scene: a person collapses in front of you; it is a cardiac arrest; you are the witness; how do you react? You find yourself with an enormous and unexpected responsibility. Indeed, you are THE person who will decide the fate of a woman, a man or a child.

For the majority of the general public, it is almost impossible to dare to practice and learn first aid because of real and unfounded fears and lack of knowledge. Implicit emotions are an integral part of everyday life and influence our thoughts, decisions and behavior. In this context, we propose a learning process that combines human senses and virtual reality to improve the management of one's emotions in real situations in order to effectively deploy the acquired skills.

Can we also say that the contribution of "gamification" added to immersion in VR could improve motivation to learn? We would like to deploy two technical axes to answer this question. (1) VR to create varied, controlled and stimulating environments, tailored to specific needs and offering a more engaging experience in a safe way. (2) Gamification being the use of games in non-game contexts to encourage audience participation, motivation and engagement in emotionally intensive training.

Supported by academic partners and our developers, VRescuer aims to solve this problem by combining the two approaches, offering immersive VR first aid training scenarios (First Aid Escape Game VR).

With a proven tool, we are convinced that our applications will be able to help you in a natural way to confront and solve the scene exposed above and in which anyone may one day be THE witness: being able to save a human life.

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**A drama that we witness
A situation where we must act...**



**... A solution to know how to react
and maybe save someone's life.**



ETHICAL AND PEDAGOGICAL REFLECTIONS AROUND SERIOUS GAMES IN THERAPEUTIC EDUCATION OF ADULT PATIENTS

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SUMMARY

In 2019, the French Ministry of Solidarity and Health presented its roadmap for digital health policy, which aims to make digital technology a major opportunity for the development and improvement of healthcare. The scope of e-health (encompassing telemedicine, connected devices, serious health games, etc.) thus affects many areas of healthcare practice: monitoring chronic diseases, therapeutic patient education, home care, etc.

In the wake of the Covid-19 pandemic, digital health has sometimes been seen as a solution to address the needs of healthcare access, the continuation and efficiency of care, particularly in the field of Therapeutic Patient Education (TPE). The development and use of serious games in health care has never been so relevant as in this time when digital health has been brought to the forefront while also raising questions about the ethics of health care.

The research approach consists of three main steps. First, we conducted an exploration of the existing scientific literature in order to define the key elements of our initial inquiry, supplemented by existing knowledge and skills by mobilizing the expertise of resource persons in this particular field within the framework of a series of webinars that we organized.

Then, we conducted two studies to test different hypotheses resulting from the first step. We therefore undertook a survey phase with designers, users and beneficiaries of TPE programs and serious health games. The first study enabled us to collect quantitative data on the use of serious games in adult TPE programs in the Centre Val de Loire region by means of questionnaires. It allowed us to question these program leaders in order to study their use of the game in the education process of patients with chronic illnesses. The second study was focused on finding more qualitative components through interviews with health professionals and patients using a serious game identified and applied in a health education program. Its purpose is to explore the practices of health professionals and patients who use it, as well as their assessments and feedback.

In a last stage, we compared and discussed the elements from the bibliographic research and the webinars with those reported by the two studies. Serious games are seen as a solution to motivate patients to adhere to their therapeutic protocol by transforming educational activities into more "entertaining" times. Feedback on the patient's progress must also be effective so that the patient can raise his or her level of health literacy. Playful activities involving serious games should also allow the patient-player to see opportunities for social interaction with those around them, which will help to renew motivation. Finally, the principles of co-design should be encouraged, where users and professionals collaborate in a perspective of "ethics by design" in order to guarantee the creation of tools that meet real needs.

To conclude this work, we propose operational perspectives on our results while also identifying new lines of thought on the use of serious games “in society”, for example. Furthermore, it seems essential to consider and determine the profile of tomorrow’s e-healthcare worker so that they can better understand the digital healthcare elements and thus use them in an ethical and responsible way with the patients they care for.

THE “E-CAREGIVER”

FEATURES

Empowered

VARIATIONS

Identifies their capabilities in the use of digital tools on a daily basis, even outside the health field, without considering themselves outdated

Engaged

Guides e-patients in the use of these digital media by demonstrating the interest that can be brought to them

Equipped

Demonstrates a professional but also personal intellectual curiosity relating to digital culture in the current societal context

Enabled

Performs agile training (face-to-face, remote, hybrid, etc.) and/or professional monitoring in the field of e-health

Educated

Develops knowledge and knowledge allowing him to develop digital health skills that meet the expectations of the e-patients he monitors

Illustration - Characteristics of the e-caregiver evolving in the field of e-health

BIO JEAN-DENIS AUBRY

Jean-Denis Aubry is a nurse by training, and is currently the pedagogical coordinator of the Institute of Nursing Training at the University Hospital of Tours (France), as well as the Master of Public Health and the Master of Advanced Nursing Practices at the Faculty of Medicine of the University of Tours. He holds a Master's degree in Education Sciences and Public Health Sciences and received a PhD from the Laboratory of Health Education and Ethics of the University of Tours in May 2023. He is a member of the scientific committee of the Centre régional de ressources, de compétences et d'expertise en éducation thérapeutique du patient du Val de Loire.

BIO EMMANUEL RUSCH

Public health doctor and professor (PhD) at the University Hospital of Tours.

His teaching and research activity focuses on the conditions of “acting together and taking care”, particularly from the perspective of health promotion. Director of the EA7505 research team “Education-Ethics-Health”, the work carried out on health pathways mobilizes and combines the tools of education sciences, epidemiology and economics.

Concerned with issues related to health action (practical and ethical issues) and the related rights of patients, he has been involved in recent years in various regional and national organizations : Regional Federation of Health Promotion Actors (FRAPS, President) and Regional Conference on Health and Autonomy (CRSA), in the Center Val de Loire region; French Public Health Society (SFSP, former President), National Health Conference (CNS, President) and more recently within the “Covid19 Control and Liaison Committee”, a national committee focused on digital tools in health.



SESSION B HEALTH

THURSDAY, JUNE 29
09:40 - 12:50

Faced with today's healthcare challenges, it is becoming crucial to develop new, tailor-made educational tools to support the evolving practices of the next generation of healthcare professionals. Simulation and the creation of educational video games offer healthcare professionals the opportunity to learn how to effectively support care beneficiaries in specific care contexts, while protecting them from potential negative repercussions.



CHAIR : LUCIEN BAPTISTE



ASHISH AMRESH
Covid Vaccine Game for Teens



SARAH DINI
Co-creation of SGs to Acquire a Professional Skill



YASSIN AZIZ REKIK
Glasgow Coma Scale Simulator



STEPHANE GOBRON
Gamifying the End-of-life Project with 3D Rendering

6 COVID VACCINE GAME FOR TEENS

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KEYWORDS

Vaccine intake, young adults, game-based intervention

ABSTRACT

Long-term effects of the Coronavirus Disease 2019 (COVID-19), a concern for all ages, including children, include pain, headaches, fatigue, anxiety, depression, fever, cough, and sleep problems. As games have the potential to improve knowledge, change attitudes and reduce barriers for vaccination in youth, we designed a tablet-based game to be used in vaccine clinics which engages both the young adult and their parents in helping understand the benefits of COVID-19 vaccination. The game is designed to be a “god-mode” genre where the player (child/parent dyads) have to make decisions to help control the COVID-19 outbreak in a school by taking proper vaccination steps for those who are willing, taking convincing steps for those who are not certain and taking isolation steps for those who are unwilling to get vaccinated. By having the dyads gather information about the benefits of COVID-19 vaccination and make decisions that help save a school, the game attempts to improve their own beliefs and perceptions regarding the vaccine. The game is designed to run for ten minutes (normal waiting time at clinics) and encourages the dyads to save as many school children as possible.

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7 | CO-CREATION OF SERIOUS GAMES TO ACQUIRE A PROFESSIONAL SKILL

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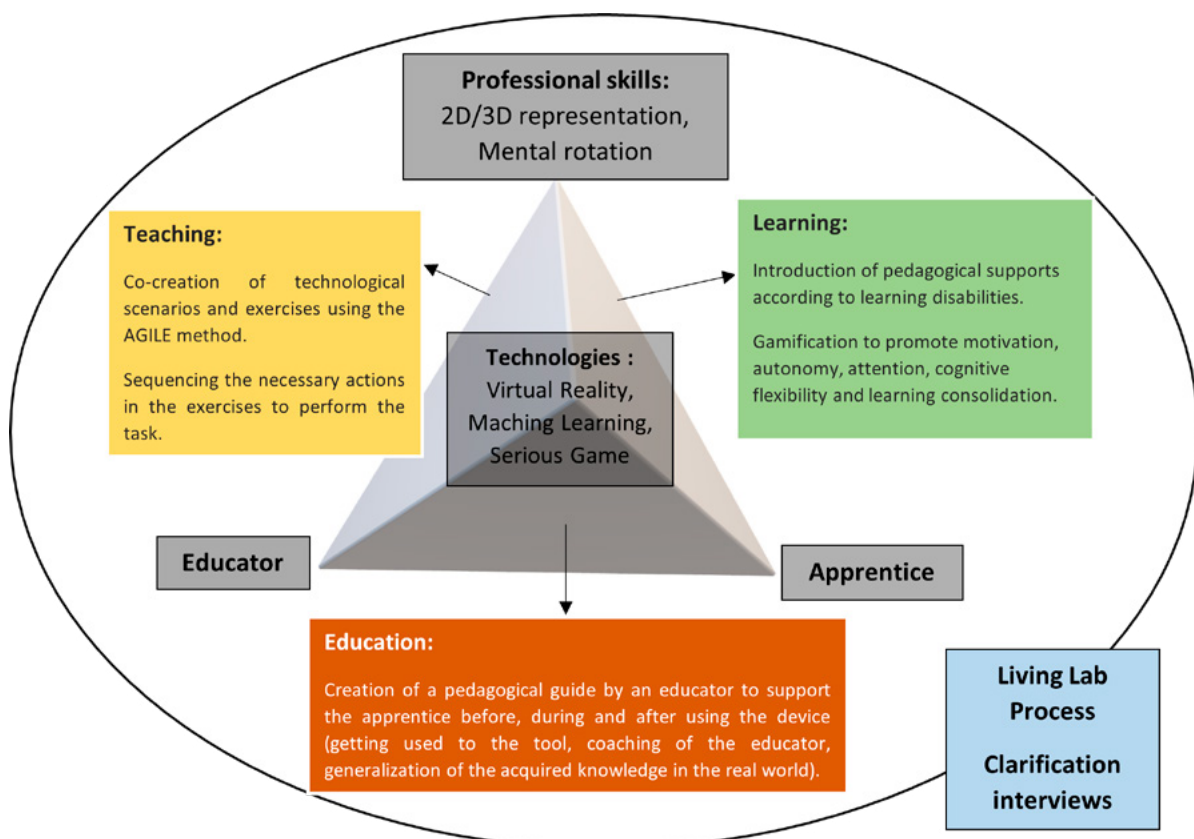
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KEYWORDS

Professional training, virtual reality, machine learning, health

ABSTRACT

ORIF is collaborating with HES-SO Valais-Wallis to co-create formative serious games, using extended reality, driven by machine-learning algorithms, to support vocational training for people with cognitive and/or social issues. The goal of this collaboration is to provide apprentices in the building sector with a virtual space to train their reading of plans and mental rotation, which are essential skills in this domain.





CONTEXT

ORIF (Swiss French Organization for Integration and Training) offers professional integration services to people with health problems and cognitive and/or social disorders. At ORIF, apprentices can train in the building, restaurant, and service sectors. They are supervised by educators who support them in their professional training.

The trainees at ORIF share the common characteristic of presenting learning difficulties that impact their integration into the labor market. Scientific literature shows that vocational training that adapts to each learner's difficulties can improve professional skills and thus employability. In this spirit, ORIF is collaborating with social work and management information technology researchers from the HES-SO Valais-Wallis on a project aiming at creating a virtual learning tool that adapts to each learner's difficulties. The goal is to use a combination of Virtual Reality (VR) and Machine Learning (ML) to facilitate the transmission of professional skills.

TARGETED ISSUE

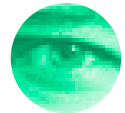
Among the skills to be acquired in the training offered by ORIF, reading plans and mental rotation pose a real problem for a majority of learners in 5 building sectors (sanitary, tiling, carpentry, metal construction and masonry). Several studies also highlight difficulties in reading 2D/3D representations for many adults in the building domain, as well as the inadequacy of traditional pedagogical tools to work on these skills for apprentices who have learning disabilities^[1]. It is therefore necessary to rethink the teaching method by using a virtual environment known to promote the cognitive flexibility essential to problem-solving, as it allows qualitative and quantitative complexity in learning contexts^[2].

Thus, this project objective consists in co-creating a technological tool that uses Virtual Reality (VR) and machine learning algorithms, proposing exercises which enable apprentices in the 5 building sectors to train these two skills while

assimilating the necessary action sequences to complete a project. This tool must also provide a learning space containing adapted supports, while having a gamification aspect that promotes the learner's motivation.

Our goal is to improve the efficiency of pedagogical devices on attention, motivation, autonomy, feedback, consolidation, and adaptation of assistance to the learner's level of acquisition.

The combination of virtual reality and machine learning has a real potential to enhance learning activities and facilitate the transmission of skills (...) for a population with learning disabilities.

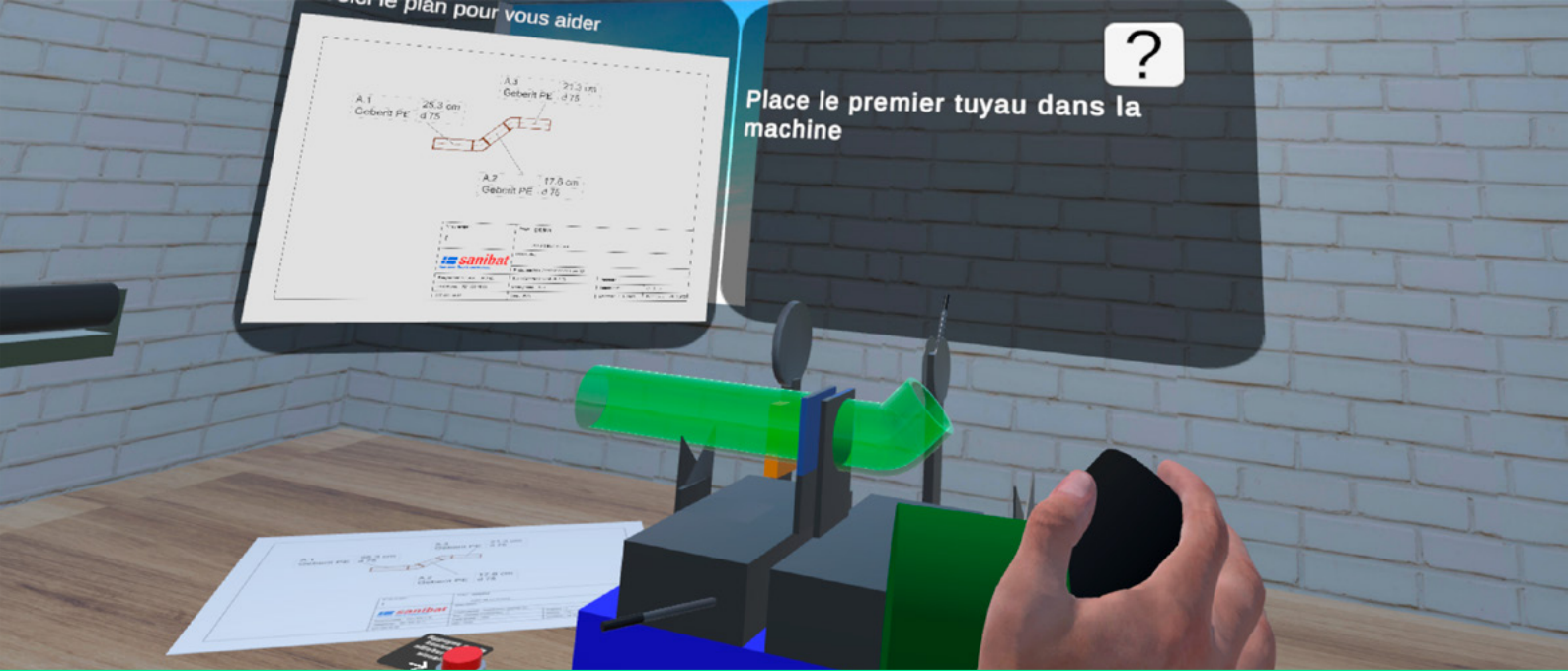


PROPOSED SOLUTION

In order to co-create this virtual environment and the exercises to be carried out, we used the AGILE method. Sprints of 3 weeks were held in the form of meetings between educators and researchers to achieve the following objectives:

- › Identify the learning difficulties of young people in the targeted skill;
- › Co-create technological scenarios containing different types of exercises with increasing levels of difficulty in order to work on the targeted skill;
- › Determine support principles using technology to overcome learning difficulties (sequencing, highlighting with colors, etc.);
- › Test the tool with the educators and a sample of apprentices and discuss the implementation progress and elements to be modified.

Thus, the close collaboration between researchers and educators from 5 building sectors should allow true co-construction of a tool, which is both pleasant and educational, and is centered around the users' needs, namely young people facing difficulties. Through continuous exchanges between researchers and educators, innovative technological and pedagogical solutions based on the difficulties of young people can be developed.



Furthermore, in a living lab perspective ^[3], apprentices are part of the co-construction process by testing the tool and taking part in an interview ^[4] with researchers to explain their experience and feelings regarding the virtual environment, tool usage, performed exercise, and proposed aids.

RELEVANT INNOVATION

The innovation of our solution is the combination of virtual reality and artificial intelligence to provide a new educational tool that adapts to the user's learning characteristics in order to improve the employability and integration of young people with health issues into the Swiss job market.

Indeed, a training tool comprising 5 sectors of the construction industry has been co-created to work on a common professional skill, namely 2D/3D representation and mental rotation. This is an innovative educational tool to help the acquisition of this skill thanks to specific exercises. In addition, scaffolding principles have been selected and introduced in virtual reality to provide adapted assistance to a heterogeneity of apprentice profiles presenting learning disabilities (autism spectrum disorder, attention disorder, hyperactivity, dyspraxia, etc.). The coloring of important elements, vocal assistance, pictograms, the 3D representation of the completed work as well as a sequencing of actions are among the proposed aids.

In addition to technological innovation, a pedagogical support guide has been developed using the pedagogical tetrahedron for the integration of technologies ^[5] to frame the tool use by the educator and the apprentice, as the developed tool is used in the classroom as an additional tool in the apprentice's training.

Finally, the tool gamification wants to promote the learner's motivation and accelerate the learning process.

PROJECT OUTCOMES & RESULTS

Currently, a first version of the virtual tool has been developed in the form of an exercise for each sector of the construction industry, with a defined sequence of actions. It contains the following elements:

- › A home screen where the apprentice selects exercises,
- › A warehouse where the apprentice must select the necessary tools to perform a task,
- › A workshop where the apprentice performs the task, which is sequenced in the form of a list of tasks to be performed and validated.

The tool has been tested on 2 apprentices per field, who were observed and coached by the relevant educator. The apprentices' and educators' opinions on the tool, as well as the suggestions for improvement, were collected during interviews (clarification interviews for the apprentices). These interviews served as a basis for discussion between the researchers and educators to improve the tool. A second test is planned to follow this improvement.



CONCLUSION

The combination of virtual reality and machine learning has a real potential to enhance learning activities and facilitate the transmission of skills such as 2D/3D representation and mental rotation, for a population with learning disabilities. Additionally, gamification introduced in vocational training can increase the apprentices' motivation.

PERSPECTIVES & NEEDS

The first objective is to find funding to keep improving the tool by testing it with more apprentices. And the final aim is to use this tool in other sectors as well as in a wider audience such as adults in professional retraining or even thousands of neurotypical apprentices with real difficulties, following an ordinary learning path.

ACKNOWLEDGEMENTS

We would like to thank ORIF, its educators and apprentices for their close collaboration during this project as well as Innosuisse for their financial support.

REFERENCES

- [1] Matri, S. (2020). Les environnements virtuels à l'école primaire, au service des connaissances spatiales: une ingénierie didactique articulant le micro et le macro-espace [mémoire de master, Université de Genève]. <http://archive-ouverte.unige.ch/unige:143872>
- [2] Duroisin, N. (2016). Complexifier quantitativement et qualitativement le contexte d'apprentissage pour faire émerger des stratégies cognitives variées : évaluation d'une habileté spatiale par l'utilisation d'environnements virtuels. *Journal international de Recherche en Education et Formation*, 2(3), 33-45.
- [3] Tijus, C. (2018). Après-propos : quoi faire avec le numérique ? *Enfance*, 1(1), 171-175. <https://doi.org/10.3917/enf2.181.0171>
- [4] Vermersch, P. (1994). L'entretien d'explicitation en formation initiale et continue. ESF.
- [5] Faerber, R. (2003). Groupements, processus pédagogiques et quelques contraintes liés à un environnement virtuel d'apprentissage. *Environnements Informatiques pour l'Apprentissage Humain*, 199-210. <https://edutice.archives-ouvertes.fr/edutice-00000137>

8 | GLASGOW COMA SCALE SIMULATOR

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KEYWORDS

Health, Training, Serious Games, Virtual Reality, Patient Safety, Glasgow Coma Scale

ABSTRACT

In all health professions the use of serious games and VR simulation for training is increasingly adopted. Indeed, recent literature demonstrates the added value of immersive simulations to learn and improve the skills of health care professionals as well as their contribution to improving the quality of care, increasing patient safety, and minimizing the costs of training programs. In this project, we developed a simulation-based serious game allowing students and professionals to practice on the evaluation of the patients' state of consciousness according to the Glasgow scale.

Glasgow Coma Scale

EYE OPENING		VERBAL RESPONSE		MOTOR RESPONSE	
					
Spontaneous >	4	Orientated >	5	Obey commands >	6
To sound >	3	Confused >	4	Localising >	5
To pressure >	2	Words >	3	Normal flexion >	4
None >	1	Sounds >	2	Abnormal flexion >	3
		None >	1	Extension >	2
				None >	1



GLASGOW COMA SCALE SCORE

Mild
13-15

Moderate
9-12

Severe
3-8



CONTEXT

The Glasgow Coma Scale (GCS) is a neurological instrument that measures the “severity” and extent of impaired consciousness. The GCS has become the most used tool in the world to document alterations in the level of consciousness caused by brain damage (Ingram, 1994). In combination with other neurological examinations, the scale is used to estimate the vital prognosis of patients with a severe brain injury. Because of its ease of use for all health professionals in all care settings, the scale has become an essential tool in all training programs. The neurological evaluation requires frequent simulation-based education to improve the cognitive, psychomotor and communication skills of the health students. However, current simulation approaches are resource-intensive and not routinely offered in all healthcare schools. Also, alternative approaches are needed to improve working memory, decision-making skills and teamwork performance. Serious games may be effective and more accessible alternatives if they use active, experiential and problem-based learning. They are indeed likely to solicit the student motivation and allow them to develop knowledge in complex learning situations.

GlasCoSS (Glasgow Coma Scale Simulator) is a gamified simulation tool allowing to immerse learners in realistic, but gamified VR situations



TARGETED ISSUE

GlasCoSS (Glasgow Coma Scale Simulator) is a gamified simulation tool allowing to immerse learners in realistic, but gamified VR situations in order to train them on GCS. The tool consists in placing the learner in challenging mission-based situations requiring to perform evaluations of patients encountered during the missions. With such a scenario, the patient diagnosis becomes one of the challenges to be met, thus motivating the learner and imposing various constraints: time, congestion, sound effects, noise, etc.

GLASCOSS HAS THREE OBJECTIVES:

1. Allow the student to experience a real situation in a virtual context and thus retain more information on the use of the Glasgow Coma Scale
2. Assess the possibility of using digital technologies to support active pedagogy, constructivist and socio-constructivist approaches.
3. Evaluate the potential use of the collected data in the simulation for educational research

Two major challenges had to be considered when developing GlasCoSS. The first was related to the modelling of patients to let the learner make a realistic diagnosis in accordance with the recommended professional practices. The second was the gamification of the simulation and the construction of a rich (various scenarios), customizable (customizable situations), and pedagogical (educational support) tool.

PROPOSED SOLUTION

GlasCoSS is a virtual reality simulation tool that enables to practice on the Glasgow Scale of Consciousness assessments of patients. This tool has been designed and developed by combining three essential aspects:

- › The realism of the medical diagnosis: indeed, the learning of the professional practices related to the evaluation of a patient’s state of consciousness requires a precision in the visualization of the vital indicators. However, in a Virtual Reality situation, it is not always easy to represent and capture these indicators. Taking the patient’s pulse is an example of this difficulty in the absence of a haptic device.
- › Gamification: we wanted to gamify the developed simulations to make the tool attractive and engage the learners’ motivation. Thus, the simulations are always implemented in the form of missions integrating patients that must be diagnosed in order to progress and obtain clues or resources. Several playful aspects have been used such as time, rewards, progression, and even collaboration, in a future version.
- › The integration of pedagogical supports: considering the intended use, it was necessary to integrate pedagogical supports in the simulation. These supports were integrated in the form of resources that the learner has in limited number during his missions and whose use requires counterparts.



RELEVANT INNOVATION

As mentioned in the previous section, the GlasCoSS project incorporates two interesting innovations. The first innovation is the transformation of the diagnostic process according to the GCS into an immersive virtual reality version. This transformation allows a viable and acceptable intermediary between the largely insufficient theoretical learning and the difficulty to achieve, and highly resource and time constrained real situation learning.

The second innovation of the project is to transform the training on diagnosis according to the GCS into a Serious Game in the form of an adventure game (Quests and Missions) and to transform the two serious processes of this training into gameplay elements. Indeed, with this simulation-based Serious Game, diagnosing a patient's state of consciousness becomes a challenge among others allowing to progress in the quest. Thus, by making the right diagnosis and taking the right decisions we can save the patient and obtain rewards in the form of clues and/or resources. The second aspect that has been gamified is the access to educational resources that become in our Serious Game resources like others that are constrained: limited number and costly. This even allows us to enhance the value of these resources in the learner's subconscious.

PROJECT OUTCOMES & RESULTS

The GlasCoSS project is still in progress. Currently, we are working in parallel but separately on the two essential components of the tool: the virtual patient with all the associated diagnostic mechanisms, and the adventure game that will integrate the patients as intermediate challenges. For both components, preliminary versions have been developed to validate the approach. We are currently extending them for a more complete and better finalized version. Realizing these components in a separate and modular way will make it possible to extend each one in a simple way and thus to make evolve the tool towards other possibilities of diagnosis and also towards other missions.

This project will create a learning environment where the student will work on the empirical aspects and the practical application of the tool, i.e. simultaneous learning of why and how to use the Glasgow Scale. We will thus promote the reflective practice of the participants by optimizing their clinical judgment in the evaluation and care of the patient with neurological impairment.



CONCLUSION

Over the past ten years, the studies have revealed a lack of rigor in the assessment of altered states of consciousness. We think that thanks to a tool like GlasCoSS, we will be able to improve the students' skills by playing the game and enhance their motivation, interaction, and engagement. These serious games could supplement traditional teaching and enhance access to neurological education. It should be integrated into the educational system and thus support students in their learning.

PERSPECTIVES & NEEDS

New technologies have invaded our daily lives and serious games are among the most promising educational options. Depending on the evaluation results, the authors wish to expand the use of serious games for teaching and learning purposes among students from other schools, professionals, health graduates.

We are also convinced that the development of a realistic virtual "Patient" linked to various diagnostic mechanisms (visual, sound, conversational, haptics) is a recurrent necessity for the development.

REFERENCES

- Gamito, P., Oliveira, J., Coelho, C., Morais, D., Lopes, P., Pacheco, J., ... & Barata, A. F. (2017). Cognitive training on stroke patients via virtual reality-based serious games. *Disability and rehabilitation*, 39(4), 385-388.
- Ingram, N. (1994). Knowledge and level of consciousness: Application to nursing practice. *Journal of Advanced Nursing*, 20(5), 881-884.
- Middleton, P. M. (2012). Practical use of the Glasgow Coma Scale; a comprehensive narrative review of GCS methodology. *Australasian Emergency Nursing Journal*, 15(3), 170-183.

9 | GAMIFYING THE END-OF-LIFE PROJECT WITH 3D RENDERING

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KEYWORDS

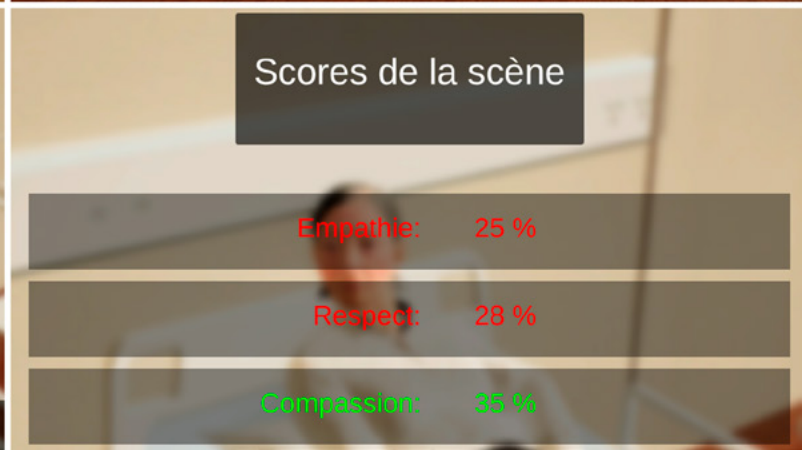
Health, Palliative care, Staff training, Soft skills, 3D renderings

ABSTRACT

Specialized institutes for the elderly as well as palliative care services are to be increased in number. In this field, where the technical knowledge of the care staff is not to be underestimated, two major problems are to be noted: (1) nurses are not trained or not trained enough in soft skills (listening, compassion, respect...) and (2) more than 10% of the young graduates give up their career as soon as they start their first year. Today, we propose to add the 3D rendering dimension to the End-of-life interactive book to make it a 3D gamified simulation.

This End-of-Life project puts the player in the shoes of Claude, a palliative care worker. In the form of a visual novel interspersed with immersive 3D scenes, the player must choose between 3, 4 or 5 options according to situations drawn from real facts. The idea is both to put oneself in a situation and increase one's knowledge and skills related to empathy, compassion or respect. Beyond the simulation, the staff receive a "mirror effect"-feedback on their own strengths and weaknesses in soft skills. As shown in the figure, the virtual agent, Claude, interacts in different ways, also by changing facial expressions.

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PARADIGM SHIFT IN CITIZEN SCIENCE: VIDEOGAME PLAYERS HELPING RESEARCHERS

Attila Szantner¹, Jérôme Waldispühl²

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SUMMARY

The last 8 years our teams have set up several successful collaborations connecting academic research institutions with major video game companies to create high-impact citizen science projects. These citizen science projects were created inside major video games with an emphasis on a high level of narrative, visual and reward loop integration to mobilize massive gamer communities inside these virtual worlds to help research initiatives in real life.

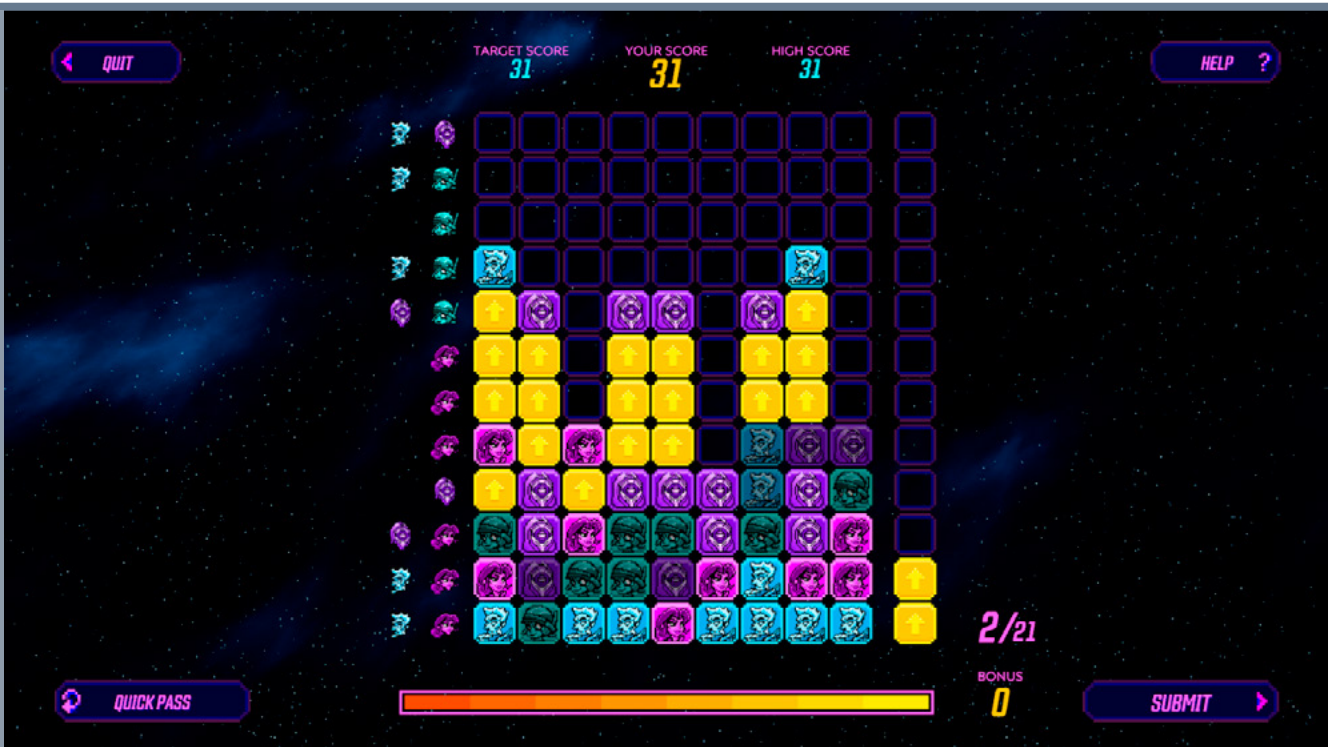
These projects have proved the validity of the original idea proposed by MMOS: they resulted in an unprecedented activity of citizen scientists, delivered high quality results for research and created unique opportunities for science engagement and communication.

Building on the experience of this work, we are proposing a new additional component to this successful ecosystem to make these citizen science projects more accessible, both for citizen scientists and both for citizen science practitioners.

KEYWORDS

Video games; Citizen science; Gamification

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The Borderlands Science DNA multiple sequence alignment minigame (Copyright Gearbox Software)

CONTEXT

Citizen science, while has been an invaluable tool in the scientific process both for accumulating and analyzing massive research datasets and as a means to conduct science communication, outreach and engagement, in the meantime always struggled with the challenge of attracting contributors (i.e., user acquisition) and maintaining their interest (i.e., long-term user engagement or retention). Furthermore, even though citizen science relies on the intrinsic motivation of participants to contribute to scientific tasks, in reality the often repetitive nature of the actual activities drives away most of the participants.

In 2014 MMOS, a Swiss start-up proposed a new way to structure citizen science projects: to integrate citizen science micro-tasks into major video games in order to resolve the issue of both user acquisition and user engagement; video games being known for their massive player-bases and their highly engaging nature. The core idea was deep integration tying the citizen science activity with the host video game on several layers: connect the activity with the lore of the game (ie. narrative integration), with the visual language and art-style (ie. aesthetic integration) and with the reward loop. Another important part of the idea was to give the lead to game industry professionals to design these mini-games. The assumption was that such a collaboration would be highly beneficial for both researchers and both game developers, opening avenues for citizen science previously unattainable for science.

TARGETED ISSUES

Though these projects were already major milestones in citizen science, during these years we have identified bottlenecks in the process: ^[1] the availability of game developer companies in engaging projects that are not part of their core mission as entertainment companies and ^[2] the amount of citizen science initiatives that we could not serve, them being incompatible with the AAA video game industry for several reasons. We wanted to be more agile in establishing new projects and serving a wider community of citizen science practitioners while maintaining the benefits of collaborating with major video game developers.

PROPOSED SOLUTION

We are proposing a new mobile platform and supporting high level API that would enable the independent development of citizen science mini-games, while maintaining the narrative, aesthetic and reward loop connection to our gaming partners. The mobile platform serves as a central hub app of several citizen science projects and the underlying API would create a secondary channel for partnering citizen science projects to tap into a massive citizen science community.

RELEVANT INNOVATION

The project would build on the previous innovations and technological solutions, like the MMOS API that currently serves these citizen science collaborations. The new innovations will include:

1. a novel collaboration design between game companies and research institutions through the proposed mobile platforms
2. a mobile hub application serving several citizen science projects and connecting them to massive gamer communities interested in participating in such activities
3. a high level API that serves partnering citizen science projects to share this massive contributor base among many other citizen science initiatives.

PROJECT OUTCOMES & RESULTS

During the last 8 years several collaborations were set up involving major game developer companies (CCP, Gearbox Software, NetEase) and many research institutions (McGill University, University of Geneva, University of Ghent, BC Cancer Vancouver, Microsetta Initiative/American Gut Project, University of Modena and Reggio Emilia, Human Protein Atlas, Natural History Museum of Paris) manifesting in two flagship citizen science initiatives: EVE Online's Project Discovery and Borderlands Science in Borderlands 3. The last edition of Project and Borderlands Science both launched in 2020 was a close collaboration between MMOS and McGill University.

These projects have brought several benefits to the video game developer companies, and equally so to research projects:

1. a massive crowd of contributors reaching several millions of participants
2. a constant high level of activity amassing hundreds of millions of citizen science tasks solved by contributors
3. The data collected through these projects can be used to improve the precision of scientific analysis, but also to discover new algorithm strategies using machine learning techniques.
4. a worldwide media coverage. The projects were supported by the expert PR and communication departments of the respective video game developer companies unlocking communication and dissemination opportunities often unavailable for research teams. These projects were covered in mainstream media from The New Yorker to BBC. In 2020 three major documentaries were shot about our work. These carried the scientific content and message way beyond the gamer communities to tens of millions of people.
5. unique science communication and engagement opportunities, like the real-life physical version of the in-game arcade machine of Borderlands Science that was proposed and created by the developer of Borderlands 3. One of them is currently on exhibition at the Museum of Gestaltung at ZHdK in Zurich.
6. Unique funding opportunities unlocked by the in-kind contribution of the game developer companies and the major achievements of these collaborations.



The Borderlands Science arcade machine inside Borderlands 3 (Copyright Gearbox Software)

CONCLUSION

This novel way to solve the engagement issues in citizen science has proven to be spectacularly beneficial for research. With the proposed new mobile platform and building on our existing collaborations we plan to extend these activities, make them more accessible and thus further enhancing the impact of many citizen science projects.

ACKNOWLEDGEMENTS

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REFERENCES

- [1] Szantner, A., *Massively Multiplayer Online Science*, in *Leveling Up: The Cultural Impact of Contemporary Videogames*. 2016, Brill. p. 103-110.
- [2] Waldispühl, J., et al., *Leveling up citizen science*. *Nature Biotechnology*, 2020. 38(10): p. 1124-1126.
- [3] Mutalova, R., et al., *Playing the System: Can Puzzle Players Teach Us How to Solve Hard Problems?* CHI '23: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems April 2023 Article No.: 679 Pages 1–15.
- [4] Sullivan, D.P., et al., *Deep learning is combined with massive-scale citizen science to improve large-scale image classification*. *Nature biotechnology*, 2018. 36(9): p. 820-828.

BIO ATTILA SZANTNER

Attila as CEO and co-founder of the Swiss start-up, Massively Multiplayer Online Science (aka MMOS), the innovator behind the novel way to structure large-scale citizen science projects in a seamless integration with AAA videogames, set up several citizen science collaborations with major AAA game developers, like *Borderlands Science* (2020-) or *EVE Online's Project Discovery* (2016-). These research mini-games engaged millions of players, who contributed with many hundreds of millions of scientific puzzles solved, were praised by a worldwide media coverage from the *New Yorker* to the front page of *Nature Biotechnology*, featured in several documentaries, and received awards, like the prestigious *Lovie Award*, the *Innovation Award* of the University of Geneva or the *IGDA Community Leadership Award*. Attila is also an adjunct professor at McGill University School of Computer Science.

BIO JÉRÔME WALDISPÜHL

Jérôme Waldispühl is an associate professor of Computer Science at McGill University. He holds a PhD from *École Polytechnique* (France), and previously was an instructor in *Applied Mathematics* at MIT (2006-2009). Jérôme conducts research in RNA structural bioinformatics and cheminformatics. He pioneered the use of video games to engage the public in genomic research with *Phylo* (2010), *Colony B* (2016), *Borderlands Science* (2020) and *Project Discovery Phase 3* (2020), which he presented at the *White House OSTP* (2013), *Québec Parliament* (2016) and *French Academy of Science* (2018). He is a recipient of the *Tomlinson Scientist Award* and the *Fessenden Professorship in Science Innovation*.



SESSION C CULTURE, SOCIETY, TOURISM

THURSDAY, JUNE 29

15:050-16:15



CHAIR : ANTOINE WIDMER



SIMON MORARD

Geome, from Design to Subjective Experience in a Museum



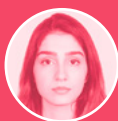
MARIIA GULKOVA

Time travellers



YANNICK ROCHAT

Lausanne 1830: "Histoires de Registre"



NARGES HAMIDI MADANI

In My Time of Loss



SIMON MORARD

AL2049, a Playful Museum's Visit to Grasp the Issues of Complexity

11 | GEOME, FROM DESIGN TO SUBJECTIVE EXPERIENCE IN A MUSEUM

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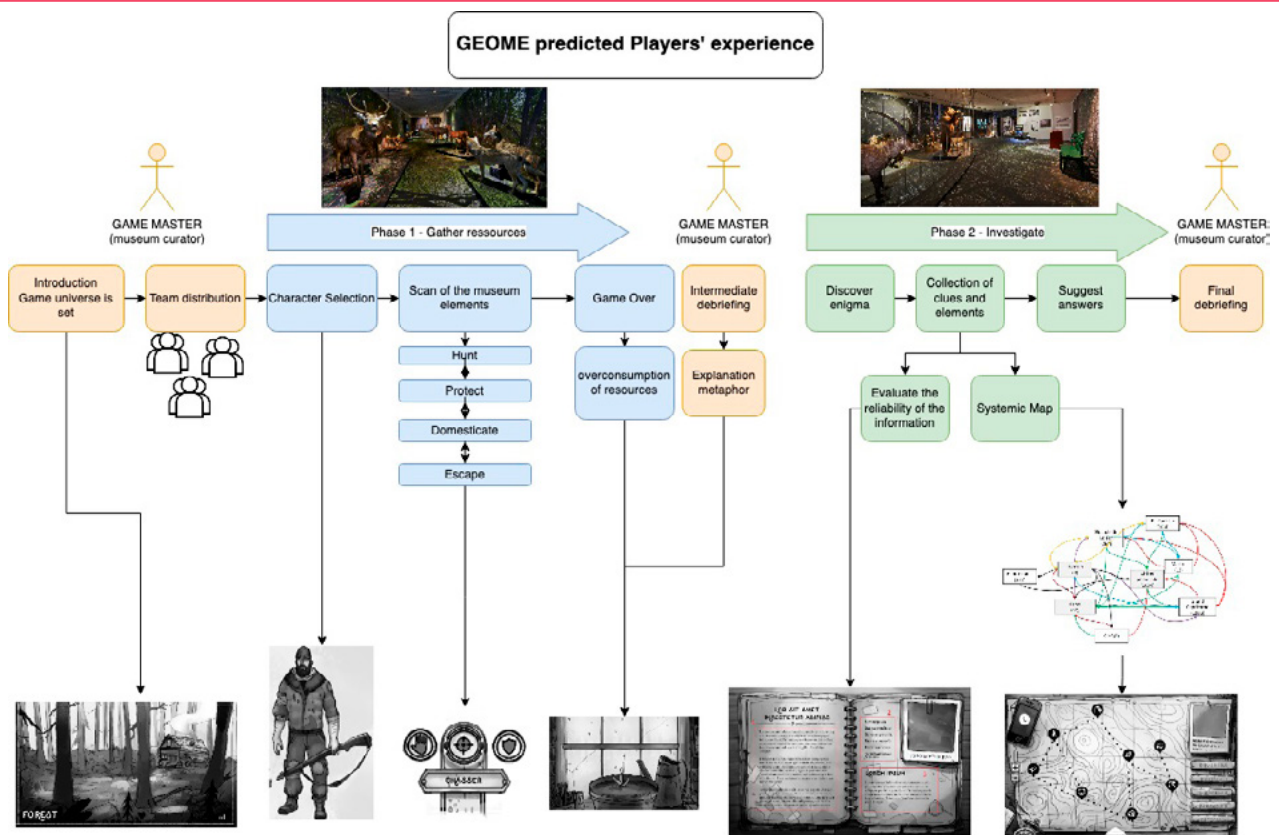
KEYWORDS

Game-Based-Learning, Gameplay, Playful Experience, Player Subjectivity, Museum School Visits, Personal Epistemology, Ill Structured Problems, Game Design, Play Design, Anthropocene

ABSTRACT

Geome is a game dedicated to museum school visits. The game is expected to create a playful experience and foster players' interaction towards the museum exhibition. This article aims to present the game and discuss the processes involved in the actualization of players' game experiences, and the distance between the game as designed and the game as played. Thus, we highlight the risks of discontinuity and disengagement due to the subjective nature of play.

GEOME predicted Players' experience





CONTEXT

Our work is part of a research project entitled “PLAY – Playing for Learning in the Museum”, supported by the Swiss National Science Foundation. The project is conducted by TECFA, an academic unit in the field of educational technologies at the University of Geneva, in collaboration with practitioners: museum staff, school teachers, computer engineers, graphic designers, and game designers. The project involves the creation and experimentation of Geome, a game dedicated to museum school visits for 12-to-15-year-old students. Our research aims to understand the subjectivity of the playful experience from the player’s perspective using theoretical frameworks from game-based-learning and epistemological theories ^[1].

The game development is part of our research method. By developing Geome, we test the theoretical models and conjectures that support the game design. Through user testing and experimentation in real museum context, we evaluate the game relevance developed to its audience, while enriching our knowledge on players’ behaviors and their relationships to knowledge (personal epistemology) and fake news.

TARGETED ISSUE

Our research deals with the design of games and the analysis of their use in a museum. The game is considered to supply the player with the opportunity to experience a situation which addresses specific learning objectives. We focus on two aspects: the first one relates to the design of the player’s experience from a play design perspective ^[2]. The playful experience should, on the one hand, engage the visitor by arousing interaction with the elements of the museum, and, on the other hand, lead him to question his relationship to nature and knowledge. Our second concern is the evaluation and monitoring of this playing experience. To study this experience, we measure the distance between the experience expected by the team in charge of the game design and the way the game is played by the young visitors in the museum.

Frameworks to learn user-centered game design suggest that it should be carefully crafted ^[3]. However, by focusing on the artifact rather than on the player’s experience, there is a risk of unexpected events occurring during the game session as players cannot be forced to follow the path, predetermined by the game designer ^[4].

Our hypothesis is that players develop their own interpretation of the game and, in so doing, create a singular and subjective experience. This subjective appropriation is unavoidable, nevertheless it presents a risk from a learning point of view since players may stray too far from the designed game scenario.

PROPOSED SOLUTION

The first step consisted in designing an engaging game experience within the museum, integrating learning objectives and fostering players’ interactions toward the exhibition. Thus, researchers, museologists and game designers collaborated to design GEOME.

GEOME is a mixed-reality game played with digital tablets and adapted to the museum permanent exhibition. The game is integrated in a pedagogical scenario dedicated to museum school visits for secondary school students (12-15 years old). The whole scenario lasts approximately 90 minutes: it includes an introduction, the game session divided in two phases, and a debriefing. Geome deals with Anthropocene issues by addressing the relationship between human beings and their environment. Players are expected to gather resources from the museum to survive. By scanning different stuffed animals with a digital tablet, they obtain different types of resources depending on the choice they make: hunting, protecting, domesticating animals or escaping from them. As a result, they consume too many resources and collectively fail. After a short debriefing about the overexploitation of resources, the players are called as wildlife experts. They are expected to deal with fake news, rumors and polemics related to environmental issues. During this part of the game, they explore the museum to find clues and solve problems. By doing so, they are expected to discover and understand the complexity of natural ecosystems’ interactions.

GEOME is a mixed-reality game played with digital tablets and adapted to the museum permanent exhibition.





RELEVANT INNOVATION

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We consider game metaphors as a way to help students to understand complex phenomena. During the first game phase, players have the possibility to gather the needed resources to survive by hunting, protecting or domesticating animals. This frantic search for resources leads to the depletion of a tree of life, a metaphor for the quality of the environment. This metaphor describes an abstract concept, i.e the quality of the environment, by providing an analogy from a familiar domain, the health of a tree^[5]. Since Geome is a team game, the impact on the tree of life will vary from one team to another. However, this impact is collective (each team's decision affects a global score). This is a way to metaphorize that the depletion of the natural environment quality results from a collective overexploitation of resources.

During the second phase, the players' posture towards nature (i.e elements of the exhibition) is expected to shift. Players move from hunters to investigators who adopt habits of curiosity to understand the natural ecosystems. The resolution of the game will depend on the adoption of this critical and reflective posture towards the information in the museum, and towards nature in general. We consider that Geome has the potential to trigger these behaviors. Nevertheless, the actualization and interpretation of the game experience depend on players' subjectivity.

PROJECT OUTCOMES & RESULTS

We tested GEOME with 6 classes of secondary school students. Some of them wore on-board cameras. As a result, we collected data about what the players did, said and how they interacted with the game. These videos highlight processes that shape the game experience and allow us to illustrate some of the risks of discontinuities and disengagement, related to the subjective nature of play. Since the game is played in a museum environment some players are attracted by elements of the museum that are not directly related to the game: this phenomenon is called "discontinuity". It represents a form of divergence as the player temporarily breaks away from the expected game scenario. These interactions between the player and his environment make the game experience unique and sometimes unpredictable. Discontinuity occurs when the game encounters IT server issues. The game universe was broken. A major discontinuity relates to the way players process information even though they are deeply engaged during the second part of the game. Indeed, they are expected to read and learn about the characteristics of different animals in the museum. A careful reading should allow them to understand the relationships between the animals and question fake news provided by non-player characters. However, we observed that some teams collected information, without paying attention to its meaning. This way of game appropriation tends to transform an investigation game into a quest game.



CONCLUSION

Our results allow us to highlight the distance that appears between a form of optimal game experience, the one expected by the design team and a subjective experience, the one undertaken by the player, when he takes possession of the game ^[6]. We consider the use of a metaphoric approach as a contribution to game design research that illustrates how a playful experience can be an analogous and metaphorical situation of specific knowledge that needs to be learned.

PERSPECTIVES & NEEDS

These preliminary results highlight processes, such as continuity, discontinuity and disengagement, making the game experience subjective. Those specific processes must be anticipated, from the very first phases of game design.

ACKNOWLEDGEMENTS

This research project is funded by the Swiss National Funds. We thank the teachers who supported us during the experimentations, as well as their students who tested the game and the staff from the Nature Museum who participated in the project.

REFERENCES

- [1] Morard, S., Sanchez, E., & Bonnat, C. (2022). Influence of a Mixed Reality Game on Students' Personal Epistemology. An Empirical Study. In K. Kiili, K. Antti, F. de Rosa, M. Dindar, M. Kickmeier-Rust, & F. Bellotti (Éds.), *Games and Learning Alliance* (p. 234-244). Springer International Publishing. https://doi.org/10.1007/978-3-031-22124-8_23
- [2] Genvo, S. : Du game design au play design : ethos et mediation ludique, in *Colloque Entre le jeu et le joueur : ecarts et mediations*. Liege (2018)
- [3] Pereira de Aguiar, M., Winn, B., Cezarotto, M., Battaiola, A. L., & Varella Gomes, P. (2018). Educational Digital Games : A Theoretical Framework About Design Models, Learning Theories and User Experience. In A. Marcus & W. Wang (Éds.), *Design, User Experience, and Usability : Theory and Practice* (p. 185-184). Springer International Publishing. https://doi.org/10.1007/978-3-319-91797-9_13
- [4] Fernández Galeote, D., Diamant, M., Volkovs, K., Zeko, C., Thibault, M., Legaki, N.-Z., & Hamari, J. (2022). Understanding the Game-based Learning Experience : A Framework of Frictions Between Design and Play. *Proceedings of the 17th International Conference on the Foundations of Digital Games*, 1-4. <https://doi.org/10.1145/3555858.3555933>
- [5] Banaruee, H., Khoshsima, H., Zare-Behtash, E., & Yarahmadzahi, N. (2019). Types of metaphors and mechanisms of comprehension. *Cogent Education*, 6(1), 1617824.
- [6] Chauvier, S. (2007). Qu'est-ce qu'un jeu ? J.

12 | TIME TRAVELLERS

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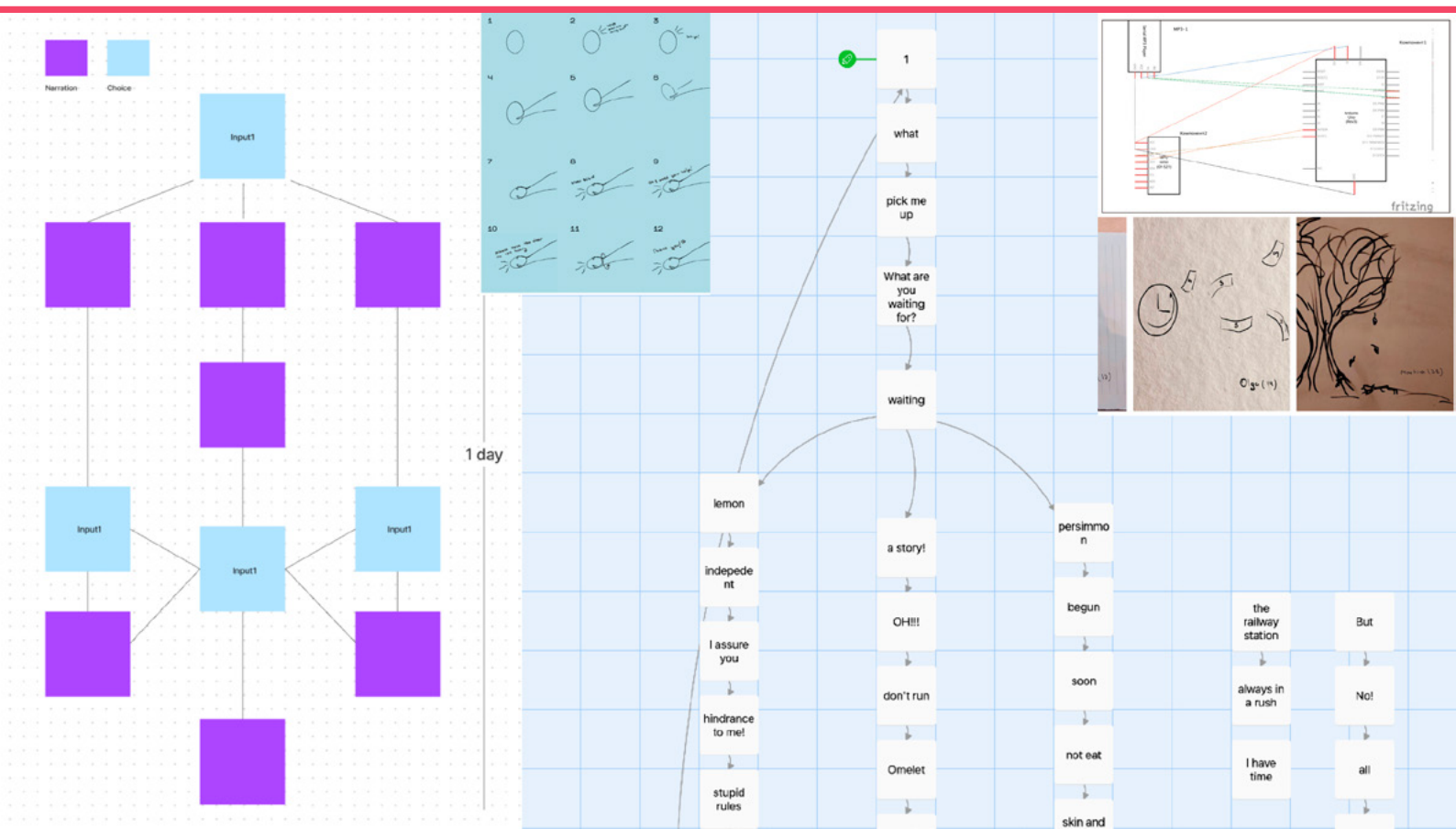
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KEYWORDS

Gamified simulation, Storytelling, Prototyping, Narrative, Interactivity, Arduino, 3D, Twine

ABSTRACT

Storytelling is the art of conveying a narrative or a series of events to an audience, typically through spoken or written words, images, or other media. It has been a fundamental part of human culture since the beginning of civilization, used for entertainment, education, and communication. In this article, I will briefly describe the path from idea to working prototype, and the tools used to build the story and characters.





CONTEXT

“Time Travellers” is a unique project that aims to explore the concept of time and how it is perceived by individuals. The project uses storytelling, 3D design, and electronic components to create an interactive experience that immerses the audience in worlds of time.

The question of what time means to each individual is at the heart of “Time Travellers”. The project seeks to understand how people feel time, whether it's fast or slow, and whether it's something that can be controlled or something that controls us.

As the players move through each world, they are presented with challenges that require them to perform certain gestures. These challenges are unique to each Time Traveller. By helping the characters overcome these challenges, the players are able to deepen their connection to the characters and gain a deeper understanding of their stories.

Overall, “Time Travellers” is a fascinating and innovative project that pushes the boundaries of storytelling and technology. It offers a truly immersive experience that encourages audiences to reflect on their own perception of time while engaging with a diverse range of characters and narratives.

TARGETED ISSUE

Interacting with fictional characters in natural language raises new design and authoring questions:

- › What steps can be taken to ensure that the Time Traveller characters are represented in a unique and authentic way, drawing from a range of personalities and perspectives?
- › How can we address potential user difficulty in reproducing certain gestures required to progress through the game?
- › What strategies can be implemented to ensure that the game is accessible and inclusive for all users, regardless of their abilities or backgrounds?

PROPOSED SOLUTION

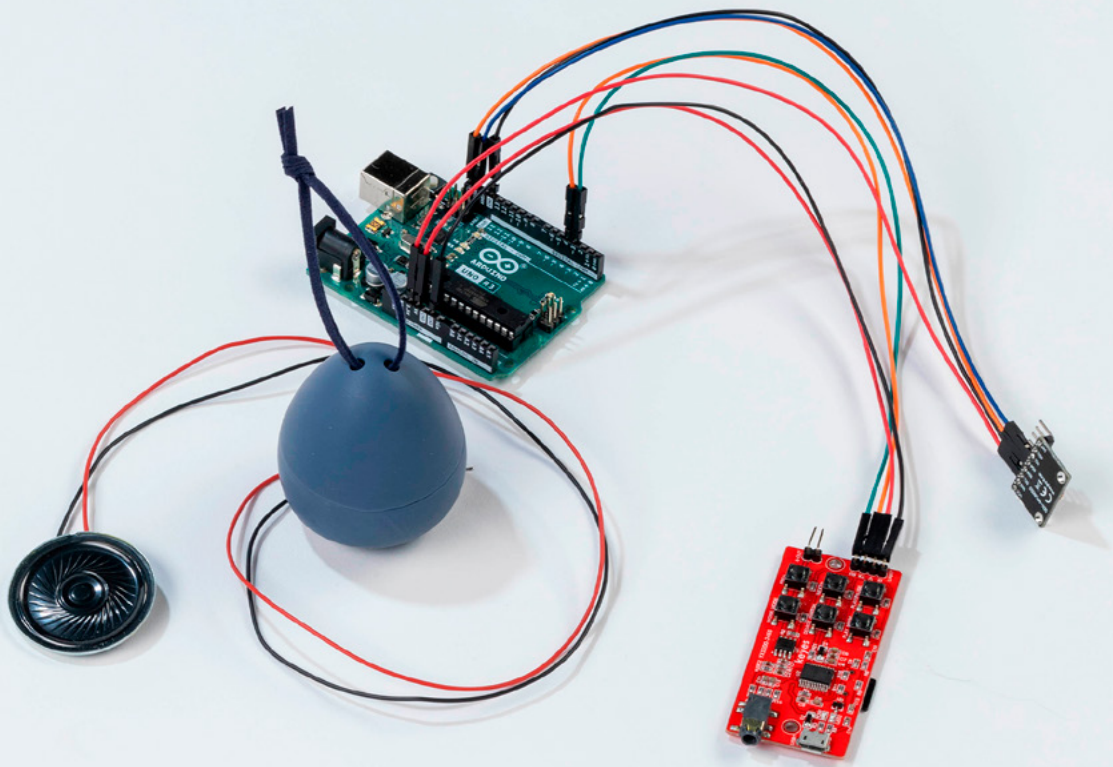
In developing the project, interviews were conducted to find answers to a number of questions: “What is time for people? Their associations with time; How quickly does it pass for them?”. I found that every person has a unique perspective on time, how it passes, and opinions about the meaning of time. For example, a four-year-old boy, when asked what time is to him, answered that for him it is 100 hours. Based on this, I developed a scope for a number of characters, looking through their understanding of time. And subsequently, I developed the stories of three characters - a child, a teenager, and a grandmother - to show how differently time can be perceived at different ages. In this way, the characters were introduced in a unique and authentic way, drawing from a range of personalities and perspectives. And the challenge was to determine how users would interact with these stories, and what form of input would be most effective. Eventually, I settled on using hand gestures as the input method and the narrator's voice as the output, enabling users to understand and empathize with the narrator's perspective on time, which allowed direct contact with the character while experiencing the uniqueness of his or her time flow. And the hand movement you need to make in order to complete a challenge with a character is intuitive, as the characters “communicate” with the user, hinting at one move or another in order to solve the problem.

The question of what time means to each individual is at the heart of “Time Travellers”.



RELEVANT INNOVATION

The relevant innovation in this project is the use of interviews to gather insights and perspectives on how different people perceive time. These insights were then used to create a range of characters with unique experiences and perspectives on time. The use of hand gestures as input and the narrator's voice as output provides an immersive and engaging experience for users. Additionally, the inclusion of characters from different age groups and backgrounds ensures that the game is authentic and nuanced, appealing to a wide range of users. This approach to storytelling and user interaction offers a fresh and innovative approach to game design that focuses on empathy and understanding, rather than simply entertainment.



PROJECT OUTCOMES & RESULTS

This resulted in a prototype device, which was done using Arduino, a tool to design electronic devices (using the Arduino system, sound sensor, and accelerometer), and Fusion360, to build and print a 3D object (using rubber as a material). And for an interactive story, I used Twine - an open-source tool to tell interactive, nonlinear stories. Written stories were dubbed and processed, by adding effects and background sounds. The entire development process is described on the github: <https://github.com/MariiaGulkova/head-md-time-in-time-out/tree/main/process>. Information is broken down by section, from interviews to final prototypes.

CONCLUSION

The project's innovative approach to game design, which includes gathering insights from interviews and creating characters with unique experiences and perspectives on time, offers a fresh and authentic approach to storytelling. By using hand gestures as input and the narrator's voice as output, the game provides an immersive and engaging experience for users.

PERSPECTIVES & NEEDS

This project is still being finalized. Future steps will allow us to refine a number of points and turn the prototype into a finished product.

ACKNOWLEDGEMENTS

This research was made possible by HEAD Geneva, Media Design department.

REFERENCES

- Nguyen,C.Thi (2020). Games. Agency As Art.
- K.M. Weiland (2016). Creating Character Arcs: The Masterful Author's Guide to Uniting Story Structure, Plot, and Character Development.
- Melissa Ford (2016). Writing Interactive Fiction with Twine.
- De Koven,Bernard and Gramazio, Holly (2020). The Infinite Play ground.

13 | LAUSANNE 1830: HISTOIRES DE REGISTRE

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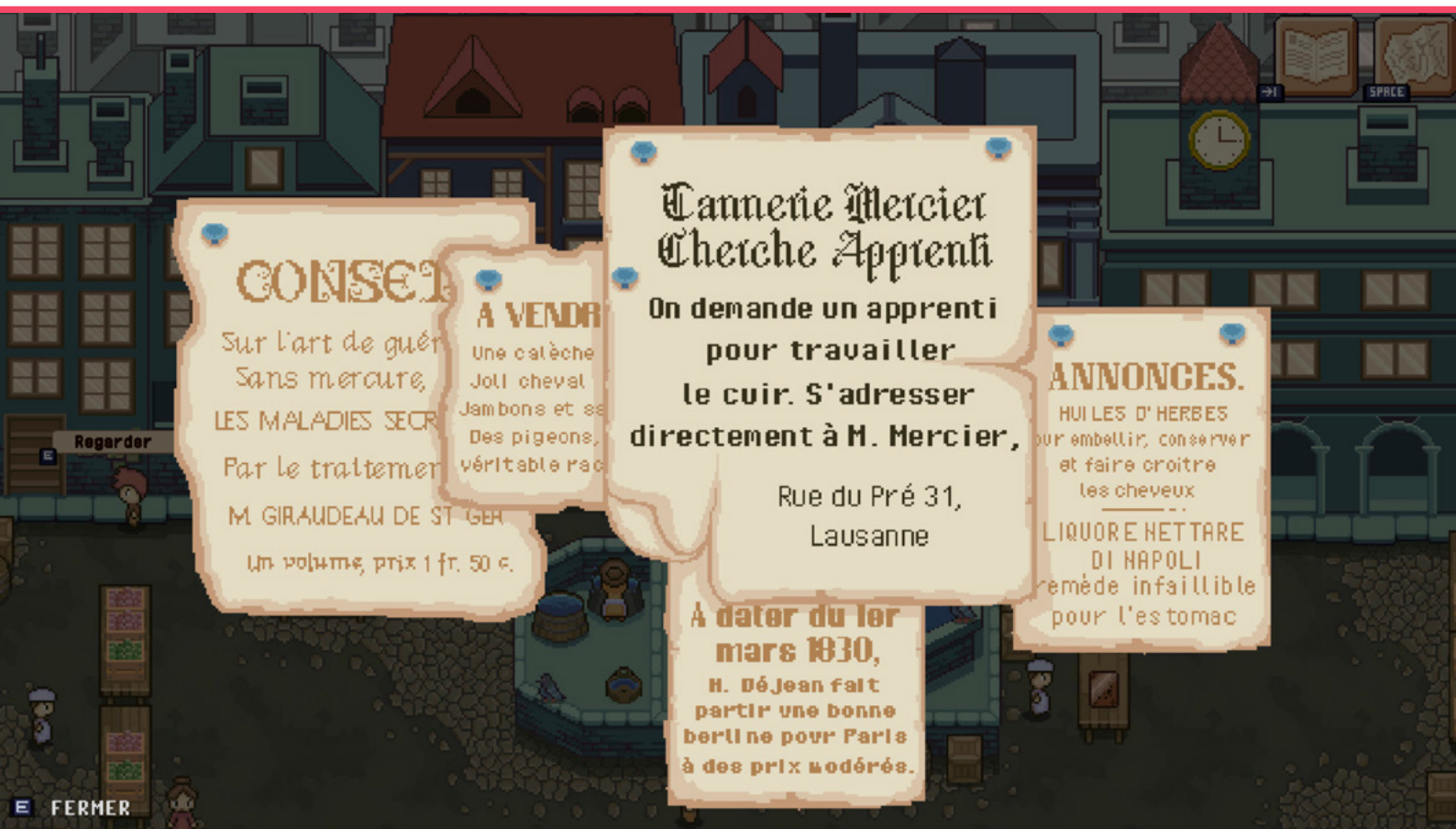
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KEYWORDS

Education, city, history, public history, Lausanne, Switzerland

ABSTRACT

“Lausanne 1830: Histoires de registre” is a video game that serves three main objectives. Firstly, it showcases the digitised archives of the city of Lausanne. Secondly, it offers to explore historical heritage through a video game that draws aesthetic inspiration from colorful action role-playing games of the 1990s. Lastly, the creation of this video provided a platform to train local students in game development by involving them in the game’s creation in collaboration with a game development company





CONTEXT

This project is the result of a collaboration between game studies scholars (GameLab UNIL-EPFL), digital humanists and historians (Lausanne Time Machine, Laboratory for the History of Science and Technology, EPFL), and a local Swiss game development company (Digital Kingdom Sàrl). It was funded by the College of Humanities of EPFL. While the Canton de Vaud has taken a significant digital turn by introducing programming courses at a young age, video games remain absent from these although they are one of the most popular media among school kids. It has been shown that video games can be relevant tools to learn and transmit knowledge (Gee, 2007), as demonstrated in the early days of democratized computing (Papert and Solomon, 1971), as well as today in the context of public history (Cauvin, 2016). Consequently, this project gives an exciting opportunity to bridge this gap and bring together education and entertainment by integrating video games into educational programs.

TARGETED ISSUE

The creation of “Lausanne 1830” – <https://lausanne1830.ch/> – presented a unique challenge as we wanted to develop an educational game that did not compromise its gameplay and entertainment value. Our aim was to create a video game that would not only be enjoyed within the confines of a school environment but would also be engaging to players outside the classroom. We observed that many serious games have a pedagogical purpose that is often obvious. Some would for example take the form of gamified quizzes, where players are forced to memorize specific information or rely on general knowledge, leading to a lack of engagement.

During a playtesting session in a classroom, one of the students even asked if “Lausanne 1830” was a

gamified quiz. This further underscored the importance of our goal to create a game that would engage players through the entertaining aspects of gameplay while still achieving our educational objectives. We wanted to create a different type of game that would generate curiosity and encourage players to ask questions about history rather than merely memorise facts.

In “Lausanne 1830”, we wanted to create an immersive experience by directly incorporating historical content into the game.



PROPOSED SOLUTION

The game mechanics in Lausanne 1830 come from an emerging type of game sometimes called “information game”, or “MetroidBrainia” (Gray, 2022). One of our main inspirations from this genre was “The Return of the Obra Dinn” (Lucas Pope, 2019), where the player’s objective is to uncover the events that led to an abandoned ship’s demise and fill in a notebook with missing information, such as the passengers’ names and the causes of their deaths. This game genre allowed us to use historical archives, including registries, newspapers, books, iconography, and other documents, to create settings and puzzles that serve our educational objectives.

In addition to the game mechanics, a crucial aspect of our development process involved crafting pixel art characters and environments that pay homage to classic video games from the 1990s, such as “The Legend of Zelda”, “Final Fantasy”, and “Dragon Quest”. This design choice helps players identify the game’s intentions as similar to a commercial and entertaining game that can be found on the market, often close to their taste. By combining historical archives and classic game design elements, “Lausanne 1830” offers a gameplay experience that blends education and entertainment.



RELEVANT INNOVATION

In “Lausanne 1830”, we wanted to create an immersive experience by directly incorporating historical content into the game. The different clues found in-game are based on archives or old documents that have been adapted to fit the puzzles while keeping the facts untouched. The registry also plays a central role in the game, as completing it is the main objective, with all characters appearing in the game also coming from the historical registry.

Our target audience was both a general, heterogeneous audience, who discovers the game through media and social media, and school children, who were our primary focus. In the case of school children, teachers who used the game in their teaching would present it, allow the children to play alone or in groups, and then open a discussion and ask questions about the experiences they had in the game. By exploring the recreated environment, children can look for answers to questions such as “What were the jobs of the people who lived in Lausanne around 1830?”, “Where were they living?”, “What was their daily life like?”, and “What was happening in Lausanne at that time?” This approach encourages children to engage with historical content in a pleasant and interactive way, enabling them to learn in a manner they can easily relate to.

PROJECT OUTCOMES & RESULTS

We quickly realized the importance of user testing during the development of “Lausanne 1830” and created a functional prototype early on in the process. By conducting thorough testing, we were able to focus on the player’s experience and ensure that the game was enjoyable and educational. One challenge we encountered was that players were initially confused about the game’s objectives and would wander aimlessly without direction. To address this, we developed a tutorial to provide clear instructions and set goals for players. This proved to be effective, as we received positive feedback from players who were engaged in the game and actively discussing the historical events and information they were discovering with their classmates and teachers. Eventually, this hard work and dedication paid off, as “Lausanne 1830” was awarded the Swiss Game Award in the “serious game” category on November 11, 2022.

CONCLUSION

“Lausanne 1830: Histoires de Registre” is a video game that uses elements of popular action role-playing games from the 1990s to explore the transmission of historical heritage. It is an “information game” that integrates video games into educational programs, offering a pleasant and interactive way to engage with historical content. User testing was positive, with users (general audience, school kids, teachers) finding it both enjoyable and educational.



PERSPECTIVES & NEEDS

A teacher has been recruited to develop educational resources based on the game. While some teachers have already incorporated the game into their classrooms, the majority of educators who are open to digital teaching, but not necessarily pro-active, are eagerly awaiting resources that provide guidance on how to utilize the game effectively in their lessons. These resources will include information on how to lead a session, as well as examples of evaluations.

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REFERENCES

- Cauvin T. (2016). *Public History: A Textbook of Practice*. New York, Routledge.
- Gee, J. P. (2007). *Good video games+ good learning: Collected essays on video games, learning, and literacy*. Peter Lang.
- Gray, K. (2022). *Feature: What The Heck Is A "MetroidBrainia"? Introducing The Newest Genre On The Block*. nintendolife. URL: <https://www.nintendolife.com/features/what-the-heck-is-a-metroidbrainia-introducing-the-newest-genre-on-the-block> Accessed on 21 February 2023.
- Papert, S. and Solomon, C. (1971). *Twenty things to do with a computer*. *Artificial Intelligence*, Memo No. 248. June 1971.



14 | IN MY TIME OF LOSS

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KEYWORDS

Narrative Design, Wearable, Story, Arduino, Lights, Game, Interactive Story, Cards, Loss, Interaction Design

ABSTRACT

“In My Time Of Loss” is an interactive story and a narrative game with a bracelet and set of cards. The bracelet is a labyrinth of light paths as well as a map to guide players through the story. Players choose different paths in the labyrinth, leading them to different narratives written on cards. The game reflects the experiences of grieving for a loved one, with a branched story. The game offers an engaging experience that explores the complexities of grief and provides perspectives on the grieving and individuation process.

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CONTEXT

Grief is a response to a significant loss, such as the death of a loved one, the end of a relationship, or a major life change. It is a complex individual process, and people experience different feelings such as sadness, denial, anger, shock, seeking empathy, and loneliness. People choose different approaches to deal with loss, such as connecting with a higher power, finding meaning, practicing acceptance, exploring existential questions, etc. In grief, people seek their memories with their lost one and integrate the loss into their identity and find a way to move forward and honour the memory of the person who has died. These memories are a central feature of the self because they are essential for the development of an internalized life story. (Maccallum & Bryant, 2008) This is individuation and self-realization in grief.

Narrative games can be helpful for the grieving process, by providing a sense of control, an outlet for expression, and a sense of escape. (NEIMEYER, 1999). By engaging in these narrations players, based on their personalities, may be able to find new ways to cope with their grief and move toward healing and acceptance. A narrative game about grief can be helpful for individuals who are grieving, offering a safe and supportive space to explore difficult emotions, promote empathy, and provide a way to process complex emotions.

TARGETED ISSUE

What is grief as a multi-sided issue?

This project aims to explore various aspects of grief such as emotional, spiritual, existential, and cognitive aspects.

How can people deal with grief?

This project aims to create meaningful ways to honour someone's memory and process their grief.

How can people develop self-realization through grief?

The concept of grief as a journey is addressed through a neutral story that the players can identify with and increase their self-compassion. The project materializes the sense of navigating the ups and downs of the grieving process, searching and finding meaning, compassion, and individuation through player experience design. Therefore, the interactions and gestures of self-compassion in the grieving process were important research areas in this project.

How to create a magical experience in grief?

The project aims to create a magical experience through rituals and symbols that offer comfort and meaning during difficult times.

PROPOSED SOLUTION

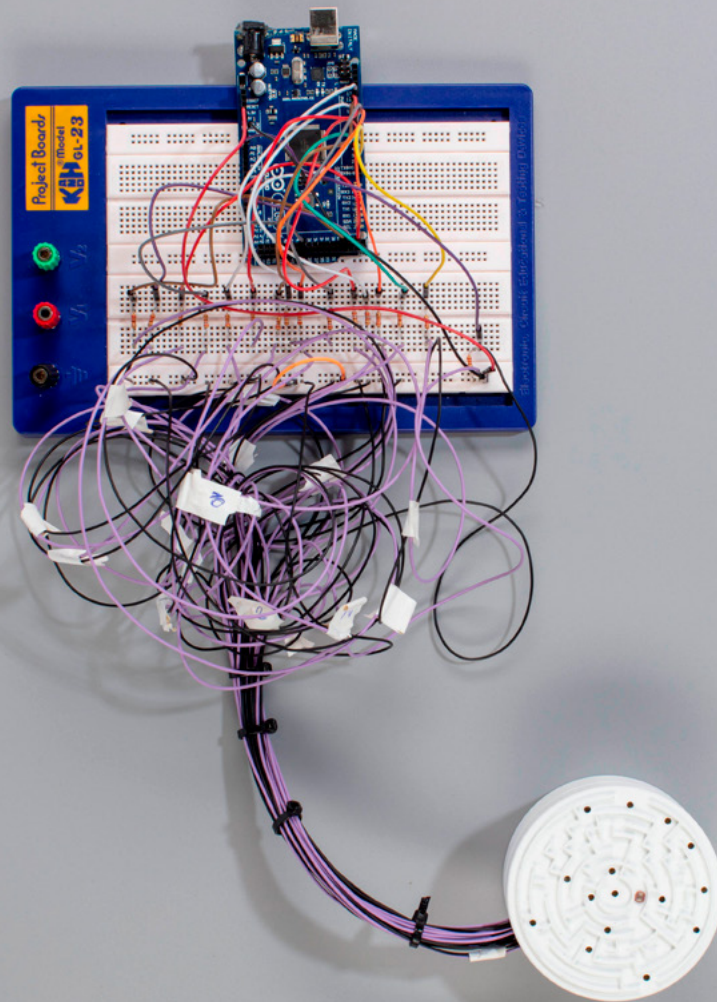
To help individuals face grief in a new way, the author ideated a game with an emotional connection between the player and the protagonist. The second-person point of view is used to make the player feel like the main character (Wake, 2016). The author used the Jungian archetype of the labyrinth to symbolize the journey through the self for grief and loss (Drapes, 1998). The story is about an individual searching for a lost one in a labyrinth (which is a metaphor for the brain) while approaching themselves during the journey. Hand gestures, especially holding an emotionally meaningful object close to the body, were explored as a way to hold onto memories of the deceased. Lights were used as guides in the story to help the player go through different dark paths of individuation.

These lights were inspired by fireflies in Japanese culture as the symbol of the presence of the departed (Takada, 2012). Fireflies are seen as a reminder of the impermanence of

life and the beauty of the fleeting moments that we share with our loved ones (Haugan, 2019). Therefore, combining magic and game design, the author used the technology of Arduino to show supernatural abilities, such as connecting people with those they have lost and using a meaningful artifact close to the body as a medium for interaction.

To help individuals face grief in a new way, the author ideated a game with an emotional connection between the player and the protagonist.





RELEVANT INNOVATION

The game is a text-based adventure with illustrations and branched narrations. What sets this game apart from others is its innovative interaction, which involves interacting with a bracelet that is part of the story. It is a remaining object from the deceased in the narration. The bracelet allows players to choose their path and experience different endings.

Furthermore, by using the game as a medium it enables players to explore the complex emotions associated with grief. It allows players to navigate through their grief in a way that feels personal and meaningful to them, giving them a sense of agency and control.

Moreover, the game provides a safe space for players to process their emotions without judgment or pressure. The interactions, storytelling, and visual design convey the nuances and complexities of grief in a manner that is both accessible and engaging.

It also provides players with an opportunity to explore different aspects of themselves: it allows them to experiment with different choices and outcomes, fostering self-reflection and introspection. It incorporates elements of fantasy and magic to explore this process in a more imaginative and metaphorical way, giving players new insights and perspectives on their self-discovery journey.

PROJECT OUTCOMES & RESULTS

This game features four unique stories with different endings set in a world where deceased individuals appear as light. The labyrinth bracelet acts as a map that shows the player's location and guides him/her through his/her journey with the help of his/her loved ones. The bracelet is touch-sensitive, revealing light patterns that correspond to specific cards and lead to different endings. The game's two main stories, existential and spiritual, explore philosophical concepts and encourage introspection and self-reflection. The existential story follows a protagonist searching for meaning in his/her life including stories of remembering and forgetting memories, while the spiritual story centers around a guide who offers different perspectives on life and encourages self-discovery, which includes two branched stories of doubt and belief. The bracelet is held on the back of the hand and creates a sense of empathy, using an Arduino to produce light patterns. The cards have illustrations that show the stories and offer players a unique and interactive experience that explores themes of grief, existentialism, and spirituality.



CONCLUSION

The narrative game, “In My Time Of Loss,” uses a bracelet as a map to guide the reader through a labyrinth of light paths, offering an engaging experience that explores the theme of grief and loss. The branches of the story provide a nuanced exploration of the complex emotions that accompany grief, highlighting the importance of self-reflection in the healing process. The game emphasizes the impact of player experience design for grief, making it a helpful and thought-provoking therapeutic tool.

PERSPECTIVES & NEEDS

“In My Time of Loss” is a demo with the short-branched story. The perspective for this project is writing more stories and designing more cards with different types of grief approaches to help the players' grieving process. It would be great to consult more psychologists and redesign the project with a group of professionals. Regarding technical aspects, to create a sense of closeness and presence of the lost one, the wearable can produce heat while the player is interacting with it.

ACKNOWLEDGEMENTS

This project is supported by Media Design Department at HEAD-Geneva.

REFERENCES

- Maccallum, F., & Bryant, R. A. (2008, December). Self-defining memories in complicated grief. *Behaviour Research and Therapy*, 46(12), 1311–1315. <https://doi.org/10.1016/j.brat.2008.09.003>
- NEIMEYER, R. A. (1999, January). NARRATIVE STRATEGIES IN GRIEF THERAPY. *Journal of Constructivist Psychology*, 12(1), 65–85. <https://doi.org/10.1080/107205399266226>
- Wake, P. (2016). Life and Death in the Second Person: Identification, Empathy, and Antipathy in the Adventure Gamebook. *Narrative*, 24(2), 190–210. <https://doi.org/10.1353/nar.2016.0009>
- Drapes, D. E. (1998). The myth of Theseus and individuation: An archetypal study of the labyrinthine psyche
- Takada, K. (2012, April 10). Japanese Interest in “Hotaru” (Fireflies) and “Kabuto-Mushi” (Japanese Rhinoceros Beetles) Corresponds with Seasonality in Visible Abundance. *Insects*, 3(2), 424–431. <https://doi.org/10.3390/insects3020424>
- Haugan, E. (2019). Homeplace of the Heart' Fireflies, Tourism and Town-Building in Rural Japan

15 | AL2049, A PLAYFUL MUSEUM'S VISIT TO GRASP THE ISSUES OF COMPLEXITY

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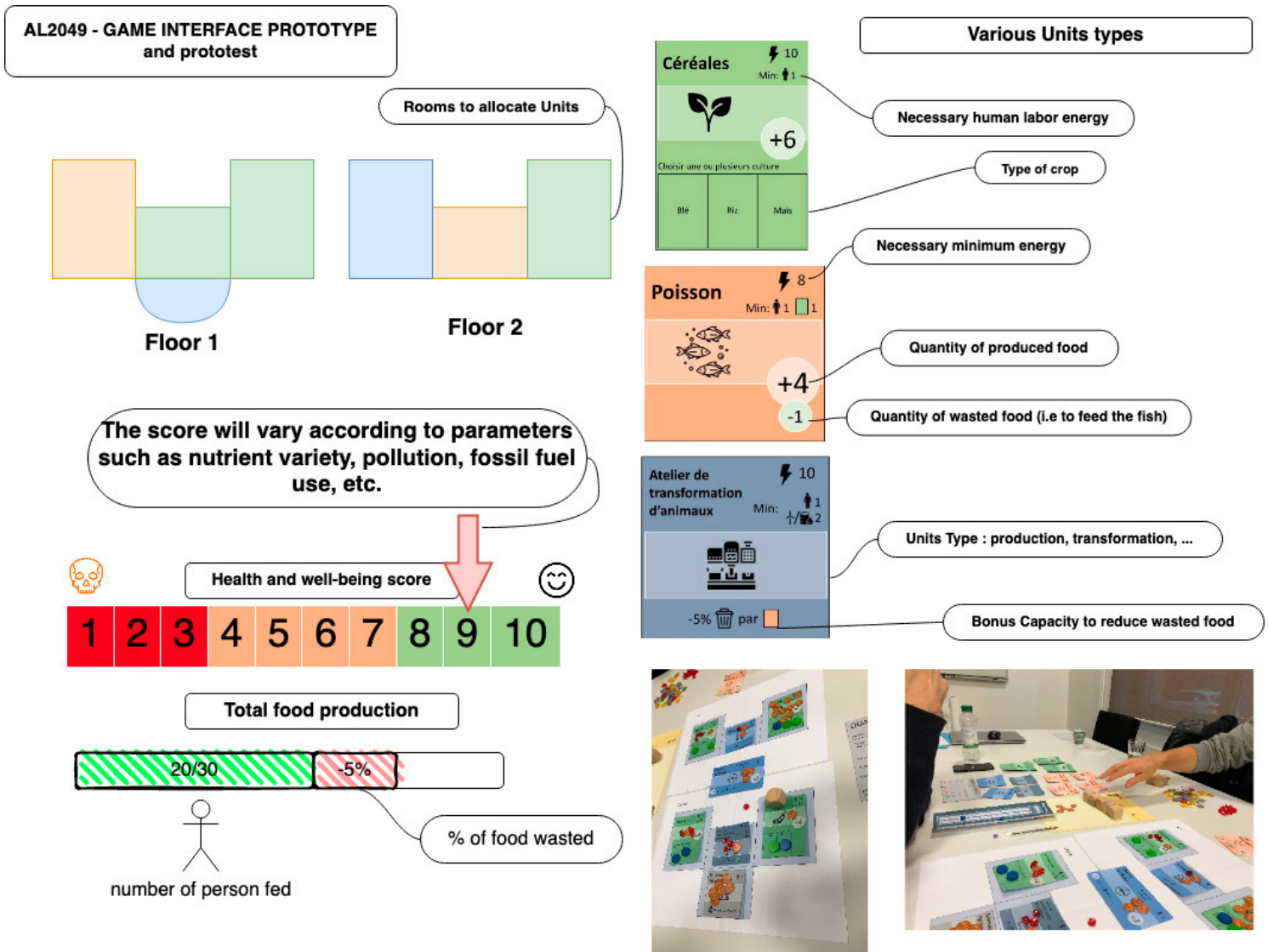
KEYWORDS

Mixed Methods, Game-based-learning, Museum, Complex Problem, Complexity, Food Production, Gameplay Analysis

ABSTRACT

This article presents a game designed for school visits in a nutritional-focused museum and the research method dedicated to evaluate its gameplay. AL2049 is a game that allows teenagers to grasp the complexity and challenges related to food production. In order to evaluate how the gameplay may impact learning, we performed an a priori analysis, enabling to formulate assumptions about how the game might be played, and an a posteriori analysis, based on a mixed method, about how it is played.

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CONTEXT

A multidisciplinary team of researchers, game design and museology professionals designed AL2049, the developed game for a nutrition-focused museum^[1]. The purpose of the game is to offer the students a playful experience in the museum and get them to reflect on the systemic feature of food and its production. The game starts with an introduction performed by a game master who presents himself as a scientist working at the museum. His main concern is to feed 30 people stucked in the museum, considering environmental and societal constraints. To succeed, players must feed this group using a simulator which allows them to test ideas about food production.

The game interface corresponds to a museum map that shows the various rooms distributed on two floors. The core mechanic of the game consists in assigning specific functions to these different spaces. Each function is a component of the food system. Then, players must make decisions to assign different units such as production units (crop cultivation, animal breeding), processing units (transformation of plants or animals), consumption units (market or restaurants) or a research unit (laboratory of agronomic science). Each unit requires a certain amount of energy and the resources are limited. The energy comes from human labor (i.e. 30 people), renewable energy and fossil fuel.

TARGETED ISSUE

After allocating various units to the different rooms, the players get information about the consequences of their decisions. The game interface provides information about the number of people who survived based on the amount of produced food. In addition, they get information about the health and well-being of the population. The score for health criteria depends on the nutritional variety and pollution. Well-being depends on the workload of the population and the quality of nutrition. Thus, a low well-being score results from too much work for food production or a lack of places for leisure and meeting (restaurants or markets). In addition, monoculture impacts food variety and health score. The player is allowed to change the different parameters and assess his decisions' results in terms of health, well-being and number of people who survive.

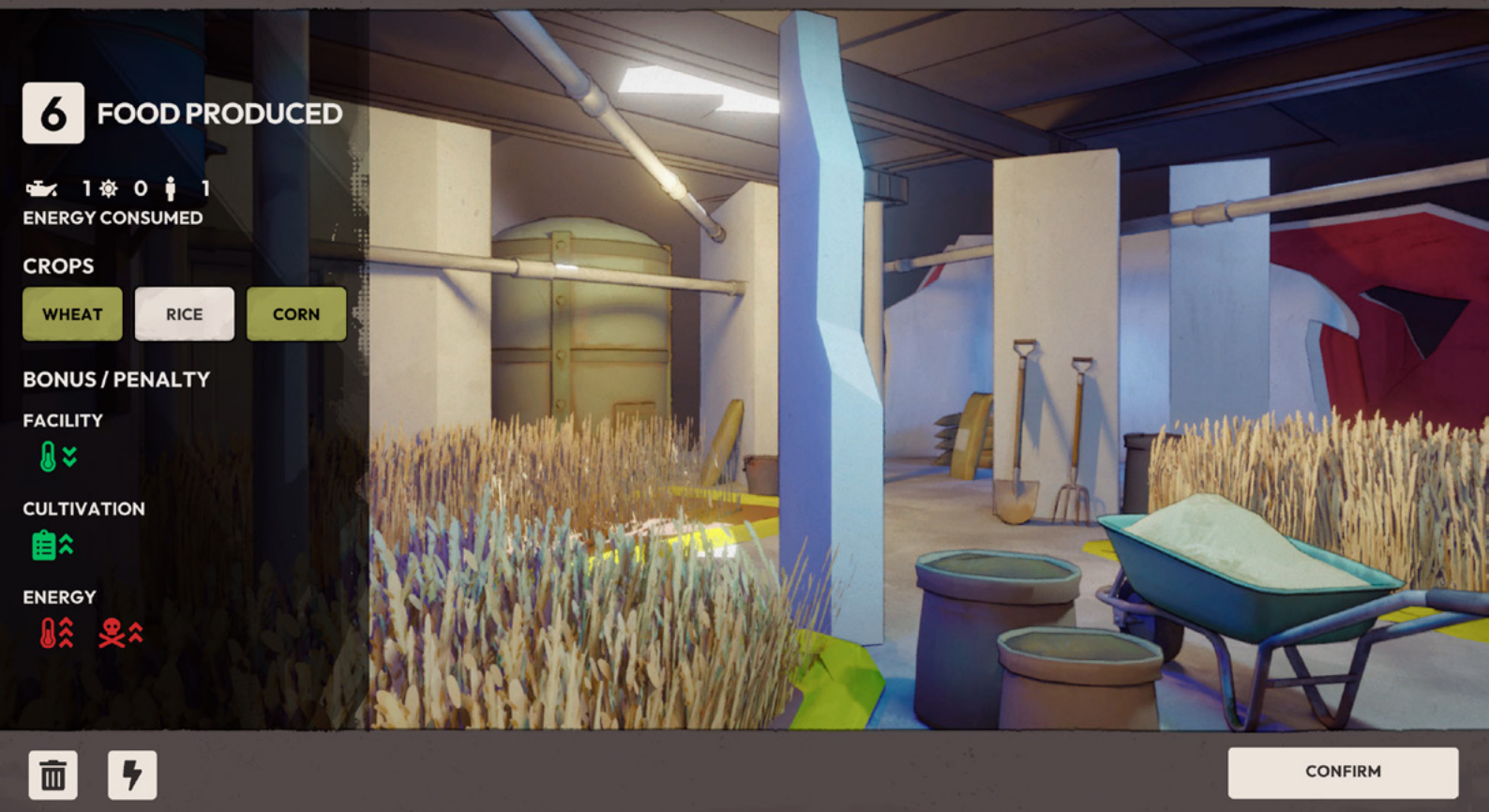
This is where our methodological challenge emerges^[1] as we would like to track the players' decisions during the game. Since AL2049 is played by teams of 2 to 3 students and they are likely to interact with each other: these exchanges are valuable for us to study their understanding of the game mechanics and concepts related to food production.

PROPOSED SOLUTION

Our research method encompasses two main steps: the first step consisted of an a priori analysis to determine whether the choices made during the game design phase were likely to provoke the expected behaviors in players, and to know the meaning they gave to the game. The process entailed scrutinizing the design assumptions by clearly articulating them in a descriptive manner (for instance, outlining the actions that the player will undertake at particular points in the game) and by elucidating their anticipated outcomes, especially with regard to learning (predictive dimension)^[2]. In a research approach, a game a priori analysis should allow the designers, as well as the researchers, to reach a shared vision of the design and formulate hypotheses on the game impacts on learning. Written in the form of a report, the a priori analysis describes and justifies the design choices based on the educational objectives. The second step of our research method was an experimentation, during which two classes of about twenty students played in the museum. The game was designed so that each interaction with the tablet was recorded in a log file; thus collecting digital traces for quantitative analysis. In addition, some players wore an on-board camera dedicated to record video files about players' interactions within the teams. The dialogues were transcribed, and we performed a categorical analysis^[3].

AL2049 is a game that allows teenagers to grasp the complexity and challenges related to food production.





RELEVANT INNOVATION

We consider our research method to be innovative, as it combines both quantitative and qualitative approaches. The use of an on-board camera proved to be minimally invasive for the players, who agreed to be filmed in all our experiments. The digital traces would not be sufficient on their own to characterize the players' experiences, but the combination of video recordings and traces allowed us to have an overall vision of what happened during the game. By studying the traces, we identified specific moments of the game, during which the players changed their strategy (i.e. by giving up a certain type of energy or by favoring well-being over health). The timestamp of the recordings of digital traces facilitates the search for specific events in the videos. For example, it is possible to focus on the moments when the players decided to change their strategy and listen to their arguments. This argumentation translates an understanding, sometimes naive and sophisticated in others, of the issues of food production.

We also consider innovative game design approaches. The museum is conceptualized as a closed and finite system, a metaphor of the global food system. Each decision reached by the player in terms of type of crop, farmed animal, related activities, or energy type and quantities allocated has multiple impacts, which highlights the complexity of food production^[1].

PROJECT OUTCOMES & RESULTS

Thanks to the a priori analysis, we could hypothesize that in the second game phase, the players' strategy mainly relied on the use of renewable energies instead of fossil fuels. However, the players realized that it would be difficult to produce enough food with this single source of energy, so they faced a complex issue with multiple solutions. The a posteriori analysis highlighted several strategies and attitudes towards the game complexity. Many players made the association between fossil fuels (which they characterized as pollution) and wellbeing and tended to reduce it.

The oil barrels, presented in the form of a pictogram, also generated confusion among players. Some of them understood that they were water barrels needed for food production. The game master had to explain that agricultural machines or food processing units need fuel. Thanks to the use of onboard cameras, we noticed the problem and revised the instructions provided to students ensuring a better playful learning experience.

Some players also decided to reduce the complexity, by voluntarily not taking into account one factor. For example, they choose to have a fed but depressed population or a small but healthy population (out of the 30 people to be fed). This way of solving the complexity seems to make them feel like they have "beaten" the game.



CONCLUSION

Our data collection method as well as a mixed method analysis allowed us to both anticipate players' behaviors, and to reveal unexpected attitudes toward AL2049. Thanks to this iterative monitoring and gameplay evaluation, we redesigned the game so that the playful experience in the museum helps the understanding of the complexity of human nutrition.

PERSPECTIVES & NEEDS

It seems possible to anticipate some players' behaviors, but not all of them, due to the subjective nature of play. The study of the distance between the designed game and the played one is a field of research that has not been fully explored yet in the field of game design^[4].

ACKNOWLEDGEMENTS

This research project is funded by the Swiss National Funds. We thank the teachers who supported us during the experimentations, as well as their students who tested the game and the staff from the museum who participated in the project.

REFERENCES

- [1] Oliveira, G., Godinot, N., Sanchez, E., Bonnat, C., Morard, S., & Dall'Aglio, S. (2022). Game Design for a Museum Visit : Insights into the Co-design of AL2049, a Game About Food Systems (p. 2231). https://doi.org/10.1007/978-3-031-22124-8_3
- [2] Sanchez, E. (2023) Enseigner et former avec le jeu. Paris
- [3] Bardin, L. (2013). Chapitre premier. L'analyse catégorielle. *Quadrige*, 207207.
- [4] Fernández Galeote, D., Diamant, M., Volkovs, K., Zeko, C., Thibault, M., Legaki, N.-Z., & Hamari, J. (2022). Understanding the Game-based Learning Experience : A Framework of Frictions Between Design and Play. *Proceedings of the 17th International Conference on the Foundations of Digital Games*, 14. <https://doi.org/10.1145/3555050.3555933>



THE POWER OF GAMIFICATION: LOWERING BARRIERS TO TECHNICAL LEARNING AND INCREASING DIVERSITY IN THE TECH SECTOR

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SUMMARY

This paper explores the power of gamification in addressing two major challenges in the tech industry: lowering barriers to technical learning and increasing diversity in the sector. By creating engaging and interactive learning experiences, gamification has the potential to attract and retain a more diverse range of learners, including those who may have previously been deterred by traditional methods of technical education. Additionally, gamification can foster continuous learning.

KEYWORDS

Gamification, Technical Learning, Diversity, Workforce Development, Lifelong learning

CONTEXT

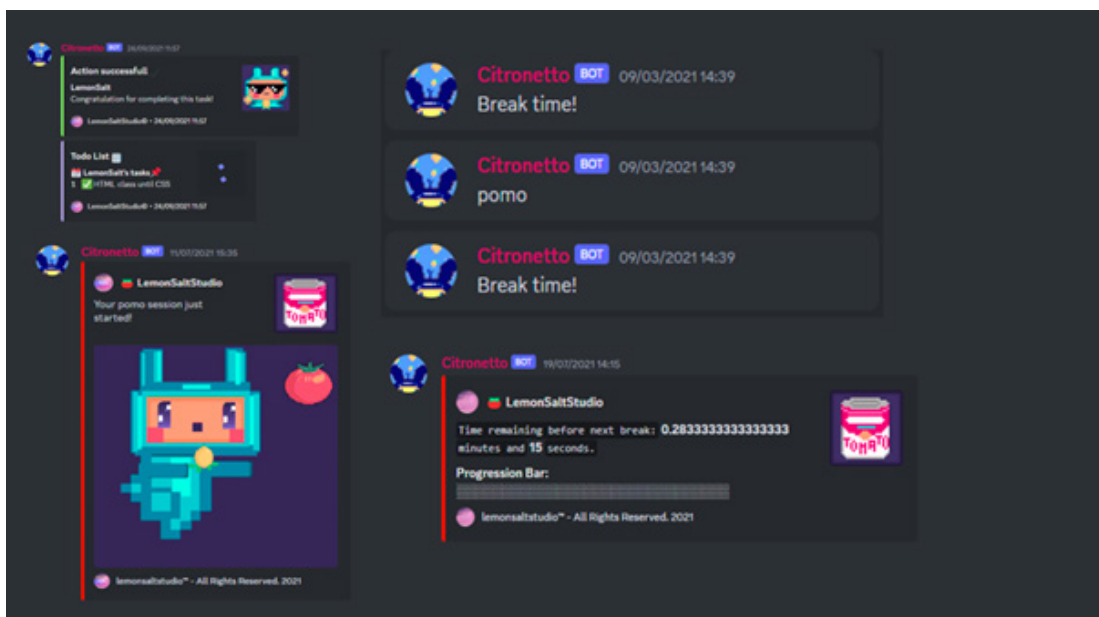
The tech industry is growing rapidly, with increasing demand for skilled professionals in areas like software development, data analytics, cybersecurity, and game development. However, many people face obstacles when trying to enter the sector, including limited access to education, little exposure to tech skills, and systemic biases that reinforce underrepresentation of certain groups. Professionals in the industry must also keep up with the latest technologies, which can lead to issues like time management and motivation. To address these challenges, innovative approaches to education and training are needed, such as gamification. This paper explores the potential of gamification to transform lifelong and technical skills learning, making it more accessible and engaging for a diverse range of learners. It is important to note that not everyone has had the same peers, environment, and incentives to develop tech skills, making gamification an essential tool in promoting a more equitable and diverse tech industry and with the rise of remote work and learning, effective and engaging methods of learning technical skills have become more pressing than ever, and gamification offers a solution by creating interactive and fun learning experiences. Numerous games and tools are available that use gamification to make learning technical skills enjoyable and accessible, such as Flexbox Froggy and VIM Adventures. By lowering barriers to technical learning, gamification can attract a wider range of talent and keep employees engaged with ongoing training opportunities.

TARGETED ISSUE

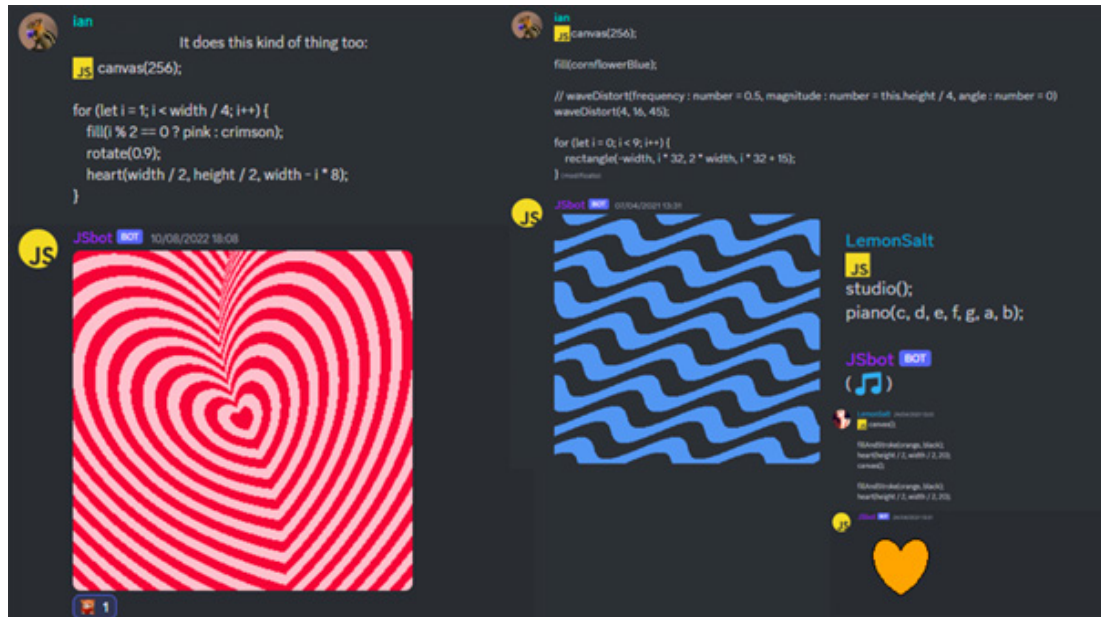
This paper addresses limited tech literacy and lack of engagement in technical learning through the use of Discord bots. Discord is a free communication platform that allows users to create or join servers with various channels for communication, file sharing, and integration with other apps and services. Integrating Discord bots into the working context can provide an engaging and interactive learning experience, making technical learning a shared experience rather than a solitary one. This approach also provides accessible and inclusive learning opportunities that can attract a wider pool of talents, making it possible for people without a technical background to acquire sought-after tech skills.

PROPOSED SOLUTION

Citronetto is a Discord bot designed to gamify the learning and self-learning experience. Its features prioritize the user's wellbeing, emphasizing social activities as much as productivity. The bot's advanced study room system and to-do list feature create an engaging and interactive learning experience with rewards, statistics, ranking and points. It is innovative in its unique reward system that also randomizes rewards based on the 'study' voice rooms created by users.



JS Bot is a Discord bot that gamifies technical learning by allowing learners to experiment with Javascript and see the results in real-time. It has a unique feature that lets users output graphics in the chat, and by being contextual to a work/leisure environment, it transforms the solitary learning experience into a group and community one. The bot recognizes the `:js:` emoji and ````js` block quotes to indicate Javascript code, and allows users to define functions and variables within the same message that they use them. JS Bot also has built-in functions, including `studio()` which sets up variables and functions to manipulate and play musical notes. Its sophisticated feature of playing music in a vocal chat based on Javascript code inputs and built-in functions makes it a specialized learning tool that demonstrates how gamification can improve tech literacy.



Citronetto and JS Bot use gamification to address the issue of increasing diversity in the tech sector by lowering barriers to technical learning and improving the learning experience. They have the potential to attract and retain a more diverse range of learners, with features such as Citronetto's advanced study room system and to-do list and JS Bot's ability to execute Javascript code and produce music based on code inputs. Their customizable nature allows them to be tailored to the specific needs of any community. Utilizing these innovative solutions can foster a more diverse and skilled workforce in the tech sector, creating a more inclusive and equitable industry.

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RELEVANT INNOVATION

Citronetto and JS Bot are innovative solutions that gamify the learning experience and prioritize the user's wellbeing. Citronetto balances social activities and productivity, while JS Bot provides a unique learning experience with its music feature and specialized functions. These bots are customizable to fit the specific needs of any community, setting them apart from other study bots on Discord. Their effectiveness in promoting technical learning and increasing diversity in the tech sector is demonstrated by their success in overcoming traditional barriers to technical learning. Both bots are designed with lifelong learning in mind and offer valuable assets to any community seeking an engaging and interactive learning experience.

PROJECT OUTCOMES AND RESULTS

Both bots gamify the learning experience by providing an engaging and interactive way to learn remotely, and have been successful with over 500 members since 2020. They serve as a way for community members to bond and enjoy healthy breaks through entertainment while enhancing learning and productivity. The success of the project demonstrates the effectiveness of gamification in addressing remote learning challenges and fostering a sense of community and wellbeing among learners.

CONCLUSIONS

In conclusion, gamification offers a powerful tool for addressing two critical issues in the tech sector: the need to lower barriers to technical learning and increase diversity. By developing discord bots that are contextual to work and remote learning, gamification has been used for learning, creating engaging and interactive experiences that are accessible to a wider range of learners. This has the potential to improve the learning experience, increase motivation, and attract and retain a more diverse pool of talent, thereby promoting inclusivity and driving innovation in the tech sector.

PERSPECTIVE AND NEEDS

Citronetto and JS Bot are self-funded personal projects developed by their creators to provide a more engaging and interactive learning experience. As the community grows and receives external support, they have the potential to promote technical learning and increase diversity in the tech sector.

ACKNOWLEDGEMENTS

I am grateful to the LemonsaltStudio community for their support and encouragement in developing a more inclusive and accessible learning experience. Citronetto has been developed by Nico Grassetto, JS Bot has been developed by Ben, thank you.

REFERENCES

- Citronetto <https://github.com/NicoGrassetto/citronetto>
- JS Bot <https://qualche.link/jsbot/>
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification". In Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments (pp. 9–15).
- "Gamification." The Interaction Design Foundation. Retrieved from <https://www.interaction-design.org/literature/topics/gamification>
- "Women in the IT workforce." European Parliament. Retrieved from [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/646145/IPOL_BRI\(2020\)646145_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/646145/IPOL_BRI(2020)646145_EN.pdf)
- Bezier. (n.d.). Bezier. <https://bezier.method.ac/>
- Flexbox Froggy. (n.d.). Flexbox Froggy. <https://flexboxfroggy.com/>
- CSS Grid Garden. (n.d.). CSS Grid Garden. <https://cssgridgarden.com/>

BIO

Federica Nocerino is a Marketing Consultant for tech and gaming companies and a Women in Games Ambassador. With a passion for diversity and inclusivity, Federica founded a community focused on self-development, continuous learning, and project-based tech learning. Her mission is to provide a space where people can create tools, help each other, and be creative with their learning. Through her work, Federica aims to enrich her community, gain new skills, and promote diversity and inclusivity in the tech industry.



SESSION D EDUCATION

FRIDAY, JUNE 30

09:30-10:30



CHAIR : NABIL OUERHANI



AURÉLIEN HÉRITIER
Intelligame



ELZBIETA PUSTULKA
Learning Java Loops and Control Structures by Moving a Ladybird



CEDRIC LAROUZIERE
Learnie



BILJANA PETRESKA VON RITTER-ZAHONY
The Biases of Artificial Intelligence

17 | INTELLIGAME

Aurélien Héritier, Jean Nanchen, Xavier Clivaz

HES-SO Master, Lausanne, Switzerland

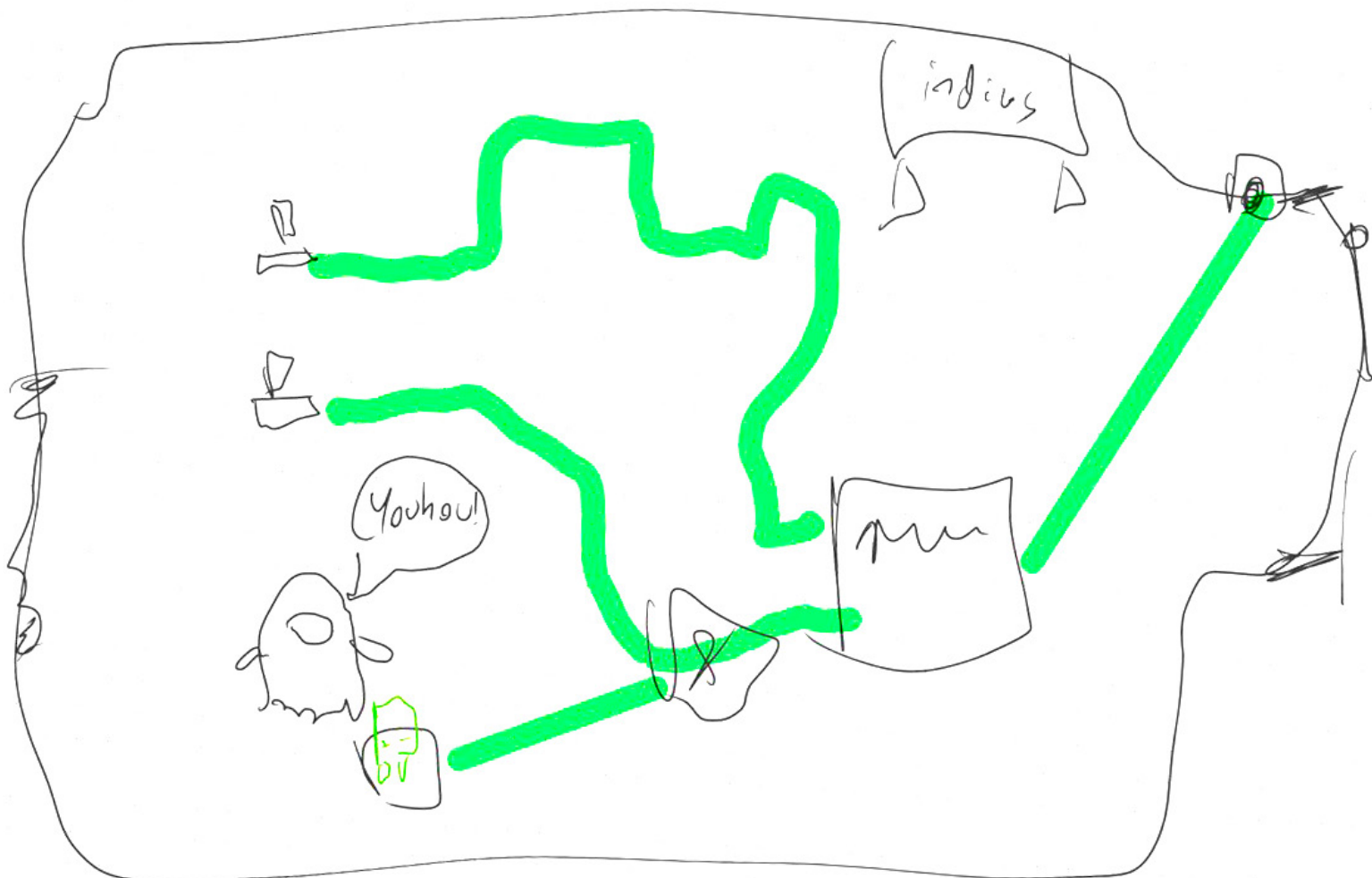
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KEYWORDS

Logic gates, Educational game, Adaptive learning, Level editor, Electronic education, Puzzle solving

ABSTRACT

Intelligame is an educational video game designed to teach logic gates to young students. The game takes place in a medieval setting where players play as a character who must activate and deactivate levers to solve increasingly complex logic gate puzzles in order to open doors and go up the next level. Teachers can also create their own levels using a CSV file system and can place any logic gate on the map. The game also includes a feature that allows players to see the signal moving through the wires to improve understanding and spot errors more easily. The game is also an excellent tool to consolidate the tedious but fundamental concepts of logic gates.





CONTEXT

Understanding logic gates is a fundamental concept in the fields of electronics and computer science. However, teaching this concept can be difficult, as students can have issues visualizing and understanding abstract concepts. The use of educational video games as a teaching tool has proven to be effective in helping students understand and retain information in a pleasant and engaging way. Intelligame is a game designed to help students learn about logic gates in a pleasant and interactive way.

The game is not only fun, it also provides a clear visual representation of how logic gates work, making it easier for students to understand and remember the concepts. In addition, the game adaptability to the student's level allows a personalized learning experience. The game is an excellent tool to consolidate the tedious but fundamental concepts of logic gates.

TARGETED ISSUE

One of the main problems in teaching students about logic gates is their difficulty in understanding and visualizing abstract concepts. The theory is very good to explain them, but we know that theory and practice differ and when it comes to practice, the difficulties often increase rapidly.

Another problem often encountered when teaching logic gates is the lack of commitment and motivation from the students. With long theories being taught, and moreover on abstract aspects, students drop out very quickly as they find them boring.

In addition, the lack of adaptability of the teaching material to the student level is another problem that arises when teaching logic gates. Teachers often make the students practice with exercises on paper and this form is often difficult to adapt to different levels.

PROPOSED SOLUTION

Intelligame is a proposed solution to the commonly encountered problems when teaching logic gates to students. The game addresses the difficulty of understanding and visualizing abstract concepts by providing a clear visual representation of logic gates that shows the signal moving through the wires. The game also allows students to interact with logic gates and see the results of their actions in real-time, making it easier for them to understand and retain information.

To address the problem of students' lack of engagement and motivation, this game offers a pleasant and interactive way to learn logic gates, which makes the game more attractive to students. The game also includes a point system that rewards players for solving puzzles, providing an extra incentive to keep playing and learning.

The game addresses as well the lack of adaptability of the teaching materials to the student level by supplying the teachers with the possibility to create the levels, thus adapting the difficulty to the student's skills.

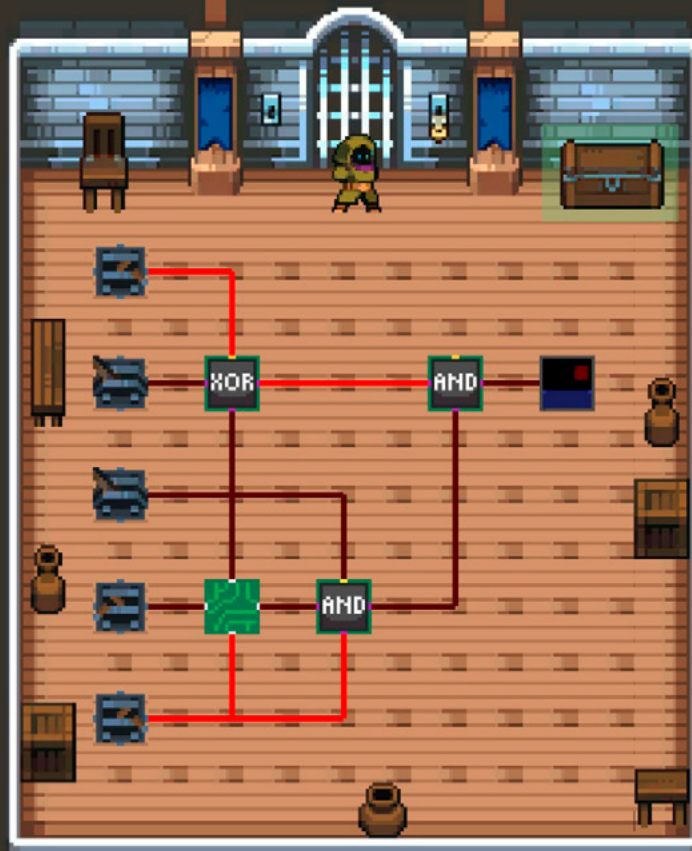
In summary, Intelligame is a proposed solution that deals with several targeted issues, commonly encountered when teaching logic gates to students. The game provides a clear visual representation of how logic gates work, making it easier for students to understand and retain information, and making the game more engaging and adaptable to the student's level.

RELEVANT INNOVATION

Intelligame is an innovative educational game that differs from other similar games in several ways. One of the main innovations of the game is the possibility for players to see the signal moving through the wires: this unique approach provides a clear visual representation of how logic gates work, making it easier for students to understand and retain information. In addition, the game adaptability to the student level allows a personalized learning experience.

Intelligame is a proposed solution to the commonly encountered problems when teaching logic gates to students.





Another relevant innovation is the possibility for teachers to create their levels using a CSV file system and place any logical gate on the map. Thanks to this feature teachers can customize the game to the specific needs of their students providing a flexible learning environment.

Moreover, Intelligame has another feature that allows players to select the correct logical gate in a chest, which adds a new level of difficulty and engagement to the game, making it a more challenging and interactive experience.

PROJECT OUTCOMES & RESULTS

The game includes a level editor where teachers can create their own levels and customize the difficulty to match their students' needs. Players can see the signal moving through the cables, which helps them to better understand the logic gate circuit and easily identify errors. The extra feature where the player must find the right logic gate in a chest adds an extra layer of challenge and immersion.

In terms of game mechanics, the game has a clear objective of opening a door with a logic circuit to solve, and the challenge is to understand the circuit. The reward for successfully solving the circuit is the understanding of the logic circuit and the gained points.

Overall, the "Intelligame" provides a fun and interactive way for students to learn about logic gates and improve their understanding of the subject. As the game is adaptable to the player's level it gives a personalized learning experience.

CONCLUSION

In conclusion, Intelligame is a unique and innovative educational game designed to help students understand and retain information about logic gates in a pleasant and interactive way. The game's ability to be adapted to the student level and the teacher needs makes it a valuable asset in the education field. The game's unique approach, using a medieval setting and the ability for players to see the signal move through the threads, adds an extra level of engagement and understanding.

PERSPECTIVES & NEEDS

In terms of future developments, Intelligame has several potential improvements: first developing an editor level for teachers to create more custom levels; in addition, further testing of the game with a larger group of students could be carried out to gather more comprehensive data on its effectiveness as a teaching tool in order to adjust it to be more effective.



ACKNOWLEDGEMENTS

We would like to thank our two professors of the Games Technologies course for the HES-SO Master, Reik Yassin Aziz and Gobron Stéphane, for their advice and support throughout the development of the project.

REFERENCES

- Reik, Y. A., Gobron, S. (2022), diapositives de cours Games Technologies. HES-SO Master
- Suborbital Games (2016). Circuit Scramble
- Rosset, C., Siggen, Y., & Rathgeb, R. (2018). Formulaire électronique - transmission. Éditions LEP.

18 | LEARNING JAVA LOOPS AND CONTROL STRUCTURES BY MOVING A LADYBIRD

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KEYWORDS

DGBL, digital game-based learning, teaching game, Java, JavaKara, Loops

ABSTRACT

We adapted an existing Java teaching game called JavaKara to help students learn how to use loops and control statements and tested it in class. Two groups of BSc Students in an introductory Java course played the game for about an hour. The game was evaluated using the MEEGA+ game evaluation method. A questionnaire was handed out to get feedback and the game got a score of 53.45, i.e. good. Students reported that they lost track of time and were satisfied with this new learning paradigm.

Situation



Students face many challenges when learning a programming language.

Learning how to program requires a lot of practising, but frustration sets in quickly.

Solution



Game-based learning.

A change from traditional exercises, visual testing, immersion, flow.

Outcome



Students have fun, are more motivated and lose track of time while playing.

Students spend more time programming and practising.



CONTEXT

Our students learn Java as part of a BSc in Business Information Technology. Computing constitutes roughly half of the course content and includes two terms of Java, alongside requirements engineering, databases, internet technology, IT security, business maths and other business topics. We also offer electives, like Python. The first programming course covers the following topics from the first 9 chapters of^[1]: data and expressions, classes and objects, conditionals and loops, object orientation, arrays, and inheritance, and introduces JavaFX, i.e. using Java to construct graphical user interfaces (GUIs).

Learning programming is a major challenge for most students who have not programmed before. Java is complex and the programming toolkit (Eclipse) requires learning not only how to program but also to install, configure, use the menus and, most importantly, translate from a business problem specification to Java. Coding is like learning a new language which has spelling rules (capitalisation, punctuation, formatting), grammar (classes, methods, variables, loops, data structures, objects), and idioms such as keywords, events and Java utilities.

Beside Eclipse, which is an integrated development environment (IDE), the students practice in class using Moodle CodeRunner^[2] which gives them instant feedback on code correctness. During the term, they write two class tests using CodeRunner and do two pair assignments which produce GUIs.

TARGETED ISSUE

Current teaching uses an environment which is realistic as Eclipse is a popular IDE and is one of many tools used by professional programmers. However, the environment is not easy to use as each project has to be configured and adding new Java libraries is not trivial for a beginner. Using Eclipse is hard work and requires skills beyond programming, which is not an ideal situation for a start. A beginner is often frustrated by many things he/she is learning at the same time: the IDE, Java spelling rules, Java grammar and Java idioms, and solving a problem using programming.

*Coding is like learning
a new language which
has spelling rules...,
grammar..., and idioms...*



Games can help students cope with the complexity of Java programming for several reasons as they address the cognitive, aesthetic and enjoyment aspects of learning. A game normally offers visual feedback on how the program works and a visual representation is usually more informative. Seeing a visualised problem solution provides extra motivation, due to the aesthetic appeal. Also, seeing what happens helps a learner to understand his/her mistakes. And finally, playing is enjoyable, due to the feeling of progress and achievement. A perfect game should engage intellectually and aesthetically to motivate a learner to spend more time practicing.

PROPOSED SOLUTION

We investigated the use of Java games^[4,5] in a university setting and found few research reports addressing this topic. We decided to focus on an area the students find hard to learn as seen in our previous exam papers and tests, and selected loops and conditions.

The first lab period of 4 hours introduced conditions and loops, with CodeRunner exercises, and in the second lab a small review preceded a game playing session lasting around one hour. After the game session, a MEEGA+^[3] questionnaire was handed out to assess the game.

The game consists of 12 short levels, each tested via two worlds where a ladybird moves on a board picking up and laying leaves, and sensing trees. Each game has a goal, like finding the way to a leaf around the trees in a forest or finding the exit out of a path with trees on both sides.

Each level is visually tested using two worlds (arrangements of trees and leaves on a board), and the student can play step by step and see how the ladybird moves and what it does. The objective is to write code that leads to the desired outcome in both worlds. The first two levels can be solved without using loops, by repeating steps, but as soon as the player changes the world, this no longer works, and the loops have to be introduced. In this game, infinite loops (the ones that do not end) can clearly be seen, and they are fun to see as the visual representation is attractive.

The screenshot shows an IDE with the following content:

```

MyKara.java
5  /**
6   * MyKara is a subclass of Kara. Therefore, it inherits all methods of Kara:
7   *
8   *
9   * Actions:   move(), turnLeft(), turnRight(), putLeaf(), removeLeaf()
10  * Sensors:   onLeaf(), treeFront(), treeLeft(), treeRight(), mushroomFront()
11  */
12  public class MyKara extends Kara {
13
14      /**
15       * In the 'act()' method you can write your program for Kara
16       */
17      public void act() {
18          while(!treeFront()){
19              if(onLeaf()){
20                  removeLeaf();
21              } else {
22                  putLeaf();
23              }
24              move();
25          }
26      }
27  }

```

The console shows the following commands:

```

sh -c javac -classpath ../jars/* -d . MyKara.java
java MyKara

```

Two game windows are visible, both titled "Java Kara Level 3". The top window is labeled "Testworld 1" and the bottom window is labeled "Testworld 2". Both windows show a green grid with a ladybird, trees, and mushrooms. The bottom window has a "Fast" speed slider and "Step", "Run", and "Re..." buttons.

RELEVANT INNOVATION

We adapted an existing Java game, JavaKara, in terms of presentation (platform) and content. To support the game flow, look and feel, we used an online environment which presented a list of games that were easy to start without doing configuration. Instead of adding print statements to see where the ladybird was, which would go beyond the skills the students had at that point in their learning path, the learners saw a visual test of their program: how the ladybird moved in each step. They had to comment or uncomment a line to test it in a different world. To create the learning content, we adopted some existing JavaKara games which use loops and created new ones to generate a game with 12 levels, enough for around one hour, so that even the students with previous Java knowledge would get enough game play.

The game was tested by two groups, as our school teaches two Java beginner courses: full-time class and part-time class. At the start of the lab, the teacher reviewed the material from the previous class and introduced new material which the students were meant to have studied at home (using a video, textbook, and slides). Then the game was introduced by stating what actions the ladybird could take and how to test them in both game worlds. The students were given a handout describing each task and one of the test worlds with a possible path. The students played for 75 minutes, and after a break filled in a MEEGA+ questionnaire consisting of 39 questions.

PROJECT OUTCOMES & RESULTS

The experiment included 33 students (14 full time, 19 part time), of whom 85% were male, 88% aged 18 – 28 and 12% 29 – 39; 58% said they play games at least weekly or even daily.

Most managed to complete 6 to 7 levels. Five completed only levels 1 to 4, five till level 5, eleven level 6, and four level 7. The game rules were clear to 87%. Likewise, most stated that the game was easy to learn and was attractive. 82% said that the content and structure of the experiment helped them and that they were confident they could learn and play the game. 75% stated that the game difficulty level was appropriate. Nevertheless, we have a few indications that the challenge was too high for 5% of the players. The pace of new challenges was fine for 85% of the students. Almost all got some satisfaction from playing, be it with what they learned or task completion. Most would recommend the game to a colleague; 88% answered that the game was fun; most also said that the game made them laugh. Finally, 79% said they lost track of time while playing the game.

The students gave a high rating to the game relevance for the course: 95%, which shows that the content and the experiment were very well adapted to the lesson. 82% indicated that they preferred learning via the game to other methods. The game has supported the students in learning. It has helped them more with loops than with conditionals. Likewise, most feel that the game has enabled efficient learning.



CONCLUSION

We presented a Java game for a beginner programming course. Using an online platform improved the usability and transported the player into a game environment which is different from the teaching environment. The MEEGA+ evaluation shows that students liked the game, enjoyed playing and thought it helped them to learn. They rated the game highly, and many preferred it to more traditional learning methods. The MEEGA+ score obtained was 53.45, which is good.

PERSPECTIVES & NEEDS:

The game will have to be deployed and made reusable in future courses, so that logging, testing and improvement are possible. Research questions relate to further Java teaching topics we could include to help students master further contents thanks to visual testing. A study of the ease of use and the comparison of programming using an IDE and a game could bring some interesting insights to drive further IDE usability engineering.

ACKNOWLEDGEMENTS

The game experiment was designed and carried out by Alessandro Spadola as part of his MSc Business Information Systems thesis at the FHNW. The thesis was supervised by Ela Pustulka who teaches the course.

REFERENCES

- [1] Lewis, J. & Loftus, W. (2018). *Java software solutions: Foundations of program design* (Ninth Edition). Pearson Education Limited.
- [2] Lobb, R., & Harlow, J. (2016). Coderunner: A tool for assessing computer programming skills. *ACM Inroads*, 7(1), 47-51.
- [3] Petri, G., Gresse von Wangenheim, C. & Borgatto, A. F. (2017). MEEGA+, systematic model to evaluate educational games. In N. Lee (Ed.), *Encyclopedia of computer graphics and games* (pp. 1-7). Springer International Publishing. https://doi.org/10.1007/978-3-319-08234-9_214-1
- [4] Reichert, R., Nievergelt, J. & Hartmann, W. (2004). JavaKara – ein sanfter Übergang von Kara zu Java. *Programmieren mit Kara: Ein spielerischer Zugang zur Informatik* (pp. 101-110). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-662-09484-6_8
- [5] Richards, B. (2022). Ein bisschen Spas muss sein: Gamifizierte Webseiten zum Programmierenlernen [Publisher: Heise]. *c't*, 2022 (3), 110-116. Retrieved December 11, 2022, from <https://www.heise.de/select/ct/2022/3/2131414441615525685>

19 | LEARNIE

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KEYWORDS

Endless game, learning mathematics and languages

ABSTRACT

In this 3D endless game, players control a cute character who must run and collect coins while avoiding obstacles. Along the way, the character will be presented with educational questions, such as “4 multiplied by 4 equals?” in order to learn mathematics and sciences.

In addition to learning mathematics and sciences, players can also learn new languages. The game presents questions in various languages, giving players the opportunity to practice their language skills and expand their vocabulary.

The game is set in a vibrant and colorful world with various landscapes to explore, including forests, deserts, and mountains. Players navigate through challenging terrain, jumping over obstacles and dodging hazards to collect coins and power-ups.

As the game progresses, the questions become increasingly difficult, testing players' knowledge of various subjects. By answering questions correctly, players can earn more coins and unlock new levels.

With an addictive gameplay, charming graphics, and an educational content, this 3D endless game is perfect for both casual players and those looking to brush up on their knowledge of mathematics and sciences.



20 | THE BIASES OF ARTIFICIAL INTELLIGENCE

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KEYWORDS

Serious game, artificial intelligence, AI, bias, big data, filter bubbles, echo chambers, high-school, education

ABSTRACT

We have developed a serious game on Artificial Intelligence (AI) for high school students. Due to their recent successes AI-driven processes are pervading a significant number of sectors. However, AI is notoriously difficult to understand because it requires specialised technical and mathematical knowledge.

Our serious game addresses the following learning objectives: How do machines learn? Why are machine learning algorithms biased? How do filter bubbles (or echo chambers) form? The emphasis is on understanding why and how these phenomena occur, not just what they are. We believe that understanding these mechanisms is crucial, as it can empower students to engage in informed debates about artificial intelligence.

Developed in Javascript, the game is easily accessible via a website and can be completed in 20 minutes. It has been tested in a teacher training course and in several high school classes in Switzerland and is highly appreciated (score 5/6, 79 subjects).

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AI Literacy

Know & understand, use & apply, evaluate & create, AI Ethics (Ng. et al., 2021)

Learning outcomes

1. Data Bias

How does AI work, how does an algorithm learn from (big) data?
Why do AI algorithms make mistakes?

2. Societal Bias

How does societal bias occur?
What problems does societal bias cause?

3. Filter Bubbles

What are filter bubbles (or echo chambers)?
How do filter bubbles form?





CONTEXT

Artificial Intelligence (AI) is a rapidly evolving field of innovation with a deep impact on our society, including education. AI is already challenging assessment practices in education, but it will also redefine the role of teachers and students. We will need to reconsider the competencies that students need to acquire rather than delegate to a machine. There is also a growing need to integrate artificial intelligence into educational curricula (UNICEF, 2021). We have therefore developed a serious game to learn about AI with teachers and students in mind. The game supports AI literacy (Ng. et al., 2021) and encourages the adoption of ethical principles (Adams et al., 2023) by exploring how AI works.

TARGETED ISSUE

The first challenge posed by AI is the exponential nature of its development. This rapid evolution is not reflected in education, where there is a relative lack of knowledge on AI (Luan et al., 2020). Indeed, our data shows that the level of AI literacy among students is generally low.

A second challenge to AI literacy is its technical nature, as the mathematical details that underpin it are difficult to understand. In this work, a lot of effort and thought has gone into making the basic principles and features of AI accessible to everyone, making them as simple and comprehensible as possible. There is a fine line between a simple explanation and a false one, and we have been careful not to cross it.

Finally, an important goal was to go beyond a basic understanding of the concepts. For example, the media often write about biased algorithms and report the phenomenon without explaining why it occurs. We believe that in order to understand the bias issue in AI, and why it is impossible to completely overcome it, it is necessary to understand the mechanisms that create bias in the first place.

...the design of a pedagogical sequence that addresses AI at the appropriate cognitive and technical level for high-school students and non-expert adults...



PROPOSED SOLUTION

We have developed an online game that promotes AI literacy, as students should be conscious users of AI-based systems UNICEF (2021). A direct inspiration for our game was the serious game “The wisdom and/or madness of crowds” by Case (2018), a playful and efficient way to learn about human networks.

Our first step consisted in identifying the key learning outcomes, which were that students should be able to answer the following questions:

1. Data bias: How does AI work, how does an algorithm learn from (big) data? Why do AI algorithms make mistakes?
2. Societal bias: How does societal bias occur? What problems does societal bias cause?
3. Filter bubbles: What are filter bubbles (or echo chambers)? How do filter bubbles form?

Each learning objective has a dedicated chapter in the game. A final chapter concludes the game and allows players to partially self-assess their understanding of the first and most technical chapter. All chapters can be accessed independently of each other, allowing the teacher to choose the duration and specific content. The game takes approximately 20 minutes to complete.

RELEVANT INNOVATION

Our main contribution is the design of a pedagogical sequence that addresses AI at the appropriate cognitive and technical level for high-school students and non-expert adults (their teachers). We have optimised the learning situations and their explanatory power by manipulating the game interactivity. As the scenario unfolds, the game gives the illusion that the player is in control, while taking the player through a series of fixed stages that progressively construct an understanding of the addressed concepts.



Today,
the prediction algorithm,
is you !

So, according to your observations,
there are more :

indigo clouds

green clouds

Another contribution is the custom graphics. Special attention was paid to the visual appearance of the characters in the game. The little clouds create a unity in the gameplay, by first representing data and then people. This visual metaphor allows us to address sensitive gender, racial or social issues. The delivered messages are simple, but effective.

We have developed the game in Javascript so that it can be easily accessed online, in a computer science class or at home. Students can progress at their own pace. To accommodate the different speeds of different students we provide many resources that allow them to continue the learning process.

PROJECT OUTCOMES & RESULTS

We first tested the game with ten beta-testers, a mix of AI experts, computer science teachers, social scientists and non-experts. We then provided the game, along with a pre- and post-questionnaire, to several computer science teachers and their students.

The results of the pre-questionnaire show that only a fifth of the 36 computer science teachers were unfamiliar with how artificial intelligence works, and a third had never heard of AI bias. Most had heard of big data, but only a half had heard of filter bubbles. Among students, a fifth of the 145 students said they had some idea of how AI works, and less than a fifth had heard of the term bias in relation to AI. Around a quarter of the students had heard of the term 'big data', but 21 students could describe big data, and only 11 students could give a fairly accurate definition of the term 'filter bubble'.

The post-questionnaire shows that three-quarters of the 56 students, who completed it, felt that they had learned 'a lot' or 'enough' from playing the game, with a fifth still unfamiliar with how AI works. The average score of the game for 79 players is 5 out of 6, with teachers rating the game higher (5.4/6) than their students (4.9/6). One reason for this lower score is that some students felt that they were too guided and wanted more choices in the answers that were offered. Many asked for the game to be more interactive.

CONCLUSION

This serious game tries to make the mechanisms of artificial intelligence and its problems more tangible for high school students. Looking at some of the students' responses to the post-questionnaire, we are confident that the game is at the appropriate level. Most of the students appreciated the game and said that it helped them learn about AI.



PERSPECTIVES & NEEDS

An open question is whether the game is also accessible to 15 year olds or younger. We need to address some important criticisms in the future, such as better interactivity. We hope that this game will contribute to raising awareness about AI through education.

ACKNOWLEDGEMENTS

MODULO: Projet d'éducation numérique du canton de Vaud.

<https://modulo-info.ch/>

REFERENCES

- Adams, C., Pente, P., Lemermeier, G., Rockwell, G. (2023). Ethical principles for artificial intelligence in K-12 education. *Computers and Education: Artificial Intelligence*, Volume 4.
- Case, N. (2018). *The Wisdom and/or Madness of Crowds*.
- <https://ncase.me/crowds/>
- Luan, H., Geczy, P., Lai, H., Goibert, J., Yang, S. J. H., Ogata, H., Baltés, J., Guerra, R., Li, P., Tsai C.-C. (2020). Challenges and Future Directions of Big Data and Artificial Intelligence in Education. *Frontiers in Psychology*, Volume 11. <https://www.frontiersin.org/articles/10.3389/fpsyg.2020.580820/full>
- Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. *Computers and Education: Artificial Intelligence*, Volume 2.
- UNICEF (2021). *Policy guidance on AI for children 2.0*. United Nations Children's Fund. <https://www.unicef.org/globalinsight/media/2356/file/UNICEF-Global-Insight-policy-guidance-AI-children-2.0-2021.pdf.pdf>.
- * <https://mi.hepl.ch/projects/ia/ia.html> [original game in French] <https://mi.hepl.ch/projects/ia/bias.html> [in English]



THE ROLE OF GAMIFICATION IN THE EMERGING THINKING ECONOMY

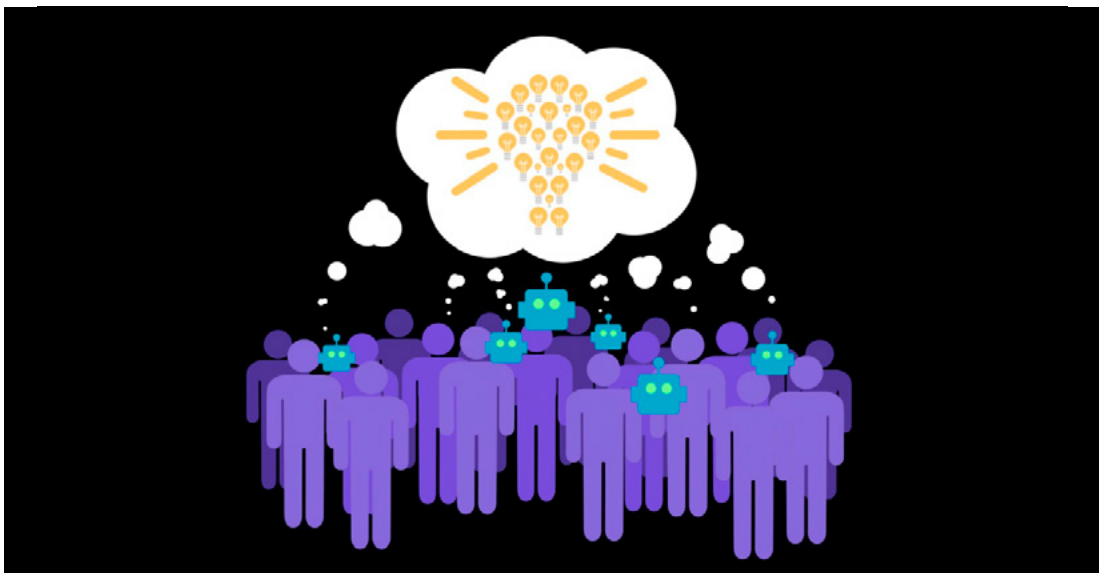
Pietro Michelucci

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SUMMARY

Despite steady growth in the digital platform economy, emerging technologies, such as ChatGPT, threaten to replace humans as online cognitive laborers while introducing potential risks. Hybrid intelligence methodologies suggest pathways for leveraging the complementary strengths of humans and machines to improve productivity and mitigate some of the risks associated with machine-based cognition by keeping humans in the loop. In this talk we explore how gamification provides a framework for thinking about the techniques, opportunities, and pitfalls associated with using technology to shape human behavior, and how these can influence the co-evolution of society and technology. To this end, I will describe my institute's research on human/AI partnerships, hybrid crowds, and the use of human computation to reinvent ethical review to address disruptive technologies and shifting value-systems. From this basis, we will explore various uses of more or less intelligent machines to gamify labor. We'll consider how the ease of quantifying behavior in the online medium enables mechanisms beyond financial reward, including reputation and credit assignment. Such incentives can be thoughtfully situated in a context of gamelike advancement, e.g., "leveling up", that dynamically matches capabilities to task type and difficulty by playing to individual strengths, which can lead to greater satisfaction, sense of accomplishment, and increased productivity. Moreover, we'll consider how human/AI synergies can lead to mutual learning and result in on-the-job education and credentialing. Indeed, we will envision a model of "precision labor" akin to precision medicine, that celebrates individual differences by continuously tuning to the specific capabilities, limitations, and desires of each person, yet remain mindful of unintended adverse effects, such as game addiction, malicious exploitation, and co-opting human agency. In the end, the game master will be the puppet master. Humans will optimize their behaviors to the rules of the labor game. And, as always, the curator of those rules, whether machine or human, will determine our quality of life.



BIO

Pietro Michelucci is founding director of the Human Computation Institute, a multidisciplinary innovation center that develops crowd-powered systems to address societal problems. He is Editor-in-Chief of the 2013 Springer Handbook of Human Computation and founding editor of the journal Human Computation. Michelucci received a joint-PhD in cognitive science and mathematical psychology from Indiana University and spent ten years advising federal research agencies on Artificial Intelligence. In 2014, he led a three-day summit at the Wilson Center, which produced a national road-map for Human Computation research and compelled the founding of the institute. He currently leads the Stall Catchers citizen science project, which accelerates Alzheimer's research, as well as new citizen science projects tackling sickle cell disease, small vessel disease, and COVID19.



SESSION E POLITICS, ECONOMY, ENVIRONMENT

FRIDAY, JUNE 30

09:30-10:30



CHAIR : ERIC SANCHEZ



THOMAS ROBERT
How to Kill your Island



FAUSTINE PÉRILLAUD
Bard



JÉRÔME CASTELLA
Powerplay



DOMINIQUE BOLLINGER
EcoGestes



22 | HOW TO KILL YOUR ISLAND

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KEYWORDS

Ecology, Strategy, Management, Industry, Destruction, Pollution, Capitalism

ABSTRACT

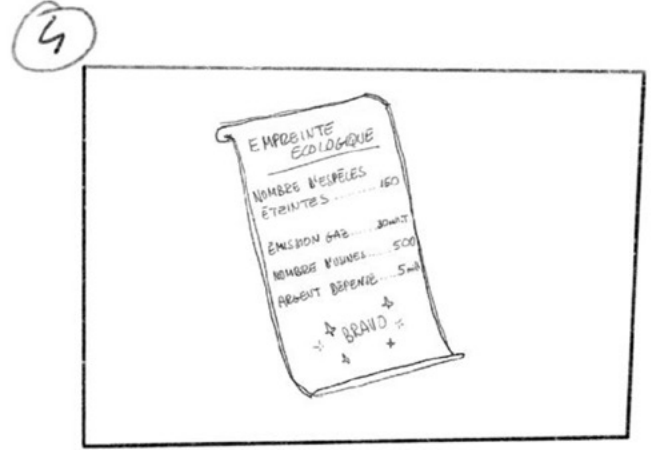
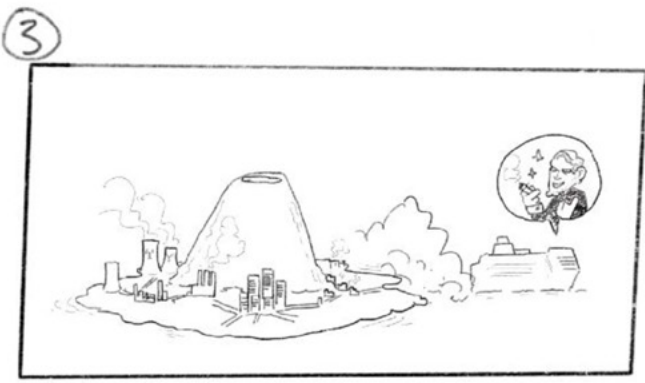
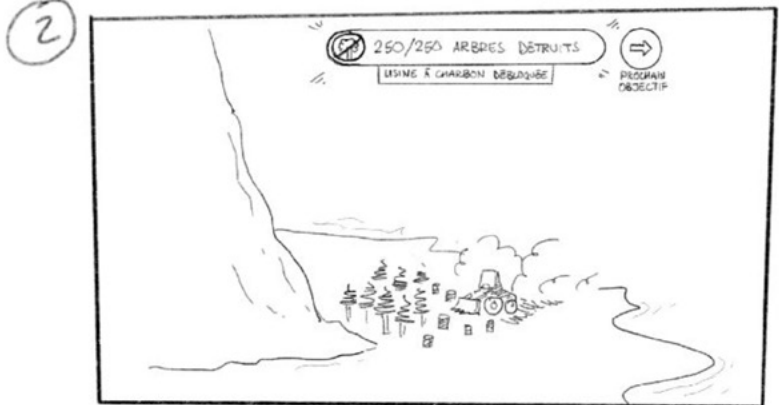
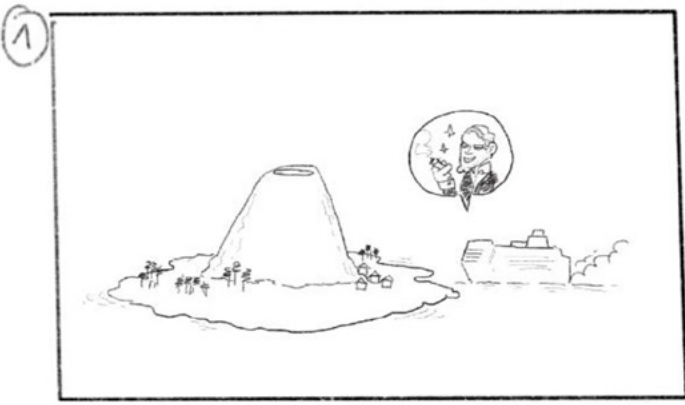
Ecology is at the heart of current concerns. For several years, the issue has been highly publicized and the responsibility often falls on the energy consumption of the population. The public has a role to play, but other sectors, such as industry, must set an example.

Yet the measures taken to slow down global warming seem to be too slow. Industry is one of the areas with the greatest impact on the environment, due to the production of goods and services that require energy, raw materials and natural resources.

There is therefore often a tension between the economic interests of multinationals and environmental concerns. The people at the head of these companies seem to be more concerned with making a profit than with doing something for the cause. Brewing up billions, they sometimes set up absurd projects without taking the current climate issues into account.

A recent example is the 2022 World Cup in Qatar. Although FIFA declared to have achieved carbon neutrality for this event, greenwashing hides the catastrophic result.

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TARGETED ISSUE

The problem caused by the climate is a vicious circle. By meeting the growing demand of the population the industrial sector continues its overproduction. On the other side of the loop, the people benefit from what is offered and, out of comfort, hardly take action.

To see the first changes, we must act on several fronts: changing our habits can reduce emissions on our own scale, but it can also reduce demand. Public opinion can accelerate the implementation of regulations on the biggest consumers.

PROPOSED SOLUTION

Changing habits therefore requires awareness. As many have already done, we are trying to raise awareness on this issue among our users. Most of these messages are often anxiety-provoking, even accusatory. Here, we seek to create impact through humor, sarcasm and interactivity.

That's why we decided to create a pleasant experience via a Serious Game. "How to kill your Island" proposes to take the opposite side of the exposed issues. In this game, the user embodies a rich billionaire who wants to empty a volcano to build a hotel. This zany and unrealistic project tends to illustrate the excessive ambitions of these people and tends to mark the user's mind.

To make the satire work, the game dynamically generates an island in a colorful world. As the player cuts down trees and digs into the ground, it changes the composition of the terrain, which at the end of the game is visually degraded. There is also a CO₂ meter: very low at the beginning, it increases exponentially as buildings are constructed, paralleling the skyrocketing carbon emissions of today.

"How to kill your island" is a game that is meant to be light-hearted, offbeat, but deals with a serious and important cause.



RELEVANT INNOVATION

The terrain is partially randomly generated. The island remains constantly round with a volcano in the center, so that the distance between the rock and the ocean is the same everywhere. Although we lose visual richness, we have more control over the difficulty of building the pipeline.

A Pelerin noise is used to generate the terrain relief. Hills and valleys are created and tree clusters represent forests. Vegetation decreases CO₂ production but also contributes to make the island graphically more natural and organic.

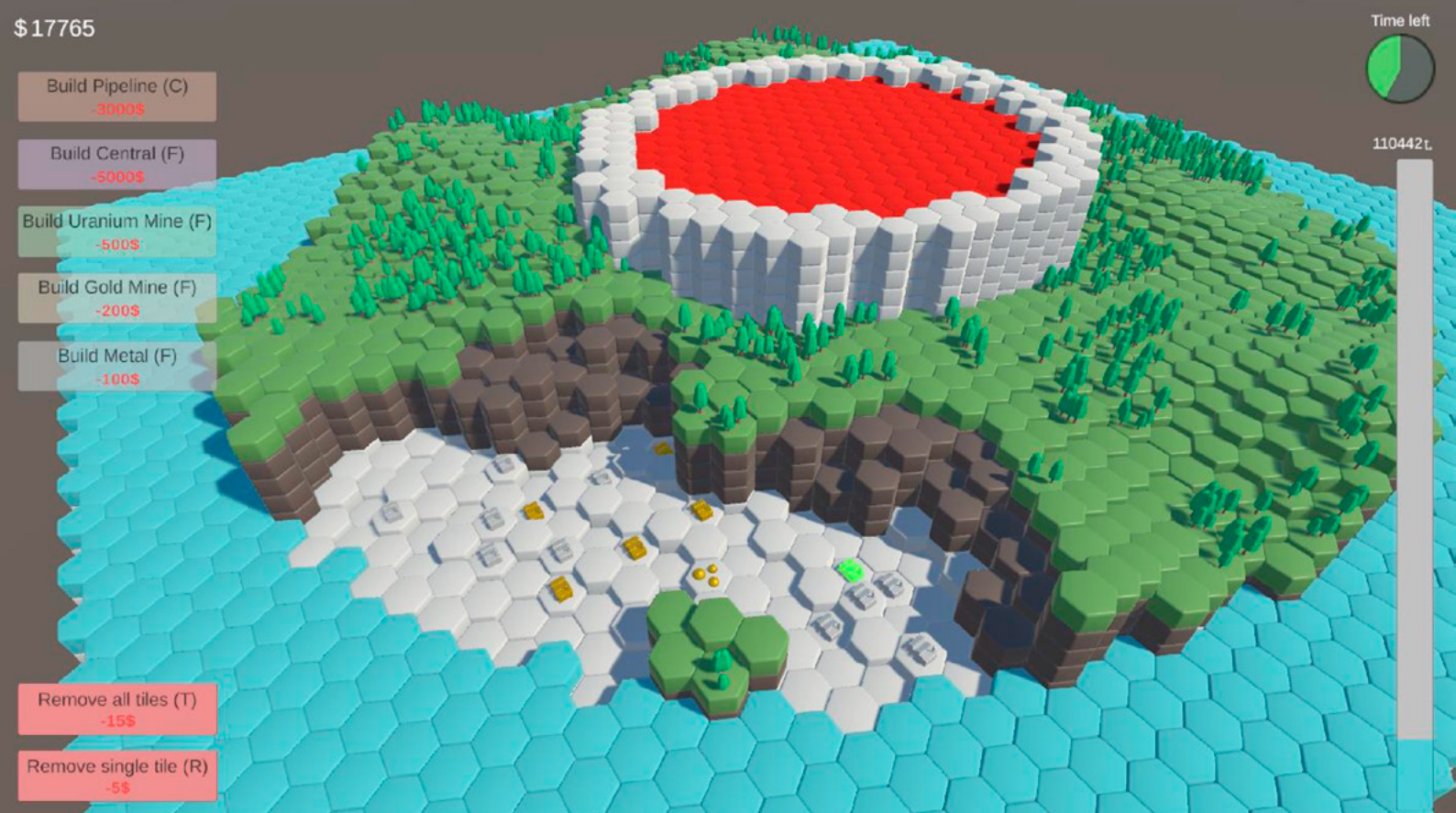
Three types of minerals are exploitable by the user: iron, gold and uranium. These elements naturally suggest their monetary and ecological impact. Moreover, they contribute to make the exploration of the island more dynamic.

PROJECT OUTCOMES & RESULTS

The game is played in three phases, each defined by a scene. The beginning briefly explains the objectives and allows to start a game. The heart of the game takes place during the second scene, which is limited in time. To finish the game, and thus reach the third and final scene, three conditions can be met:

1. The time is up
2. The CO₂ limit has been reached
3. The volcano has been drained

The unofficial objective of the game is to maximize these three parameters: to lay the pipeline as quickly as possible while generating the most CO₂. Draining the volcano, however, is the most difficult victory condition to achieve, since money must be generated quickly without exceeding the carbon emission limit.



CONCLUSION

“How to kill your island” is a game that is meant to be light-hearted, offbeat, but deals with a serious and important cause. Because of its satirical air, the message it conveys will probably not speak to everyone.

Can the ecological impact of certain projects justify their realization? Don't we tend to underestimate the CO₂ production of the industry? The game seeks to raise these types of questions about the cause it defends without claiming to be able to provide answers.

PERSPECTIVES & NEEDS

The game is in the prototype stage. Many elements need to be modified to improve the user experience. One of the priorities would be to improve the gameplay to encourage replayability (example: presence of disruptive elements that hinder the production of money, possibility to dig on a larger surface, etc.). The visual aspect of the game is also a point of improvement: shape of the island, the volcano, more interactive UI, addition of animations, etc.

ACKNOWLEDGEMENTS

The most technical steps, such as programming or creating 3D models, are often the most intimidating. There is a tendency to give them more importance whereas the phases that precede them are crucial.

REFERENCES

- Boykoff, J. (2022, November 23). The World Cup In Qatar Is a Climate Catastrophe. Scientific American. <https://www.scientificamerican.com/article/the-world-cup-in-qatar-is-a-climate-catastrophe/>
- Andrews, R. (2018, May 28). Why Can't We Artificially Drain Magma Chambers To Stop Volcanic Eruptions? Forbes. <https://www.forbes.com/sites/robinandrews/2018/05/28/why-cant-we-artificially-drain-magma-chambers-to-stop-volcanic-eruptions/>
- GODARD Olivier, HOMMEL Thierry, "Les multinationales, un enjeu stratégique pour l'environnement et le développement durable ?", *Revue internationale et stratégique*, 2005/4 (N°60), p. 101-112. DOI : 10.3917/ris.060.0101. URL: <https://www.cairn.info/revue-internationale-et-strategique-2005-4-page-101.html>



23 | BARD

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KEYWORDS

Game

ABSTRACT

“Bard” is a narrative proposition for the performance we expect from technologies, and the way we cohabit with them.

The object is controlled by infrared signals and reacts by playing music in return. You can use it with all the IR remote controls you can find. It's shaped like a bird and is meant to be worn on the shoulder as if carrying a parrot. The Bard only knows one melody, but it has its own mood and will interpret it very differently depending on the signal you send him.

The functioning of the Bard reverses the way we command machines around us. Here the remote is not a tool to give orders anymore: it has become the source of musical inspiration for our wooden bird. It's more like a score that we need to decrypt.

It's a wandering experience, where you look for signals by listening to new variations of the melody in order to tame your Bard. You are learning its boundaries while it is humming into your ear.



24 | POWERPLAY

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KEYWORDS

Energy transition in Switzerland

ABSTRACT

We think knowledge is key to the energy transition! And the best way we found to spread it is to make it appear pleasant and non-judgmental.

“PowerPlay” is a pedagogical serious game aiming to make various audiences (politicians, media, companies, local communities...) understand the challenges of the energy transition (decarbonization, efficiency, consumption, security of supply...) and grasp the orders of magnitude. In groups, players decide on which electrical production units they want to invest with their own characteristics (deployment and operational costs, build time, summer / winter production, CO₂...) and must do their best to provide the population with power all year long and until 2050.

The data from the cards are all based on the reference scientific reports (BFE, PSI, IEA...) to make sure the game is as realistic as possible, though remaining rather easy to grasp.

The goals are multifold: educate the general public to the subject, spread the sense of urgency to take strong decisions regarding energy savings / production in Switzerland, encourage transpartisan dialogue to find consensus and accelerate the transition...





25 | ECOGESTES - A MOBILE GAME TO SHIFT TO ENVIRONMENTAL BEHAVIOUR

Paul Gillet¹, Dominique Bollinger²

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2. EcoSquad, Fey, Switzerland

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KEYWORDS

environment individual transition impact mobile free app game planet limit shift design thinking

ABSTRACT

The state of the planet imposes drastic changes in our behaviour and consumption if we want to preserve the planet habitability for humanity. The changes must come from the economic world but also from individuals. Noting the reluctance of individuals to modify their behaviour to reduce their impact on the environment, it was imagined encouraging them to change through a game.

It is the prototype of an app allowing to consult, choose, propose, exchange and send “individual environmental action cards” between users which are presented in the form of challenges related to environmentally friendly behaviour.

The cards consist of a title, a description of the action to be carried out, a deadline for its completion, an illustration, “environmental gain” points according to several indicators, an explanation, the reduction of the impact and a “mini file” presenting different characteristics of the problem addressed.

With this game prototype, a user can create an account, list all the challenges, count the environmental benefits, challenge other users, set challenges for fixed deadlines, see the effect of the community and keep a playful spirit.

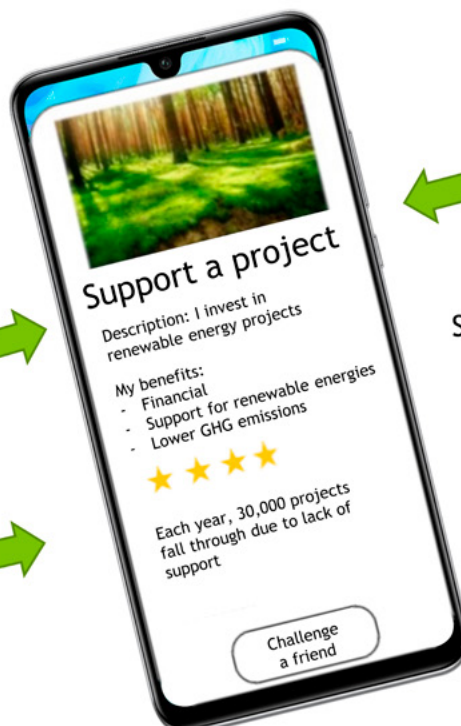
The goals are multifold: educate the general public to the subject, spread the sense of urgency to take strong decisions regarding energy savings/production in Switzerland, encourage transpartisan dialogue to find consensus and accelerate the transition...

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The planet's in trouble... What can we do...?

Challenge your friends or get together to make a bigger impact

Rewards at stake!



Small actions, big impact !



DESIGNING EFFECTIVE SERIOUS GAMES

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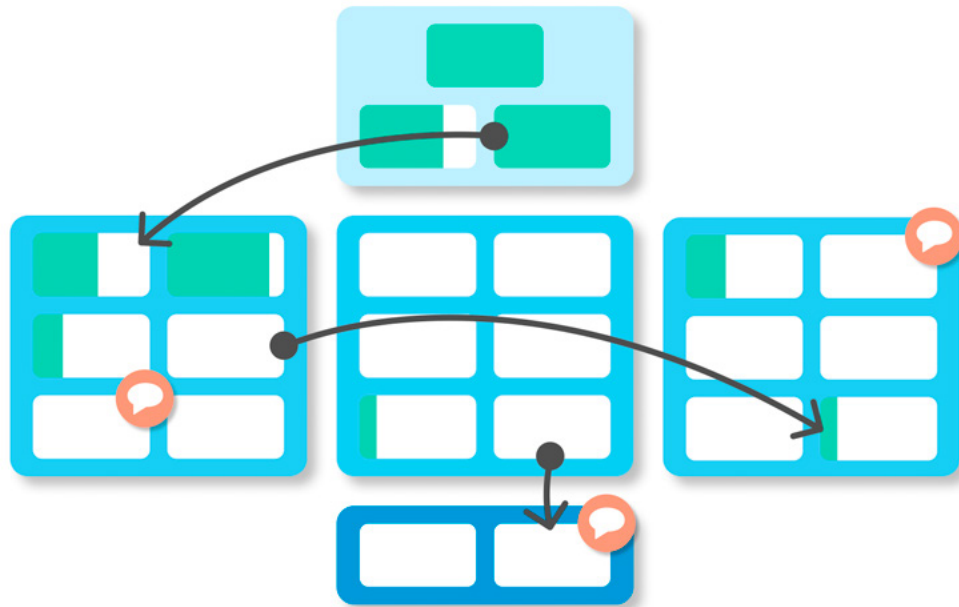
SUMMARY

Serious games are recognized as effective tools for supporting learning and teaching practices. However, research indicates that serious games do not always fulfill their intended pedagogical objectives^[1-3]. To ensure that a serious game achieves its objectives, it must successfully integrate both gaming and learning aspects, and be accepted by teachers who will ultimately utilize it. Collaborative design of serious games is recognized as a critical success factor in achieving this integration and acceptance^[4].

Designing serious games that are both engaging and efficient is thus a multidisciplinary endeavor that requires the collaboration of teachers, game designers, pedagogical engineers, graphic designers, and computer scientists^[5]. A major challenge during the design process is to support the collaboration within this diverse team and establish a shared view of the work in progress.



During this presentation, we will introduce the co.LAB framework for serious games design^[6, 7], which is a visual tool that facilitates the collaborative design of serious games. The co.LAB framework has been developed over a period of 10 years in the field of academic and professional education, and has been supported by a research project funded by the Swiss National Science Foundation.



The co.LAB framework integrates serious games design elements into a global design map, and thus provides a shared vision for the design team. This shared vision should support consistency between different aspects of the game in development, facilitate communication within the design team and reduce misunderstandings. The co.LAB framework emphasizes the links between game and learning elements, and thus helps design teams to reach a balance between these aspects, ensuring that the game is both enjoyable and effective for learning.

The main contribution of the co.LAB framework to the field of serious games design is that it provides a shared visual space for collaborative multidisciplinary design. Thus, it should support design teams to create more efficient, effective, and engaging serious games that meet the needs of all stakeholders.

REFERENCES

- [1] M. Dankbaar, "Serious games and blended learning: effects on performance and motivation in medical education," *Perspect. Med. Educ.*, vol. 6, no. 1, pp. 58–60, 2017, doi: 10.1007/s40037-016-0320-2.
- [2] A. Ranchhod, C. Gurau, E. Loukis, and R. Trivedi, "Evaluating the educational effectiveness of simulation games: A value generation model," *Inf. Sci.*, vol. 264, pp. 75–90, 2014, doi: 10.1016/j.ins.2013.09.008.
- [3] D. Djaouti, "Serious Games pour l'Éducation : utiliser, créer, faire créer ?," *Tréma*, vol. 4, pp. 51–64, 2016, doi: 10.4000/trema.3386.
- [4] J. Bourgonjon, F. De Grove, C. De Smet, J. Van Looy, R. Soetaert, and M. Valcke, "Acceptance of game-based learning by secondary school teachers," *Comput. Educ.*, vol. 67, pp. 21–35, 2013, doi: 10.1016/j.compedu.2013.02.010.
- [5] S. Verschuere, C. Buffel, and G. Vander Stichele, "Developing Theory-Driven, Evidence-Based Serious Games for Health: Framework Based on Research Community Insights," *JMIR Serious Games*, vol. 7, no. 2, p. e11565, May 2019, doi: 10.2196/11565.
- [6] D. Jaccard, L. Suppan, E. Sanchez, A. Huguenin, and M. Laurent, "The co.LAB Generic Framework for Collaborative Design of Serious Games: Development Study," *JMIR Serious Games*, vol. 9, no. 3, Jul. 2021, doi: 10.2196/28674.
- [7] D. Jaccard, L. Suppan, and F. Bielser, "Contribution of the co.LAB Framework to the Collaborative Design of Serious Games: Mixed Methods Validation Study," *JMIR Serious Games*, vol. 9, no. 4, 2021, doi: 10.2196/33144.

BIO

Prof. Dominique Jaccard leads the research team "Serious Games and Simulations" at the University of Applied Sciences of Western Switzerland. His research activity focuses on the overall serious games process, from design to development, usage, and evaluation. He has been the initiator and project leader of several research projects that have led to the development of serious games for educational purposes in fields such as medicine, crime scene investigation, project management, energy management or emergency triage of patients.



SESSION F TRAINING

THURSDAY, JUNE 29

09:40 - 12:50



CHAIR : MICHAEL PERRET



SIMON CIRILLI
Driving Test Theory Learner



PIERRE-BENJAMIN MONACO
The Negotiator



PATRICK JOOS
Exergame Cloud Platform -Decoupling Input Devices from Games



SERGIO LOPEZ
Enhancing Gamification within an Online Brainstorming Tool

27 | DRIVING TEST THEORY LEARNER

Simon Cirilli
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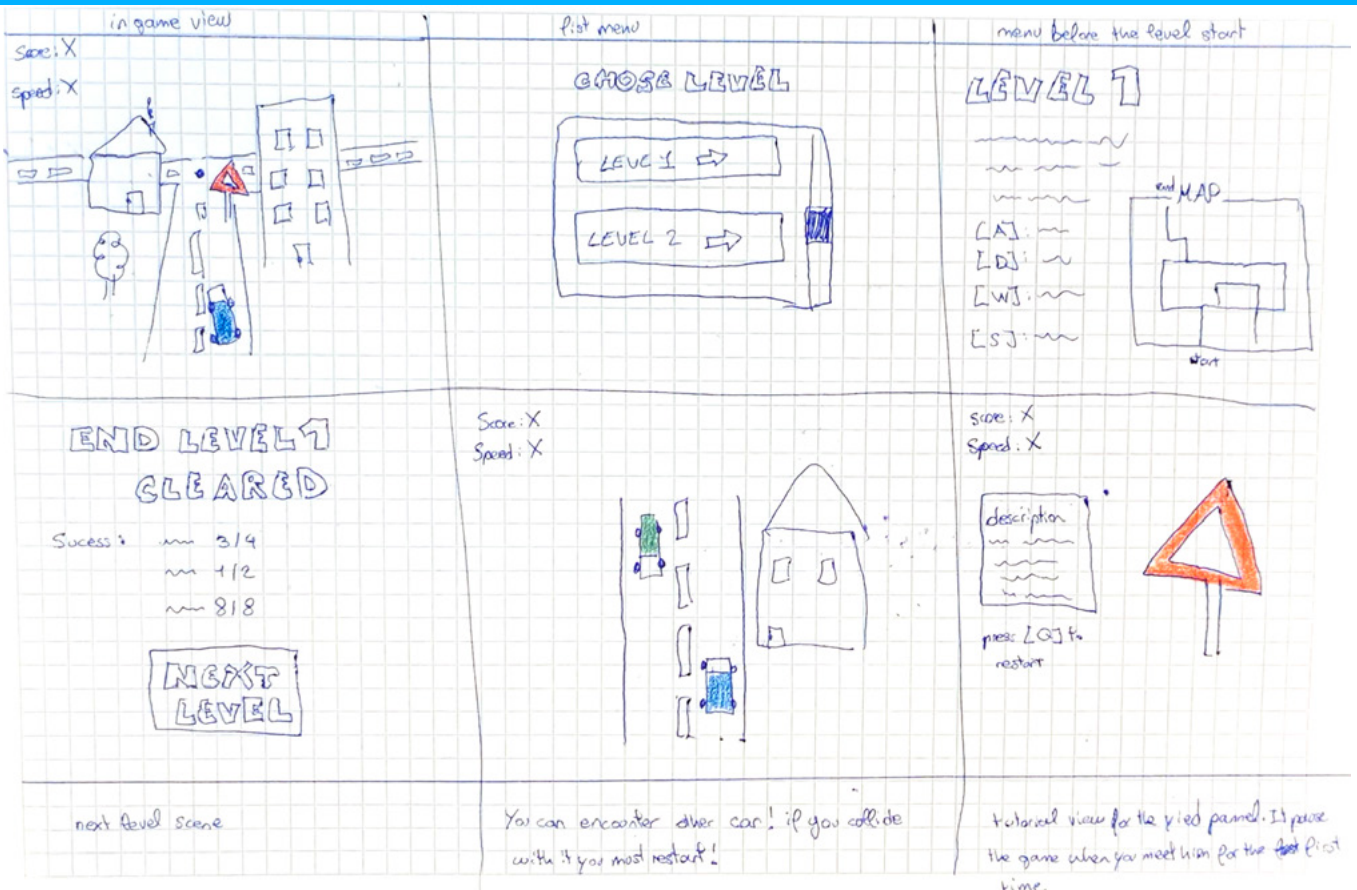
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KEYWORDS

Driving Test Theory, road sign, adapt the speed, driving

ABSTRACT

This proposed solution proposes a gamified traffic simulation as an alternative method to learn the traffic rules for the driving theory test. The current study method by using smartphone apps or CDs can become tedious and repetitive. The gamified traffic simulation aims to overcome this problem by providing an engaging way of learning. The game presents the rules and tests the player's understanding, gradually introducing more complexity.





CONTEXT

A driving license is a document that allows its holder to drive certain types of vehicles on public roads. In Switzerland, more than 80% of the population has a driving license. The acquisition of a driving license is done in several stages, one of which is a compulsory theory test, which is usually taken by young adults, as it is only available to people of legal driving age.

The theory test is the first step in the process of obtaining a driving license and must be passed before being authorized to learn to drive. The test covers a wide range of topics, including traffic rules, traffic signs and safety rules and a thorough understanding of these is essential to pass the test.

Currently, the main study method for the driving theory test consists in using smartphone apps or CDs. These resources provide learners with the necessary information to pass the test and move on to the next stage.

TARGETED ISSUE

As mentioned earlier, the main method of study for this test consists in using smartphone applications or CDs. While this method may seem effective at first, it can quickly become tedious and repetitive, acting as a deterrent for many people who wish to take the driving test.

Since most smartphone applications or CDs work with multiple-choice quizzes, the questions are always the same and learners often have to guess before starting to learn. As they progress through the questions, the work becomes tedious, because each question has to be repeated until the answers are known by heart. Moreover, repetition can make it difficult to keep students engaged and motivated.

To overcome tediousness and repetitiveness, we propose the implementation of a gamified traffic simulation as an alternative method to learn traffic rules.



In conclusion, while smartphone apps or CDs are useful for studying for the driving theory test, the process becomes tedious and unengaging through repetition and lack of variety. It is important that individuals find ways to make the study process more interactive and engaging in order to retain information and pass the test.

PROPOSED SOLUTION

To overcome tediousness and repetitiveness, we propose the implementation of a gamified traffic simulation as an alternative method to learn traffic rules. The game presents the rules and tests continuously the player's understanding, which is a more interesting and interactive learning method.

The game's aim is to adapt to the different traffic signs that the car encounters on the predefined course of the level. When the player sees a sign for the first time, he or she is given a brief explanation on how to behave. As the player progresses through the levels, the rules and signs become increasingly complex, enabling the player to gradually understand and learn the road rules.

A level is considered complete when the player has successfully followed and complied with most of the rules in the level, which gives a sense of achievement and encourages the player to continue learning and progressing through the levels. Overall, gamified traffic simulation provides a more enjoyable and effective way to learn traffic law, making it easier to pass the driving theory test.

RELEVANT INNOVATION

Our innovations for this work are: The creation of a fixed route in the city for normal and AI cars and the addition of a system that makes them respect the priorities and the road signs. If the player does not respect the priority, he crashes, and the level is restarted. We also added a system updating the score automatically according to the user's actions reacting to the signs. The creation of a tutorial mode where the player can zoom in on the announced signs as never seen before and pause the entire level. The creation of a script to move AIs automatically according to the colliders they encounter and the tile (on a tilemap) on which the collider is located as well as the creation of a GPS reacting to colliders on a tilemap enabling the player to give the next direction. The creation of turn signal coroutines that make lights flash when the player decides to use his turn signals. Finally, the creation of a HUD listing speed (speedometer), score, GPS, time spent in the level as well as an indicator determining if the speed is correct.



PROJECT OUTCOMES & RESULTS

Our finished game is a 3D world where the user drives a car in a city and must respect the signs to score points. It includes all types of traffic signs found in real life, such as speed limits, stop signs and priorities, and the driver must also be careful to the other cars on the road. In fact, the game features AI-controlled cars that follow their own routes and routines, respecting traffic laws such as speed limits and stopping at priority signs.

The game has multiple levels with a small story and theme to the signs the player must respect, for example in the first level, the tutorial is about familiarizing oneself with the controls, the traffic signs and respecting the speed limit. Upon completing a level, the player unlocks the next level when achieving 80% or more of the maximum possible score and can then access it through the main menu.

Graphically, the game is designed to have a simple, playmat-like aesthetic using only free and self-made assets. The camera is fixed, follows the car, and the player does not have any control over its movement.

CONCLUSION

To conclude this work, let's go back to its construction: The first part was to think about how we were going to realize a gamified simulation to teach the theoretical driving knowledge to players. From here came the idea of creating a game where the player drives a car in a city and has to react to various signs and priority rules. We also decided to add a scoring system to motivate the player to learn, and more immersion elements like other cars and sounds.

PERSPECTIVES & NEEDS

Next, we would like to add a wider range of traffic signs and their rules in the game. As well as pedestrians to force the player to respect a new dimension; a system of overtaking cars could also be considered. As far as the requirements are concerned, we would need to restructure our code and configure some parts with external files, e.g. the path of the player's car in the map. Finally, we would like to add a soundtrack to our game in the menus.

ACKNOWLEDGEMENTS

We are grateful to our teachers for teaching us what the serious game style is and the principles to implement in our game. We also thank them for giving us ideas on how to make our game, bringing us creative ideas and constructive criticism.

REFERENCES

- Tamara Makes Game (2022). "How To Build 3D Worlds with Unity Tilemaps | Tutorial". link : https://youtu.be/_wDT_Mlv3sM
- Pxl Dev (2020), "Unity: Set Get and Detect tiles in tilemaps!". Link : <https://youtu.be/zABMvbTyEK8>
- Mr. Sakowicz (2019). "Unity - Scriptable Objects - "Score Board" Project". Link : <https://youtu.be/1bK-ucDfa0g>
- Press Start (2018). "Unity - How to Detect Collision in C# [Using Colliders]". Link : <https://youtu.be/ZoZcBgRR9ns>
- Office fédérale de la statistique. Possession de véhicules, de permis et d'abonnements des TP. Retrieved January 22, 2023, from <https://www.bfs.admin.ch/bfs/fr/home/statistiques/mobilite-transport/transport-personnes/comportements-transport/possession-vehicules-permis-conduire.html>

28 | THE NEGOTIATOR

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KEYWORDS

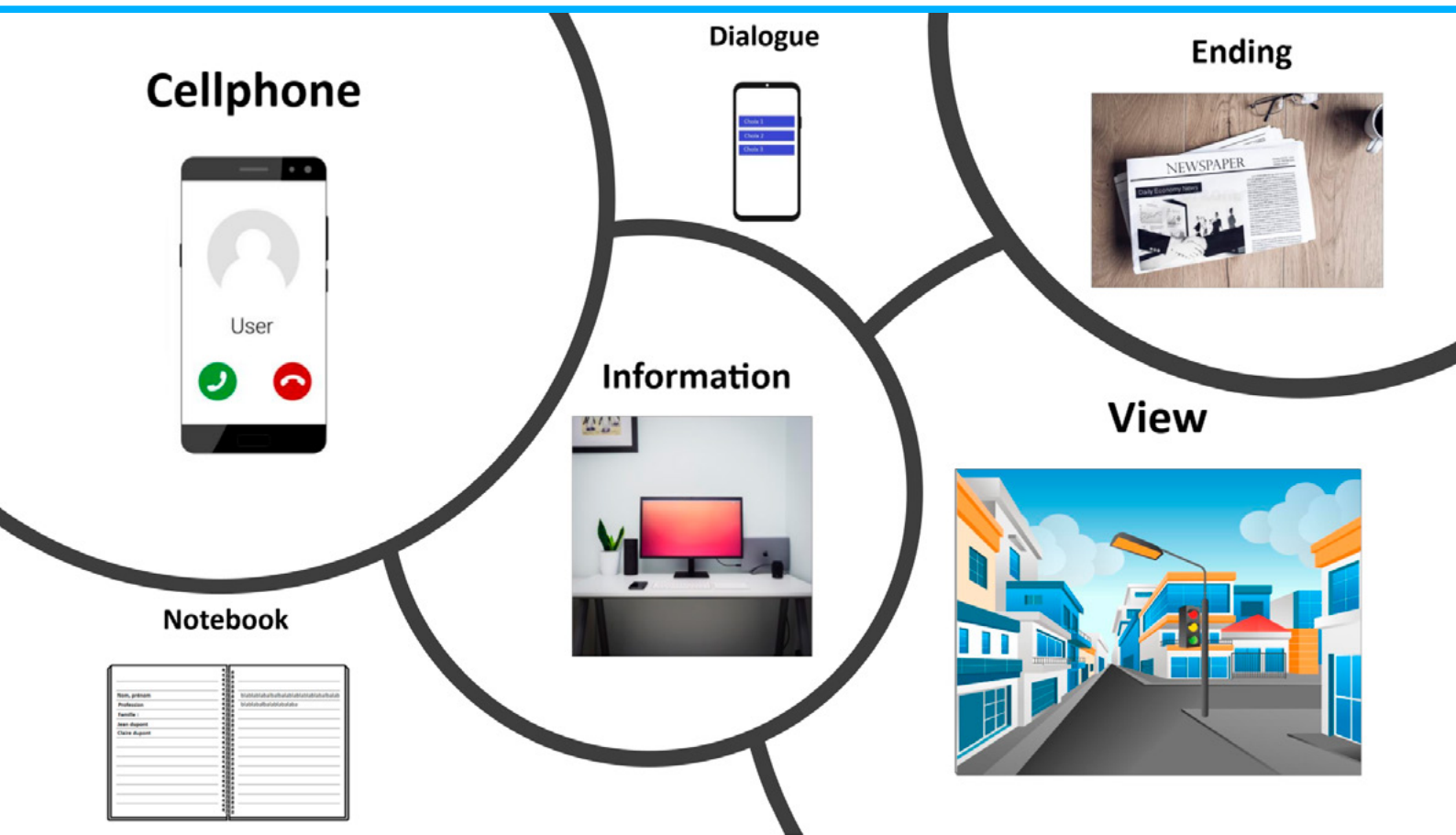
Police, training, simulation, cellphone, roleplay, immersion, pedagogy

ABSTRACT

“The Negotiator” application aims to teach players (future police negotiators) how to manage crisis situations requiring negotiation skills. It puts the player in the shoes of a police negotiator and forces him to control the situation according to his choices. The player must also seek information about the current situation and the people involved in order to better interact with its counterpart.

In order to make the simulation as immersive as possible, the game has been developed in 3D and requires a phone application for the player to interact with the simulation.

“The Negotiator” has been primarily developed for future professional negotiators but also aims to bring these skills to the general public.





CONTEXT

As part of the Gaming Technologies course of the MSE master program, we are asked to develop an application with the Unity game engine. This application must have an educational purpose. Although the job is known to most people through books, movies or series, the field reality is not as simple as the image we have of it. The members of the project have in their entourage people whose current or future job is negotiating in crisis situations. That is how the idea of creating a simulation that puts them into action was born in order to highlight the challenges that these professionals face.

After discussions with the project members and the involved professionals, the project was refined by seeking to create a pedagogical tool that would simulate a critical situation and thus offer a unique opportunity for future negotiators to immerse themselves in a situation that is as real as possible and experience the possible outcomes. The idea is to make as many mistakes as possible in the simulation so as to learn to recognize them beforehand without repeating them when the situation is real.

TARGETED ISSUE

Jobs such as negotiators, surgeons, airplane pilots fall into a category of professions where mistakes often have very serious consequences. Negotiator training already includes simulations such as role-playing which are essential to immerse the future professional in situations he or she will face during his or her duties. With this type of exercise learners put into practice the concepts seen in class, acquire automatisms and make mistakes without the dramatic impact they could have in a real situation.

The problem with a full-scale simulation, even an individual one, is that it requires the implementation of substantial material and human resources. The different actors in the simulation must learn a text or represent a character, which is not an easy exercise for everyone. In view of these difficulties, the quality of the exercise can vary greatly depending on the actors involved. Finally, the time needed to set up and carry out such an exercise is important because the scenario must be replayed as many times as the number of participants.

Professionals in the field feel that learners have not been subjected to this type of exercise frequently enough, but unfortunately it is very difficult to modify the learning modalities by adding more role-playing for the above-mentioned reasons.

PROPOSED SOLUTION

“The Negotiator” aims first and foremost to allow future negotiation professionals to practice living through complex situations by offering an immersion close to a life-size role-play, where the learners have the opportunity to explore different approaches to the same situation. They will be able to make mistakes and observe their consequences in the simulation.

The proposed application provides a new learning modality between the role-play and the question-answer exercise. It offers both learners and teachers a new pedagogical tool with minimal preparation: simply installing the application on the computer and mobile phone. Unlike a role-playing game where all the actors are human, a software simulation enables standardised interactions between the main actor and the scenario and gives the possibility for learners to have the same experience regardless of the educational structure or time of day.

It should be noted that “The Negotiator” is not a solution to all problems and that this application does not pretend to replace a full-scale simulation. It offers a simplified approach to role-playing and tries to keep the maximum immersion and realism.

*“The Negotiator”
application aims to teach
players (future police
negotiators) how to
manage crisis situations
requiring negotiation skills.*





RELEVANT INNOVATION

Many negotiation role-plays exist and are commonly used in courses. “The Negotiator” is a negotiation simulation in the form of a video game, which can be played independently. The proposed solution is halfway between a role-playing game and a question-and-answer exercise to practice and/or validate the concepts learned in class.

Having become as much a means of communication as a source of information, always close to us whether we are awake or asleep, the mobile phone has become a “companion”, a part of our lives, to the point that it would be very difficult for most of us to distance ourselves from it. This symbiosis with the phone is an incredible immersion vector that we are trying to exploit in this simulation.

As the application is still in the prototype stage, the phone is only used to communicate with people in the simulation, but the potential uses are immense.

PROJECT OUTCOMES & RESULTS

The realization of “The Negotiator” had three main focuses. Firstly, the development of the game itself, involving the environment, the player and his interactions, the dialogue system and all the mechanisms necessary for the game to function properly and the scenario to unfold.

The use of a smartphone, complementary to the game and to push the immersion of the player is the second axis. Its implementation required first of all a reflection to justify and fluidly integrate it in the game itself.

The multiple choices of dialogues, branches and possible endings complicated the writing of the scenario, the whole having to be imperatively coherent as well as balanced to allow a strong replayability and a feeling of not having only one path of optimal choices. To increase realism, the hostage taker’s dialogues have been fully dubbed by a human voice.

The result of all these elements is a game providing an optimal immersion, a good potential for replayability thanks to the multiple possible dialogue paths and different endings depending on the choices of the player. The immersion is reinforced by the addition of human voice, a first-person view and the use of a real smartphone.

CONCLUSION

“The Negotiator” brings together different technological means to create a more immersive experience for the player: the video game brings an immersive dimension and offers multiple interaction possibilities, the use of a smartphone brings realism and interaction with the real world and finally the dialogue provides multiple possibilities during the game and its finality.

As desired at the beginning of the project, this solution enables a quick immersion in the world of negotiation.



PERSPECTIVES & NEEDS

A larger collection of scenarios would allow a further exploration of the negotiation domain, including different hostage taker profiles (different psychology, types of demands, number of hostages, context).

The expertise of specialists in these field would further refine and improve the authenticity of the scenarios.

The use of speech recognition and synthesis technology could provide even more solutions to facilitate content creation.

ACKNOWLEDGEMENTS

Special thanks to the people, who work or have worked in the field of negotiation and serious games, and contributed with their experience and knowledge to the realization of this project.

REFERENCES

- VAN HASSELT, Vincent B., ROMANO, Stephen J., et VECCHI, Gregory M. Role playing: Applications in hostage and crisis negotiation skills training. *Behavior modification*, 2008, vol. 32, no 2, p. 248-263.
- DOCHERTY, Jayne Seminare. *Learning lessons from Waco: When parties bring their Gods to the negotiation table*. Syracuse University Press, 2001.
- LEMPEREUR, Alain et COLSON, Aurélien. *Méthode de négociation-2e éd.: On ne naît pas bon négociateur, on le devient*. Dunod, 2010.
- MUNROE, Belinda, BUCKLEY, Thomas, CURTIS, Kate, et al. Designing and implementing full immersion simulation as a research tool. *Australasian Emergency Nursing Journal*, 2016, vol. 19, no 2, p. 90-105.
- LAURENT, Maxence, MONNIER, Sandra, HUGUENIN, Audrey, et al. Design Principles for Serious Games Authoring Tools. *International Journal of Serious Games*, 2022, vol. 9, no 4, p. 63-87.
- KRAUS, Sarit, WILKENFELD, Jonathan, HARRIS, Michael A., et al. The hostage crisis simulation. *Simulation & Gaming*, 1992, vol. 23, no 4, p. 398-416.
- BRONACK, Stephen C. The role of immersive media in online education. *The Journal of Continuing Higher Education*, 2011, vol. 59, no 2, p. 113-117.

29 | EXERGAME CLOUD PLATFORM – DECOUPLING INPUT DEVICES FROM GAMES

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KEYWORDS

Exergaming, cloud, standardization, web-technology, health, sports

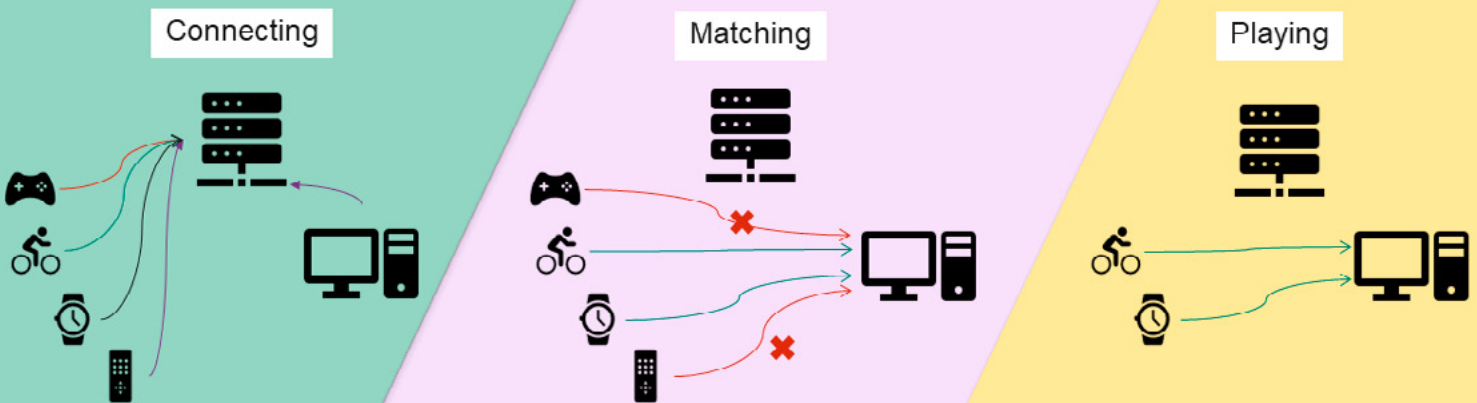
ABSTRACT

Exergames promote healthy behaviors by combining video games and physical exercise. Since such games and corresponding input devices are strongly interdependent, the development of exergames is challenging and costly.

We present an approach to abstract all actions of manifold input devices and to decouple exergames from devices. Three sophisticated games demonstrate the feasibility of our proposal. With our approach, developing exergames can be greatly democratized and expenses reduced.

“The Negotiator” has been primarily developed for future professional negotiators but also aims to bring these skills to the general public.

Device Server – Abstract





CONTEXT

Literature shows that exergaming can have a tremendous effect both at home and in therapeutic environments^[2]. However, the development of exergames today faces a fundamental hurdle: due to their nature, they are often coupled to a single (in many cases custom) input device, which makes their development, testing and operation expensive, and puts a limit on their availability, in therapeutic environments, sport facilities, and in homes.

Users need special hardware suitable for exergames, which explains this tight coupling between the devices and the games. This hardware is expensive and requires lengthy certification processes to be available in the market. At the same time, developing advanced games is a complicated and lengthy process. It takes vast knowledge and skills to develop compelling games and device manufacturers are not capable of following.

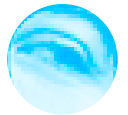
TARGETED ISSUE

The main barrier to developing exergames is the tight connection between the targeted devices and their games^[2]. This coupling requires developers to have access to (at least early) prototypes of the intended device to realistically test their game. In many cases, they need to implement auxiliary functions only for testing purposes which are later discarded.

This puts the device and game developers under pressure as they constantly must wait for progress of the other team. Both are required to work with assumptions, which may change later in the project.

Furthermore, tight coupling makes intercepting and collecting data for logging and analysis hard and sometimes ambiguous. It requires either the device or the game to have a special code to record data for later inspection.

By decoupling exergames from their input devices, we have really simplified developing exergames and custom devices.



PROPOSED SOLUTION

We propose a solution for decoupling exergames and their input devices. Our approach contains:

- a) an abstraction interface for all possible data from input devices
- b) a webserver, transparently managing connections between games and devices

The abstraction interface^[3] is an extension of the classification system developed by^[1]. The webserver uses industry standard technologies for an easy integration into existing projects.

When establishing a connection, a game announces its requirements, i.e. the types of data it needs to provide its services. Similarly, devices announce their capabilities, the kind of data they can provide. The server then performs a matching routine (either automatically or user-assisted) connecting the relevant requirements and capabilities. This is done through WebSockets following a publish/subscribe design pattern:

Notably, neither game nor device directly detect the other, they just send/receive data to/from a connection, allowing to easily replace and swap them with ease.

As neither game nor device are dependent on the other, teams can develop in isolation, should they wish to release a separate product, or team up and start development of both independently.

This greatly democratizes the development process for exergames and reduces expenses. Game developers can bring in their expertise without having to acquire expensive (and space-consuming) devices but can freely experiment with different game concepts.



RELEVANT INNOVATION

The common issue laid out previously show the need for an efficient, yet loose approach to connect various devices and games. We achieve by leveraging common Web-technologies and combining them with an interface specifically tailored to the needs of exergames.

While prior development approaches require tremendous efforts, our decoupling approach provides several advantages:

- › An exergame is longer restricted to one input device and can receive data from any number of devices through data channels. This allows enables games to be played simultaneously by multiple users simply by connecting several devices for different inputs.
- › Through the interface definition, communication between hardware and software teams becomes easier since the discussion between the teams is only about the interface type each component needs to implement. Specifics are left to the individual teams.
- › Input devices can be swapped even during runtime, which allows therapists to change the input-device on the fly, giving them enormous flexibility in their work.

PROJECT OUTCOMES & RESULTS

To demonstrate the feasibility of our concept, we implemented three device-independent games:

- › A kayak game designed to show tap inputs, where the user floats down a river.
- › A marble labyrinth where the player must direct a marble to a destination while avoiding holes in the ground.
- › A bike game where the user pedals through a semi-realistic environment.

These games were created to test the integration of the server infrastructure as well as to create better libraries to support game developers. They used various game engines and frameworks (namely Unity, Godot and MonoGame).

By using these self-implemented games, we have demonstrated the easy integration of different input devices and modalities:

- › Ant+ is a protocol developed by Garmin and used in a variety of devices such as sport watches, smart trainers and other wearables.
- › XInput, originally developed for the Xbox 360, is an API that has become the de-facto standard on all Windows devices.
- › A smartphone app transmitting several sensor values (gyro, accelerometer, buttons, etc.) for android.
- › Dance Pads, providing 8-directional input by stepping.

For these devices we wrote a separate gateway that showed how simple and quick the integration of new devices is. These gateways range from separate (windows) processes to native apps on smartphones.

A demonstrational video for this system can be found in [\[4\]](#).



CONCLUSION

By decoupling exergames from their input devices, we have really simplified developing exergames and custom devices. As neither game nor device are dependent on each other, we developed devices and games in isolation, simplifying testing and iterating.

Thanks to our decoupling approach, trying out new input devices requires only a minor reconfiguration instead of major code changes, making experimenting easier. We thus expect quicker iteration times for further exergame development.

PERSPECTIVES & NEEDS

The newly introduced decoupling interface needs to be promoted by allowing developers to engage and implement new games and devices that are compatible. We plan to encourage developers of exergames and corresponding input devices to further test and disseminate our platform.

ACKNOWLEDGEMENTS

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REFERENCES

- [1] T. Stac, T. C. N. Graham, M. Brehmer, and A. Hollatz, "Classifying input for active games," in Proceedings of the International Conference on Advances in Computer Entertainment Technology - ACE '09, ACM Press, 2009. DOI: 10.1145/1690388.1690465.
- [2] A. L. Martin-Niedecken and U. Götz, "Design and evaluation of a dynamically adaptive fitness game environment for children and young adolescents," in Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts, ser. CHI PLAY Companion '16, Austin, Texas, USA: Association for Computing Machinery, 2016, pp. 205–212, ISBN: 9781450344586. DOI: 10.1145/2968120.2987720. [Online]. Available: <https://doi.org/10.1145/2968120.2987720>.
- [3] P. Joos, "ECP-UGC," Feb. 2023. <http://inf-public.pages.gitlab.ost.ch/ecp-documentation/>
- [4] P. Joos, "ECP-UGC - What can we do," Jan. 2023. <https://youtu.be/v2yzoBFv4M>

30 | ENHANCING GAMIFICATION WITHIN AN ONLINE BRAINSTORMING TOOL

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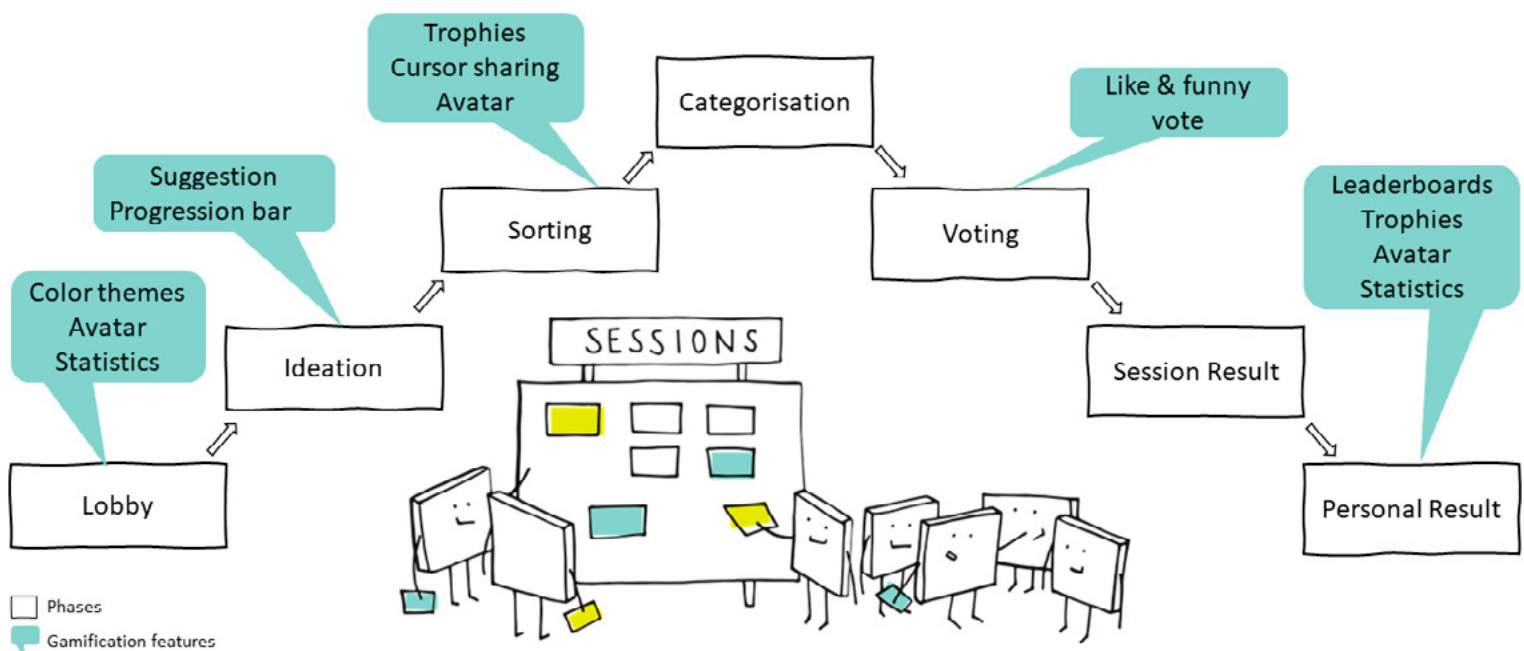
KEYWORDS

Brainstorming, gamification, user management, suggestion system, common goal, cursor sharing, personalized involvement, creativity, interactivity

ABSTRACT

Brainstorming allows people to come up with ideas on a particular problem. The first application^[4] digitized this creative process. This proposal, the second version of the project, proposes a new version of the application that focuses on adding gamification elements, such as the addition of a common goal, a suggestion function, cursor sharing, and a user system. This version was tested with a small group of teachers and students. The results showed an interest in this type of application in the classroom.

Spark IT 2: let's gamify online brainstorming





CONTEXT

For several years, the Swiss Confederation has been looking for ways of dynamizing classrooms. With this in mind, we created the first version of the application, which allowed online brainstorming sessions (main phases are presented in figure 1): so, small groups were able to come up with ideas on a topic. Our project will focus on adding gamification elements. Gamification adds features and elements mainly from board games, video games in an application whose main purpose is not gaming. These elements must make the user want to use the application and excel, while keeping the purpose of the application intact without penalizing the users who do not want to use these features. Several studies ^[1, 3, 5, 6] have shown that gamification in education is a good solution, but it can have negative effects if it is poorly integrated. Therefore, this document will present the different important gamification features that have been added as well as the result of a small user test that has been conducted.

TARGETED ISSUE

One of our main goals is to add a user management feature that enables us to store student performance in a centralized database and to add other gamification elements that were impossible to implement without the aforementioned possibility.

Another goal was to correct some of the first version's shortcomings, especially from a pedagogical point of view thanks to some studies ^[1, 7] and the intervention of an expert in this field, because some features of the previous version increased the competition between the participants. Finally, we want to add features that improve creativity by helping the participants in lack of ideas; to increase the user's interactivity and feel more involved during the phase that will allow to sort the ideas into categories; to give the participants the choice of its interface, colors and font of the application; to correct some bugs and improve the overall user experience of the application. To confirm our implementations, a test phase will be organized with graduate students and professors.

Our application is the result of a complete new design and improvement of the gamification aspect...










PROPOSED SOLUTION

Our project is a web application developed in Unity. The main purpose of the original application was to conduct online brainstorming sessions. Thanks to our improvements, the moderator will create an account for each participant of his session. At the beginning of each session, participants will choose an avatar from a large selection. They will also be able to access statistics on their past sessions, such as the score and number of ideas generated in all sessions, as well as a list of trophies, allowing them to see which ones have already been earned and which ones never. An important addition to stimulate participants' creativity is the addition of a suggestion system. During the idea generation phase, if a user hasn't submitted an idea in a while, the application will share the last idea submitted by the other participants. A feature of the previous version was the competition between participants during the idea generation, but we have completely replaced it with a progress bar that counts the ideas of the participants to reach a goal chosen by the moderator. A new feature is the possibility of seeing the cursors represented by the avatars of all participants during the idea sorting phase. We also created four different graphical themes, which change the application colors and font, that can be selected at the beginning of a session.

RELEVANT INNOVATION

Our application is the result of a complete new design and improvement of the gamification aspect (see figure 2), considering some pedagogical aspects according to our expert's advice. It will offer a complete alternative to the classic physical brainstorming. The addition of a common goal during the idea generation phase allows users to work together towards a common goal, eliminating any competition. It goes even further by giving users access to some statistics about their past session. Thanks to the gamification evolution the participant is involved in a more personalized way and the goals and objectives make him want to play again.

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PROJECT OUTCOMES & RESULTS

We organized three test sessions of our application. A first session was organized with 12 teachers, five of them were willing to answer our questionnaire. The other two sessions were organized with 4 different university students. All testers were familiar with the classical brainstorming method and completed a full session of our application. The first feedback on the new features is positive and reports that this type of gamified brainstorming is motivating. The feedback on the cursor sharing feature is mixed as there can be an issue of readability. Teachers were also asked if they would use this type of gamified application in their classrooms, and all of them answered in the affirmative.

CONCLUSION

Our project is designed to energize the classroom. Enhancements to the application include user management that stores participants' performances, and features that stimulate creativity and interaction, and customizable interface choices. The goal is to provide a complete alternative to traditional physical brainstorming by allowing users to work together toward a common goal. Ultimately, it provides a fun and interactive learning experience for students and teachers.

PERSPECTIVES & NEEDS

To improve the application, we recommend adding features such as better network synchronization, account deletion, and improved trophy animations. Additionally, a moderator page and upgrades to the Photon PUN version would be beneficial. Design improvements such as consistency and usability should also be made. Testing with more participants, including younger students, is needed. A tablet application for classroom use could also be created.

ACKNOWLEDGEMENTS

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REFERENCES

- [1] Boller, S., and Kapp, K. (2017). Play to learn: Everything you need to know about designing effective learning games. Association for talent development.
- [2] Chan, J. C., and Lam, S. F. (2008). Effects of competition on students' self-efficacy in vicarious learning. *British Journal of Educational Psychology*, 78(1), 95-108. url: <https://bpspsychub.onlinelibrary.wiley.com/doi/abs/10.1348/000709907X185509>.
- [3] Ertan, K., and Kocadere, S. A. (2022). Gamification design to increase motivation in online learning environments: a systematic review. *Journal of Learning and Teaching in Digital Age*, 7(2), 151-159. url: <https://dergipark.org.tr/en/download/article-file/2067298>.
- [4] Gobron, S., Barman, C., Sadiku, A., Lince, X., and Capron-Puozzo, I. (2021). Towards an E-class Stimulating Social Interactivity based on Digitized and Gamified Brainstorming. *gamevironments*, (15) url: <https://doi.org/10.48783/gameviron.v15i15.145>.
- [5] Hamari, J. (2019). Gamification. In *The Blackwell Encyclopedia of Sociology*, G. Ritzer (Ed.). url: <https://doi.org/10.1002/9781405165518.wbeos1321>.
- [6] Xiaoyu, C. (2022). Can gamification platforms be "simple"? A case study on improving the efficiency of a gamification platform.
- [7] Ying Jie, H. (2021). Gamifying Innovation: Effect of Collaborative and Competitive Gamification (Master's thesis). url: <https://urn.fi/URN:NBN:fi:tuni-202109157103>.



THE DESIGN PROCESS OF THE ROTBEESTEN?! (ROTTEN BEASTS?!)

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SUMMARY

Designing a serious game offers various challenges and opportunities. This was the same for Rotbeesten?! (Rotten Beasts?!). A game designed by the Gamelab of the Technical University of Delft in collaboration with Fivoor, an ambulant forensic healthcare facility.

The game was designed using the Triadic Game Design method. With this method, designers aim to balance the reality, meaning, and play aspects of creating an impactful game whose learnings will be remembered after the game has been finished.

In this talk, we will go over the design steps of Rotbeesten?! and dive into the three different worlds of Triadic Game Design. Aside from this game, I will use other projects developed by the Gamelab to explore the challenges of various serious games and demands. In doing so, I will show you how the difference in, for example, meaning can require different games and implementations of reality.

I will walk through the stages of the card and digital games' design process and share some insights, challenges, and exciting outcomes we have experienced at the Gamelab. I will not only go over the design aspects of the game itself but also include the design process of the introduction and the debrief and their importance



BIO

Doris is a game design and project leader with a heart for stories. She graduated her master's degree "Integrated Product Design" at the TU Delft using a serious games for high schoolers and have worked on many more since then. At the Gamelab, she and her colleagues, develop both digital and tabletop games. The Gamelab focusses on serious games that are either part of a research or educational projects. Other tasks of the Gamelab include hosting workshops, facilitating sessions and offer advice to other (aspiring) game designers, both professors and students. As for Doris herself, she attempts to create games that allow players to explore, test out and feel free and save to experiment in the created worlds.

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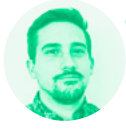
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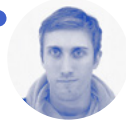
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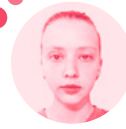
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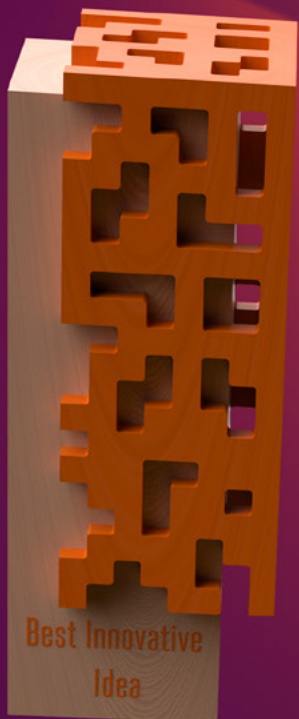
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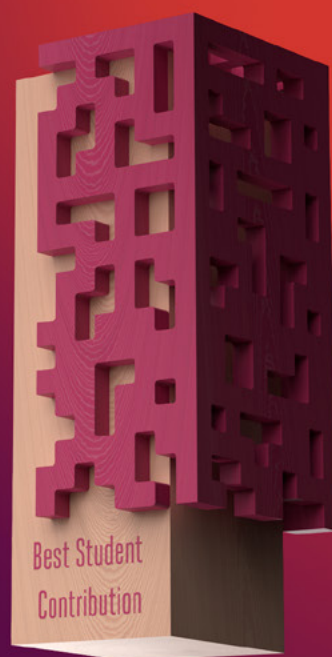
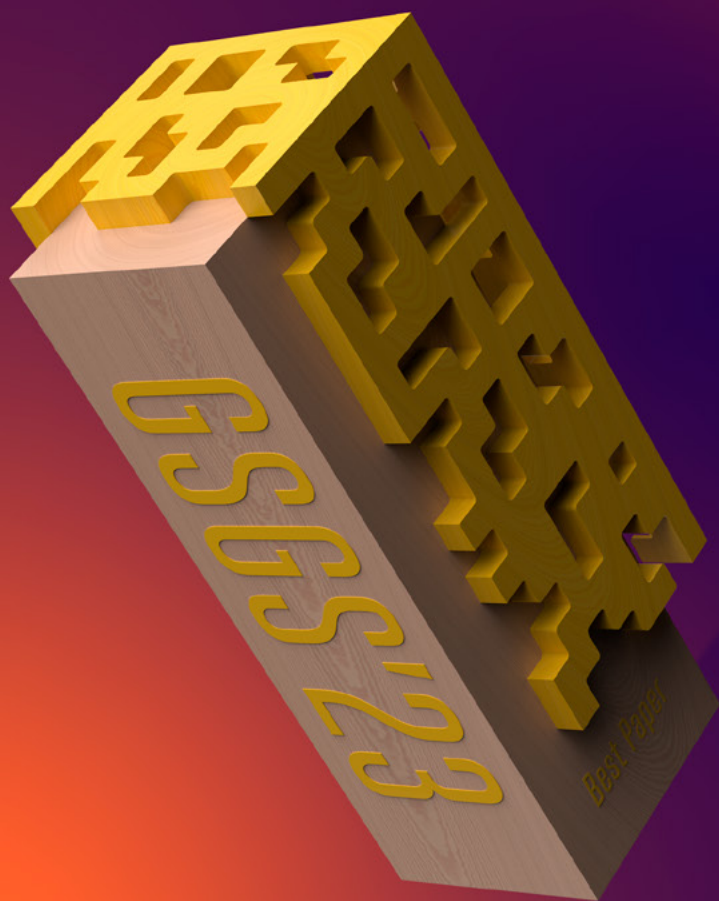
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