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Introduction

CHALLEDU constitutes one of the leading R&D experts in game-solutions for education and inclusion. We focus on 2 main sectors: education and innovation, social inclusion and equality. Our approach includes forms of non-formal or informal education, game-based methodologies, Role-model methodology, open-learning and digital tools, gamification, as well as cross-sectoral approaches.

Social Inclusion

In our work we give specific emphasis on various disadvantaged or marginalized groups. The projects of this sector focus on inclusion and empowerment of people with disabilities (kinetic disability, deaf or blind people, people with intellectual disability or autism, etc), refugees, people with health problems (eg. dementia), old people, caregivers, NEETs. The aims are: inclusion in the society, improvement of employability, development of skills and

competences, advocacy. However, the emphasis is given to create environments where people with different abilities, or cultural backgrounds or skills, or generations interact with each other. The approaches of this sector involve; non-formal or informal education, living labs, open co-creative workshops, game-based tools, and cross-sectoral approaches.

Education and Innovation

Education is considered by our team as the driver for positive change. The projects developed under this sector are focusing on promotion of environmental challenges and agriculture, Entrepreneurship, STE(A)M education, active citizenship, Sustainable development. The target groups are young people, adults, trainers and educators, students (kindergarten/primary/secondary/university/VET), professionals and institutions relevant to the project. Our approach includes forms of non-formal or informal education, game-based methodologies, Role-model methodology, open-learning and digital tools, gamification, as well as cross-sectoral approaches.

Types of games we design

Challedu has been in the game design sector for almost a decade and we had the opportunity to create plenty of games, through which we explored different types of methodologies. In order to make it clear in which category each game belongs, it is important to break it down, following some criteria. We follow the model of dividing the types of games in two categories, based on **Materiality** and **Gameplay**.

In this way, the people playing the games and the designers avoid misunderstandings.

1. Materiality

Materiality is defined as the physical form of the objects you use when playing a game. Following the criteria stated above, we will explore the following 4 categories: **group games**, **tabletop games**, **digital games** and **phygital games**.

Group games

Some popular **Group games** are sports like football, basketball or tug of war, music chairs, cat and mouse chase etc. Nowadays, Escape rooms are a popular group game for young people.

In Challedu we developed several group games within the project *Little Scientists* which was implemented in schools between 2018-2021. Some examples were games, where the students created their paper frog and as in relay races they competed between 2 or more teams. Another very interesting type of group games we have created within the project *Mystery in nursing homes*, is escape room games with live actors. The live "actors" were old people living in 4 nursing houses in Greece and the students were the players. They were using discussion, interaction, songs, along with the clues given by the older people, in order to solve the riddles of the game as a team.

Tabletop Games

Some examples of **Tabletop Games** are board games, card games, dice games among others. Most of the games we have created are within this category. Some examples of the most recent tabletop games are *Anti-Rumour*, *Herstory*, *FLYie*, *FEMALES*, *Legends of Disability*, *The Shopping Time* (within ID GAMES project), etc. Specifically the games designed within the project *Legends of Disability*, *ID GAMES* and *BRIDGE*, were focusing on the accessibility features while the *Herstory*, *FLYie*, *FEMALES* on the inclusivity aspect of board games.

Digital Games

Famous examples are PC games, xbox and playstation consoles, smartphone applications. The last 4 years we have been working in digital games and gamified applications. Some examples in this category are *Curate-D*, *MOMentum*, *Grandfriend*, *Zoo Keeper*, *INSPIRE*, *FemSTEAM Mysteries*, *AgriCharisma*, *PERIEGESIS*, *PARASKINIA*, *TA STEKIA*, *AEOLIA*, *FAREWELL ANATOLIA* etc. *MOMentum*, *FemSTEAM Mysteries*, *Grandfriend* etc are emphasizing on inclusivity while *Zookeeper*, *Canteen*, *Periegesis*, focus on accessibility for people with disabilities.

Phygital games

The most known Phygital game is the Wii console, but we can also mention some types of Scavenger Games that include QR scanning games/quiz games and are included in this category. Challedu's examples on Phygital games are *Tour-Fr(I)end*, *Emotions*, *Escapers*.

2. Gameplay

Gameplay is the way that the players interact with the game. This term refers to the player's interaction with the game itself, the storyline, the mechanics and the other players. In this

type of game, we will explore many categories: **Cooperative games, Puzzle games, Action games, Storytelling games, Role Playing games, Dexterity Games, Abstract Strategy games.**

Cooperative games

The **Cooperative Games are also called coalition games.** Most of our games are cooperative or semi-cooperative since we try to promote collaboration, interaction and development of soft skills and inclusion. Some examples are *Mystery in Nursing homes, Tour-Fr(I)end, Herstory, FLYie, FEMALES, The Directors, Blooming flowers, Specialites, The shopping time, Love game.*

Puzzle games

Puzzle games usually require that the players find a solution to an arising problem, in order to move up to the next levels or to finish first during the game. In this category, we might include escape rooms, mystery games and deduction games. In several projects we have utilized escape rooms, puzzles and riddles to empower our target groups. Some examples are *Mystery in nursing homes, ESCAPERS, Agro-Edu games, Coder, FemSTEAM Mysteries.*

Deduction games

Some examples from our games are *A Dive in Adventure, Tour-Fr(I)end, Herstory, Anti-Rumour, Agro Edu game.*

Mystery games

Some examples are *Murder in Pagrati, ESCAPERS, Mystery in nursing homes, Aeolia, Paraskinia, Ta stekia, FemSTEAM Mysteries.*

Action games

In **Action games**, players have to tackle challenges that require fast reactions and strong hand-eye coordination from the player. Within our program *The Little Scientists*, we also have many action games where students would improve their coordination, quick reaction etc.

Storytelling games

Storytelling is a quite popular method we utilize in game design. Some examples are: *A dive into the adventure, Specialites, The directors, ESCAPERS.*

Role playing games (RPGs)

These types of games are usually considered a sub-genre of storytelling games. Some of Challedu's game examples are *Simply4emotions*, *The shopping time*, *Agro-edu game*.

Dexterity games

In dexterity games the players compete with their physical reflexes and hand coordination. Through the project *The Little Scientist* we created many dexterity games. Moreover through *ABI GAMES* and *Bridge Game* jams, we developed many dexterity games for young children with autism and people with dementia.

Inspiration for game ideas

Co-creation game workshops

In the games that we want to focus on accessibility and inclusivity, we follow the co-creation game methodology which enables us to get inspired directly from the needs, the interests and the abilities of the target groups. Below, we are going to describe the methodology followed by co-creation of games from brainstorming to finalization.

The first step is the specification of the target group we will focus on and a deep research and need assessment from our team. It follows an engagement with groups, NGOs, educational centers that work mainly with this target group and an invitation to work together to facilitate the co-creation of games that meet their needs. It is important to mention that we also have discussions and focus group sessions to define the exact environment and way of implementation of the co-creation game workshops that facilitates the participation of the key target groups (eg. people with intellectual disability)

Together we implement the co-creation game jams/workshops which are like living labs that aim to achieve the following objectives:

- Bring together people from the community having different backgrounds, needs and abilities (e.g. people with intellectual disability, people with dementia), their caregivers, young volunteers, game designers, and healthcare professionals to co-create game prototypes.
- Develop games that empower those target groups and promote collaboration.
- Promote the social inclusion of our main target group by actively involving them in the game design process.

- Encourage young volunteers to participate in activities that bridge either intergenerational gaps or break stereotypes.
- Increase awareness and knowledge about various types of disabilities.
- Highlight the potential of "serious games" as a tool for improving the quality of life and well-being of various impairments.
- Challenge societal stigma surrounding disability and showcase the capabilities of disabled individuals.
- Promote games that offer mental and cognitive stimulation, mild physical exercise, and social interaction.
- Encourage participants to learn new and complex skills in a fun and engaging environment.

The inspiration of the game ideas comes directly from the co-creation workshops, where the participants are allowed to be heard, and they offer us a big insight into their real interests, needs and abilities during the game-play

Brainstorming for concept, gameplay, game scenario

As explained before, the main brainstorming of the concept of the game and some key features for the game play are co-created during the co-creation game workshops.

In order to move through with the brainstorming process, the concept, scenario and other aspects of the game creation process, we involve people from our target groups, in order to maximize the accessibility of the game.

Some participants we involve come from the following groups:

-People from vulnerable groups: Some examples are people with intellectual disability (idgames.eu), people with dementia (bridgeproject.eu), kids with autism (challedu.com/abi-games-en). In order to empower their participation, we explain what is the scope of the workshop in a clear and accessible way. We are emphasizing on creating a welcoming environment for them that responds to their needs. It is also important to have fun and play engaging games with them, that will not only give inspiration for the game-creation part but also will have potential benefits for their health and social life. People from vulnerable groups not only participate in the co-creation game workshops but also during all the phases of the testing, feedback and refining of the game.

-Carers/ parents /guardians: Their role during the brainstorming and ideation process is substantial since they know the skills, needs and abilities of the specific vulnerable target group and will help the other understand better what they also need in their everyday life to improve the inclusion and skills of them.

Professionals/educators working with vulnerable groups: They are the ones who know better how to handle the communication within the diverse team and which skills can be empowered in the most vulnerable group through the games. They also have the opportunity to develop new tools for their work, share their expertise with a wider audience, and contribute to an innovative project that can help improve the lives of their beneficiaries.

Young Volunteers: They are offering support during the workshops but they also have the opportunity to contribute to a meaningful project, to gain new skills and experiences, and the social benefits of interacting with diverse groups.

Game Designers: In our brainstorming sessions they are the leaders of the working teams that design the ideas for the games. Based on their background, they are capable of transforming simple ideas that usually come in the form of exercises from the professionals or the carers to games with deep game-play that provides skills and knowledge but also players have fun.

During the co-creation game workshops we divide the participants into subgroups that will develop collaborative ideas for games. A large workshop with 50 people could potentially be divided into 10-12 groups consisting of 2-3 people from vulnerable groups, 2-3 carers/parents/guardians, 1-2 professionals/educators, 2-3 young volunteers and 1-2 game designers (the one will be the leader of the team). In a smaller workshop with 12 people, they can be divided into 2-3 groups. There is no specification in terms of the size of the workshop but it is important to ensure a collaborative and safe environment for all the target groups and empower their participation regardless of their diverse backgrounds, needs and interests.

Each group usually creates at least one game idea which in some cases has reached the stage of a first prototype that can be tested. The co-creation game workshops we propose, usually last 3 days and this gives us the opportunity to facilitate a first verification of the idea by playing it with the key target group.

Game design process

After the co-creation game workshops the game designers of CHALLEDU collect all the ideas and the created prototypes and review them in terms of game concept, skills that need to be practiced, needs of our target groups etc. Most of the time, we select some ideas, along with the professionals/educators that are furtherly developed into prototypes of beta games. Usually at this stage we set specific objectives for each game idea. Based on these objectives we review the game-mechanics and redefine the rules to ensure that we reach the specific objectives. The objectives can be either learning objectives or skills empowerment or

promotion of inclusion of the key target group. They can also include all these aspects. Based on the objectives and game-mechanics we also develop the storyline, the characters and any other feature of the game.

At these stage, we also evaluate and develop the various features of the game (eg. board, cards, etc) taking into account various aspects of accessibility design such as:

- variations/adjustment levels of difficulty
- visual characteristics e.g. large fonts, high contrast, sans serif fonts etc
- adding sensory characteristics eg sounds, subtitles etc to create a greater number of prototypes that could be tested with many target groups

We also emphasize that for the **inclusiveness of the game**, we take into account characteristics such as:

- including characters with diverse genders, abilities, ages, colors etc
- developing a storyline that fosters collaboration and inclusivity
- promoting equality and giving leadership roles to diverse groups etc.

Finally, we always promote digital download of the games to reduce the environmental footprint of delivery.

Testing and evaluation

Testing prototypes

After having created beta game prototypes, we reach out to our collaborators who work every day with the specific target groups, and train them to facilitate the game. They afterwards test the game with the target group (with or without our participation). Usually, 2 game designers are involved in the testing, with one facilitating together with the professionals/educators of our collaborator the testing session and the other one observing participants, noting down reactions, ideas, met and unmet needs. We usually organize playtesting sessions that last around 1.5 hours per game.

The testing phase and back and forth of beta game versions can vary from 3 to 6 months. During it, the game mechanics, storyline, characters, rules etc are revised again and again until they meet all the criteria. Moreover when we have a version that is close to the final game, we start developing the graphics, illustrations etc., to ensure testing them as well and taking feedback from the key target group in terms of accessibility and inclusivity.

Finalization of the game

Collecting feedback and refining prototypes

As explained before, the playtesting sessions give us the opportunity to finalize the games. Our creative team collects the feedback and makes all the needed adjustments to finalize the prototypes, while all the graphics, illustration, coding etc. is tested. After the finalization, we usually translate the game into other EU languages (based on the project), in order to maximize the accessibility of the material.

Conclusions/recommendations for our target audience

Challedu has designed numerous types of games throughout the years. This experience is manifested in better management and familiarity in the games' creation process, with special focus in the games we specialize, that are created through an educational and social perspective.

An important aspect in game design, is to include target groups in the game creation process. For example, including the target groups in brainstorming, in the beginning of the actual creation process, will provide adequate and precise parameters in the overall process.

Focusing on the co-creation methodology, it is a lively and engaging process that goes beyond game creation. If it is organized and implemented correctly, it can bring social change in the local communities and through International partnerships, it can have worldwide outreach. This methodology fosters an overall community engagement and creates a space for NGOs, volunteers and communities in local and international level, making it a significant method in the social and educational games sector.

This specific method requires that the game creators are active and motivated in aspects outside of the classic game designer role.

In the final stages of the game design process, the playtesting is a fertile ground for the polishing of the game and should be monitored thoroughly, with questionnaires and open discussions in order to get feedback on the creation process. It is a good practice to bring the game designers in direct contact with the target groups, as well as educators and professionals working with them) through video calls, playtesting sessions, events.

Another important aspect is the creation of a template that includes accessible and inclusive game design practices and features. This template should always remain open for review by the target groups.

In conclusion, Accessibility and Inclusivity is achieved through continuous research, inclusion of multiple people in the process and maintaining quality standards.

Further resources

The procedure of co-creation game workshops and following game creation and testing is described in the methodological guides of our Erasmus + projects Bridge and ID games. In the national context, we have used the same methodology in the project Legends of disability and ABI games.