Integrating drug safe use and harm reduction techniques into a story based digital game

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Abstract

This paper presents the development of a novel game concept, the objective of which is to encourage risk competence within at-risk youth. The game concept is based on the overhauled concept of the predecessor game, "All Tomorrows Parties". The results from the citizen scientist workshops, as well as the prevention advisory board, were an integral part of its success. Developing the prototype was facilitated by using the software Figma and Obsidian. An evaluation of the prototype was conducted with the target demographic and it was revealed that the interaction with the prototype generated dynamic discourse among the groups of young people, thereby functioning as a catalyst for reflection on risk competence and responsibility. For subsequent application, it is recommended that both the prototype be utilized as a risk competency workshop tool and the workshop concept be employed with story boarding, to achieve the most influential effect on the adolescents.

Keywords

Addiction Prevention, Serious Gaming, Story Based, Risk Reduction, Safer Use, Empowerment, Citizen Scientists

1. Introduction

Over the course of several decades, a substantial amount of research has been conducted that has resulted in a considerable change in our understanding of substance use and its effects on the brain. This knowledge has facilitated novel approaches to the prevention and treatment of substance use disorders. In addition to this, there is now substantial scientific evidence that adolescence represents a critical risk period for substance use and addiction. Alcohol and marijuana, for instance, have been identified as addictive substances that exert particularly harmful effects on the developing adolescent brain[1].

Due to these findings it is imperative that the fields of addiction and drug work evolve and adapt to the constant emergence of novel substances and methods of addiction, as well as the transformative experiences of individuals struggling with these challenges. The success of prevention and support is dependent upon their ability to resonate with the diverse generational and cultural contexts of affected communities, aligning with their real-life experiences[2].

In addressing this challenge, a proposed approach involves the cultivation of five fundamental competencies in adolescents and young adults: a positive sense of self, self-control, decision-making skills, a moral system of belief, and prosocial connectedness[3]. Adolescence is a period of increased risk behavior, characterized by experimentation and subsequent engagement in behaviors that can have immediate and long-term consequences, affecting individuals' physical and mental well-being, as well as their future prospects. A specific group of youth who are particularly vulnerable to risk behaviors is referred to as "at-risk youth"[3]. The vulnerability of this group is attributed to a combination of individual youth characteristics, the contexts in which they live, the situations they encounter, and the manner in which these factors interact over time[3].

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To facilitate the development of the competencies mentioned above, two aspects need to align and work together as a unit:

Firstly we have the medium of serious games, more specifically persuasive games, defined as follows: "Game design aiming to create a user experienced game world to change the user behavior in the real world." This medium must possess two vital qualities - immersion and enjoyment - in order to effectively evoke a change in user behavior[4]. Further insights into this topic in Chapter 1.1.

The second aspect necessary to evoke change and learning in youth, as proposed by the self-determination theory[5], involves fulfilling three key needs: competence, relatedness, and autonomy. The aspect of relatedness has been identified as a particularly challenging element in the implementation of this theory, as it is not always easy for youth workers to empathize with the experiences of young people[5]. They are often unfamiliar with the environments and situations youth face daily, both in scope and content. However, this familiarity is crucial, as it forms the foundation for effectively implementing risk literacy strategies. The method employed to elicit a process of learning within the players in a game setting is a crucial tool for the successful development of such an application. This subject will be discussed in more detail in Chapter 1.2.

The conceptual framework underlying *All Tomorrow's Parties*, the predecessor to *LEWELJU* (the project discussed in this paper), is rooted in game-based elements, aiming to achieve a synthesis of both aspects.

1.1. Serious and Persuasive Games

The concept of Serious Games has existed for a considerable period of time, with applications in domains such as education, training, military and communication. However, as evidenced by Laamarti et al[6], there has been a significant growth in the field of Serious Games in research from 1995 to 2013, demonstrating the increasing relevance of Serious Games in research. Furthermore, the term is subject to various definitions, including the following:

"Games that do not have entertainment, enjoyment, or fun as their primary purpose."[7]

A critical distinction between serious games and traditional games lies in the incorporation of diverse media and content, along with a specific intent and purpose designed to elicit a deliberate response from players. Interestingly, Trépanier-Jobin[8] argues that all games have a serious implication integrated within them and that all games teach or enhance certain skills of the players, considering the role-playing nature of traditional games. Furthermore, the fact that the main purpose of serious games focuses on teaching and education does not mean that the entertainment value is lost on them, as these two aspects often overlap and take advantage of each other[8]. Ian Bogost was the first to coin the term "persuasive games" with a means to define games that "[...]convey messages, draw arguments, convince players to adopt a specific point of view, change their beliefs about the world or influence their behaviours"[9]. It is evident that this definition is of particular significance in relation to the objective of LEWELJU, which leads to the secondary aspect of the discussion.

1.2. Meaningful Learning In Serious Games

Serious Games are distinguished by a range of mechanics, components and features that are more intricate in nature than those found in traditional games. Furthermore, the elements vary considerably between serious games, depending on the desired effect of the application. Therefore, it is evident that a single mechanic will not be applicable to all serious games[10]. In particular, LEWELJU is characterized by its emphasis on meaningful choices and meaningful learning. Meaningful learning is an educational theory, which can be defined as follows:

"Meaningful learning is the process of acquiring knowledge by relating new information to what is already known, enhancing comprehension and the ability to apply the information effectively in various contexts."[11]

The exploration of meaningful decisions is founded on the premise that games facilitate the creation of personalized and meaningful experiences through conscious decision-making processes, thereby

aligning with the principles of meaningful learning[11]. How meaningful choices were integrated into LEWELJU will be revisited at a later point (Chapter 3.1.2).

In order to facilitate meaningful learning[11], five characteristics must be present: activity, construction, intention, authenticity and cooperation. Active learning is defined by interaction and manipulation of content, leading to construction in the form of observable results and deeper understanding. Intentional learning is goal-directed, helping students to focus their efforts effectively, while authentic learning applies content in real-world contexts for better comprehension, retention and transfer. Collaborative learning encourages sharing ideas and perspectives to enhance understanding through teamwork and all of the previously mentioned characteristics are of an interconnected nature, and the necessity of their integration for effective learning, should be noted. The aspect of authenticity correlates with the aspect of relatedness and therefore presents a crucial pillar for this project, in order to achieve the desired effect within the players[11].

1.3. Risflecting-Approach

A similar practical application to that of this paper's project was adopted with the *risflecting* approach[12], a novel communication model. It is founded on the concept of risk-integrative prevention, which is achieved by encouraging individuals to consciously integrate and use experiences of intoxication and risk in their personal, social and societal lives, as well as utilizing such experience in everyday life. The program emphasizes responsibility, self-awareness, and intentional decision-making regarding non-everyday behaviors. It is important to note that the program is not intended for problematic substance users on a regular basis or those with a long history of excessive risk-taking behavior. Instead, it has been developed for individuals who may unintentionally engage in risky situations. It is founded on three key principles: Firstly, it is important to pause and assess one's mental and physical state, and to make conscious choices. Secondly, it is important to be mindful of and attentive to the needs of friends in social settings. Thirdly, it is recommended to engage in discourse and reflection on past experiences to enhance the navigation of future scenarios[12].

1.4. All Tomorrows Parties (ATP)

In order to resolve the issues previously mentioned, *All Tomorrow's Parties* sought to develop a mobile gaming application that was oriented towards self-empowerment, whilst simultaneously increasing risk and action competencies, and establishing new behavioral models. It encourages decision-making and risk assessment within the context of taking responsibility for themselves as well as others. Rather than evading risk, the objective is to make risk a tangible entity by rendering it as close to real-life experiences as possible. In order to facilitate the translation of these competencies into real-life learning, it is recommended that players be encouraged by repeatedly engaging in playful action patterns, mirroring such experiences. With regard to the methodological approach, the project was founded upon the principles of gamification, storytelling, and co-design.

The game was designed to convey primary experiences beyond the digital game world, with excitement and thrills serving to build a bridge to real life and ensure a high level of immersion. Additionally, the aim of the design was to create a shared experience that would enable young people to find new peers. The target group for this project consists of vocational school students and apprentices aged between 15 and 18 who frequently consume substances (primarily alcohol and cannabis) outside of school or work hours. The game was developed in collaboration with the *Institute for Addiction Prevention Vienna (ISP)* as part of a commissioned research project.

ATP, in its realized form, is a serious game designed to help players reflect on risky behavior and strengthen their sense of responsibility for friends in a playful, engaging way. Players take on the role of a virtual party crew member, making individual decisions during entertaining and realistic scenarios that simulate a party night. These decisions directly impact the behavior of their crew members and influence their ability to manage risks. The objective of the game is to navigate the crew safely through the simulated social events without excessive caution, which might result in diminished enjoyment, or

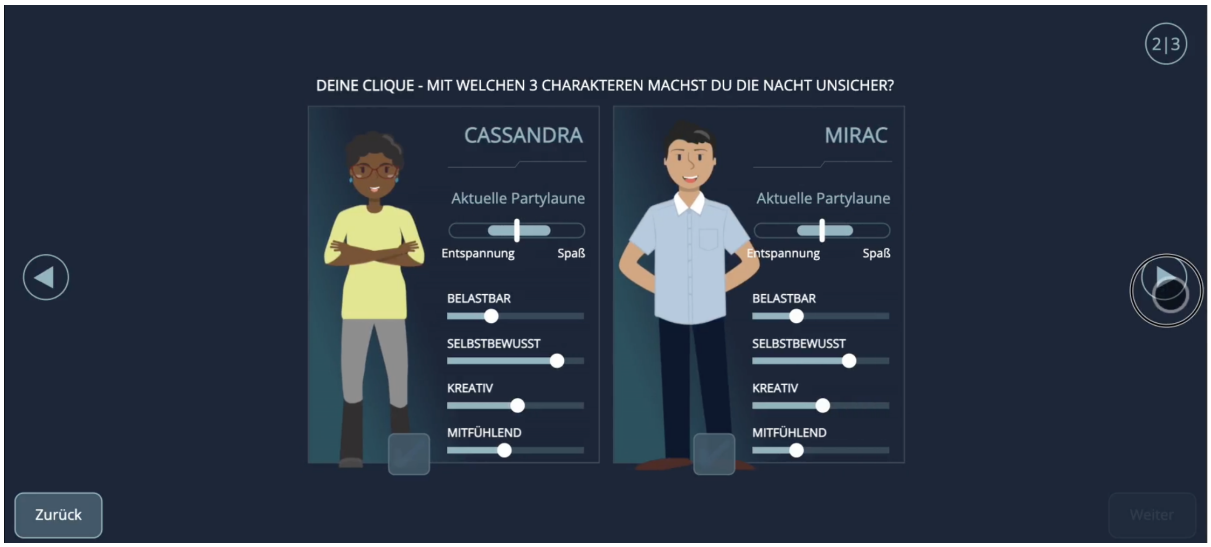


Figure 1: Two of the characters the players can choose from, displaying different characteristics, personality and mood.

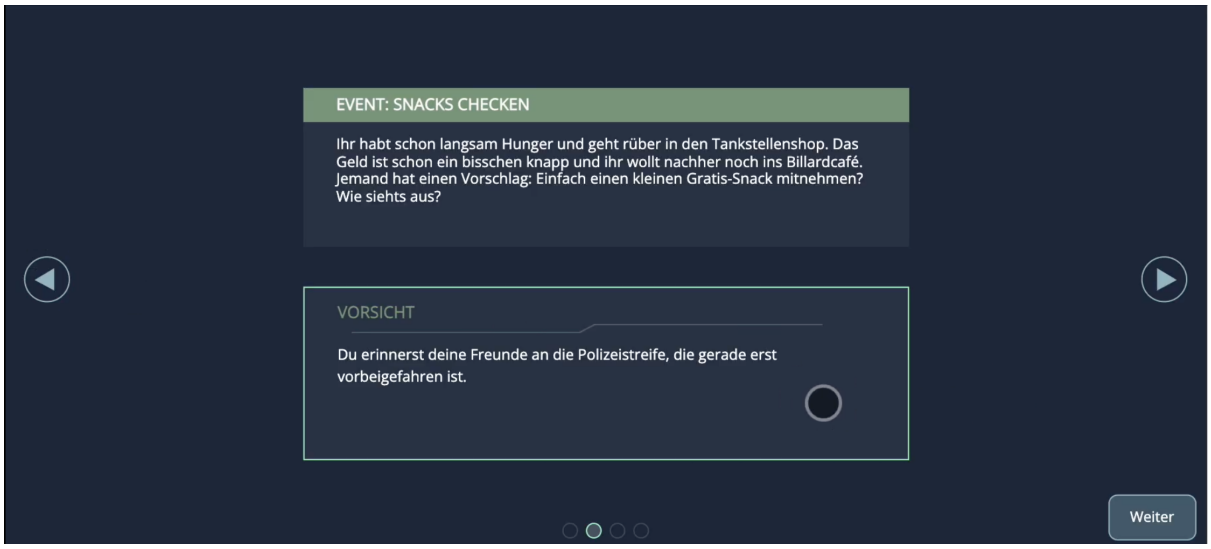


Figure 2: Event: Get snacks (buy it or shop lift), the player reminds the crew that a police car just rounded the corner.

recklessness, which could lead to adverse health or social consequences.

The reception of the mobile application was mostly positive, as its strengths lie primarily in its capacity for entertainment and the range of decision-making options available to players. There was a general consensus that the game provided both engaging and entertaining content, while also sustaining players' interest. However, the target group also identified several criticisms, including poor immersion, moralism, unrealistic content, and excessive text. The most significant feedback highlighted a disconnect between the game's exaggerated fictional world and the target group's real-life experiences, making it an inadequate reflection of their daily lives. The pursuit of hyper-realism was not seen as particularly appealing; rather, it hindered player immersion, creating a contradiction between the desire for authenticity and the fundamental elements of game entertainment and suspense.

Based on the findings, the concept fosters player engagement and interest, with the potential to enhance learning in risk competency and responsibility. However, it is imperative that the content of the serious game is more closely aligned with the experiences of the target group. Failure to meet these expectations and standards may result in the application being perceived as a mere form of entertainment.

2. Methods

The core concept of *All Tomorrow's Parties (ATP)* was intended for use in its follow-up project, *LEWELJU (Development Workshops on Real-Life Scenarios for a Risk Competence Game for Young People)*. While the medium proved successful, the content required improvement. Implementing these improvements may enable the revised game concept based on *ATP* to serve as an access catalyst in two way: first, by reflecting participants' realities within the game content, and second, by incorporating their own life experiences into the gameplay. The overarching objective of *LEWELJU* remains consistent with that of *ATP* - empowering vocational students and apprentices, who often belong to at-risk youth groups, by authentically representing their lived experiences. This alignment is essential, as only by mirroring their reality can the game function effectively as a training tool for risk competence. In doing so, the game could evolve into a dynamic, contemporary tool for youth work.

The central research questions guiding this project were: *Is it feasible to co-develop scenarios with the target group for use in both games and education? What design principles should guide the development of such workshops?*

2.1. Workshop concept

In order to accomplish the objectives of the project, it is necessary to adopt a different approach to content generation than that taken with *ATP*, given that the content was primarily created by service workers and did not evoke the desired interest and relatedness within the players. The approach that was chosen to overcome this obstacle was citizen science, a term that is defined in a variety of ways depending on the sector. Socientize[13] defines the term in a white paper as follows:

"In Citizen Science, a broad network of people collaborate. Participants provide experimental data and facilities for researchers, raise new questions and co-create a new scientific culture".

In the case of *LEWELJU*, it has been determined that vocational students and members of youth centers who have come into contact with substances, or regularly do so, represent a suitable pool of citizen scientists, considering that they represent a possible collection of at-risk youth. The rationale behind this decision is that they can utilize their own experience and reality, engage in discussion and comparison with others, and determine narratives that reflect the collective stance of the group on the topic.

The primary purpose of their involvement in the workshops was to generate ideas for crew, locations, and events that reflected their own experiences and values, all woven into a coherent story. The outcomes of these workshops were intended to serve as in-game content for the prototype. The workshop series comprised three sessions, preceded by a pre-workshop to assess participants' receptiveness and adjust the subsequent sessions if needed. However, this adjustment was unnecessary, as the format received overwhelmingly positive feedback. The pre-workshop was conducted at St. Pölten UAS, while the second workshop took place at the *Mobile Youth Work Donaufeld* and the third one at the vocational school *Evita Mollardgasse*. The citizen scientists participated in a group setting and were tasked with creating a "supernight".

Each session began with a welcome and an introduction of all participants, followed by a brief video presentation of the predecessor game, *All Tomorrow's Parties*. The moderator then introduced storyboard templates, using the film *The Hangover*[14] as an example. Participants would later use these templates to design their own version of a 'supernight'. Thereafter, the participants were divided into groups and engaged in a warm-up exercise ('Bad Ideas'). This was followed by the development of a story, spanning over the course of a night out, including four characters, a minimum of one location and several events. The participants then presented their stories to each other, after which a debriefing and discussion took place, closing the session.

In response to concerns raised by the *ISP* regarding the narratives' impact—particularly their nonchalant depiction of substance abuse—a prevention advisory board was established. To address these concerns, two experts from *Addiction Prevention Lower Austria* and one from *St. Pölten University of Applied Sciences (St. Pölten UAS)* were invited to collaborate in a workshop with the project team.

During the workshop, the game concept of *All Tomorrow's Parties (ATP)* and the citizen scientists' stories were presented, followed by an in-depth discussion on the characteristics of an effective story-based empowerment game. This collaboration led to a significant shift in focus toward harm reduction, emphasizing safer use and risk minimization in both singular and poly-drug use — an aspect that would prove crucial in the next phase of the project, the prototype development.

2.2. Overhauled game concept

The game concept was improved upon by the addition of authentic content, which was produced by the citizen scientists through the previously mentioned workshop concepts. A total of three workshops were conducted, with a cumulative total of 25 young people participating. During the course of these workshops, the participants generated six narratives, 22 characters and 17 locations. The workshops facilitated a process of introspection, wherein the young people offered insights into their lived experiences, providing a foundation for a reflective exploration of substance use and risk management in everyday life. It is noteworthy that the intended reflection and educational impact, already had a marginal effect during the workshops.

Based on the conclusions drawn from the expert workshop, extensive research was conducted to further explore the complex topics that need to be integrated into the revised game concept. This research aims to ensure sustained player interest and engagement. A broad overview of findings on poly-drug use, safer use, and harm reduction will be presented in Chapters 2.3.1 and 2.3.2.

Additionally, the workshop's findings revealed that the complete prevention of drug use was not consistent with the experiences of young people, as sometimes peer pressure can affect consumption behavior. Furthermore, some affected groups have no intention of discontinuing substance use. This discrepancy has been shown to result in waning interest among the youths in regard to the game. It is acknowledged, however, that the players' interest is a vital part of the knowledge transfer process and is therefore an integral aspect of the game's effectiveness[15].

2.3. Research

This chapter examines research on poly-drug use, safer use, and harm reduction — complex topics essential for a deeper understanding of potential players.

2.3.1. Poly-Drug Use

The definition of poly-drug use has evolved over time, and since 1948, the term has been used to denote poly-substance use. In this context, it specifically refers to the simultaneous consumption of various substances, as opposed to concurrent poly-drug use, which describes the use of different substances on separate occasions[16].

The most common poly-drug use combinations in Europe are as follows:

- heroin and cocaine
- cocaine, cannabis and alcohol
- cannabis and alcohol

In consideration of the findings, it can be stated that alcohol is a recurring common denominator, thereby emphasizing the importance of recognizing poly-drug use as such[16].

In adolescents, alcohol, tobacco, and cannabis are the most commonly used substances. The use of multiple drugs by adolescents in general has been associated with a number of outcomes, including but not limited to: non-completion of schooling, substandard academic performance, psychosocial difficulties, depressive symptoms, psychological distress, legal issues, interpersonal challenges, a propensity for risky sexual behavior, and physical health concerns[17]. In addition to the long-term repercussions, the consumption of two or more substances within a brief span of time, or over the course of a single night, can impose a considerable strain on the body and psyche, as the likelihood of adverse events increases.

The effect of combining substances is inherently unpredictable, which poses a considerable challenge in determining the appropriate dosage for each individual substance. It is imperative to consider the effect of a combination of substances not merely as the sum of the individual effects of each substance[18].

To illustrate this,

- LSD and ecstasy, when consumed in combination, may not elicit the anticipated effects of visual enhancement and emotional warmth, but instead can lead to adverse reactions such as fear and confusion.
- Smoking cannabis after taking ecstasy does not necessarily induce a relaxing effect. Instead, it can potentially amplify the effects of ecstasy, sometimes triggering additional hallucinations.

The combination of several sedative substances, commonly referred to as 'downers', is a matter of particular concern. This combination has been known to induce potentially life-threatening respiratory depression[18].

The consumption of multiple substances has been depicted in the stories accordingly. When specific choices are made by the players, Peter (one of the characters in the game) mixes alcohol with cannabis, which has an effect on the mood of the crew. Moreover, players have the option for Peter to consume MDMA (empathogenic, entactogenic and a stimulant[19]) in combination with alcohol and cannabis, which ultimately triggers the most severe outcome—an ambulance being called due to Peter's adverse reaction to the substances.

2.3.2. Harm Minimization, Risk Reduction and Safer Use

Harm minimization, in this context, emerged in the expert workshop as a viable strategy to promote risk competence while possibly maintaining player engagement. The fundamental principle of harm reduction[20] has developed over time through accumulated experience in the treatment of drug addiction. It was evident that those affected had a good chance of 'maturing' out of their dependency if their chances of survival were improved. Research has shown that many of the health and social problems experienced by drug users are not solely caused by the substances themselves but rather by the methods of consumption, the conditions under which they are used, and the social exclusion and criminalization of users. Consequently, an approach has been developed that seeks to reduce the impact of these harmful influences by embracing a more tolerant stance[20]. However, this does not apply to the target group to the same extent, given that the risk scenarios frequently depict the initial use of drugs or the consumption of inexperienced users and not necessarily long-term users.

In order to minimize the risk of substance-related harm, a number of measures can be taken[18]. It is recommended to start with a minimal dose in order to gauge the effects. It is imperative to take regular breaks from substance use to ensure adequate rest for the body and mind, as substance effects can vary greatly from person to person and are influenced by various factors. Some substances take a long time to take effect, and personal condition (depressive episode vs. neutral vs. manic episode) and environment can also influence the effect. It is recommended that personal equipment is used and that the environment is kept clean. When injecting substances intravenously, the risk of infection is significantly increased. For this reason, the use of disposable syringes and fresh equipment for injection is essential. It is important to note that many substances can cause an increase in body temperature, and therefore, it is advisable to incorporate rest and cooling phases into one's routine, ensuring the consumption of approximately 0.5 liters of non-alcoholic beverages per hour. In addition, a diet consisting of light meals and fruit is recommended[18].

Adverse health effects resulting from the inhalation of substances through the nasal cavity can be mitigated by adhering to *"Safer Sniffing"*[18] techniques. This approach is recommended due to the potential for damage to the nasal cavity and an increased risk of infection. Prior to the utilization of substances through the nasal cavity, it is advised to refrain from use in the event of an injured nostril or a chronic cold. The substance should be applied to a clean surface, preferably in powder form, to minimize the risk of larger particles becoming lodged in the nasal cavity and causing damage to the

nasal mucosa. It is equally important to exercise caution and refrain from using banknotes, as they carry an added risk of infection. It is recommended to clean the nose before and after use to ensure that all residue is removed[18].

3. Concept Evaluation

This chapter discusses the improved game concept alongside its realization through a prototype. Additionally, the evaluation of the prototype and its results will be examined.

3.1. Prototype

The game concept prototype was developed as a web-based click prototype rather than an extension of *ATP's* mobile game. The development process utilized *Figma*[21] and *Obsidian*[22], each serving distinct purposes. *Figma*[21], a cloud-based design and prototyping tool, was primarily used for creating user interface (UI) and user experience (UX) designs. Meanwhile, *Obsidian*[22], a writing application, was utilized to map out the branching narrative.

3.1.1. Story

One of the six narratives generated in the citizen scientist workshops was selected as the story base for the prototype. While the core story remained intact, slight adaptations were made for credibility, and the narrative was fully developed. The characters and locations were preserved without alteration. For a better understanding of the topics discussed in the next chapter, here is a short insight into the story "Der Schwan" (The swan) as created by the participants:

Everyone at the water park has something to do. Maxwell is a drug dealer and wants to sell drugs there. Two people want to take drugs and Briana is a bit crazy and wants to hunt swans. There are various tasks at the water park: the two people who want to take drugs have to get them. Maxwell wants to sell drugs, win customers and become known as a dealer. Briana wants to shoot her cosplay videos and hunt swans. Peter has no home, so they try to find him a place to sleep. He tries to protect the swans and stop Briana from hunting them. Then they want to go to a gym without a pass, which could get them caught. If they get caught, they'll get taken away and reported. That's the end of the evening. If they don't get caught, they have fun with the gym equipment and see who is the strongest. They want to buy alcohol and food at a petrol station and pay by card. The positive outcome is that they get the alcohol with a fake ID and have enough money on their card. The negative outcome is that their ID is confiscated and they don't get any food. The evening ends at Briana's flat. Depending on how her hunt went, she ends up with the swan. There they can relax and don't have to hide from the police with all their stuff. The aim of the visit is to drink alcohol. The flat is very cramped, very small, with no kitchen, only a microwave (which is why they eat at the petrol station). At best, the evening ends there and they all go home the next morning. But they could get caught anywhere and end up at the police station, and then the evening ends there and you've lost.

3.1.2. Gameflow

The click prototype is structured with the players being presented with a circumstance, then a problem and lastly a decision (Figure 4a). Each decision has two options the players could choose from, and each option has a different outcome. The game has four endings, the good, the medium, the bad and the ugly, depending on the players choices.

At the game's start, the crew members are introduced by name and two characteristics they embody, in addition to a portrait as can be seen in Figure 3 (a). Each character enters the game with a predetermined mood, the development of which is influenced by the choices made by the players.

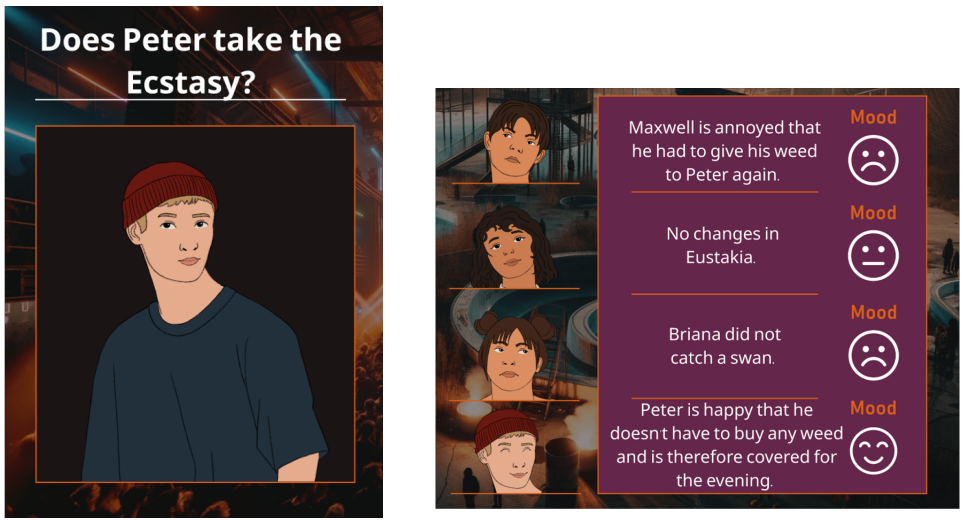
The mood of the crew members can be categorized into four states: *happy*, *neutral*, *sad* and *incapacitated/left*. If one character achieves the mood *incapacitated/left* the game is over, as the objective of the

(a) Two characters as displayed in the games screen.

(b) The options for preparations before starting the night out.

Figure 3: Two in-game screenshots showing two characters and night out preparations

game is to ensure that the crew members remain unscathed throughout their night out, without losing any members of the crew. A mood change based in a decision is depicted in Figure 4 (b).



(a) (b)

Figure 4: Two in-game screenshots showing (a) Peters choice in *Der Schwan*, and (b) the affected mood of the crew when the player makes a decision.

An additional method of minimizing risk was also included, but was to take place before the start of the story. The definition of three prerequisites by the players was to be incorporated, but this functionality was only implemented in a prototypical manner. The reason for this was that the variables would have had an effect on each character's mood respectively, and therefore extensive branching of the narrative would have been caused. This would then have been out of scope for the project.

Consequently, a decision was made to create the impression of choice, despite the fact that it was a fixed aspect of the game. The objective of this approach was to demonstrate that effective preparation for a night out can serve as a means of reducing the risk of substance consumption. The three needs that were displayed were *food intake*, *mental state* and *soberness*. The variability of each need is illustrated in Figure 3 (b). In the case of the prototype the needs were preselected as follows: ate a snack, relatively mentally present and reasonably fit again. Consequently, the characters entered the scenario with all their moods set in neutral.

Throughout the game, each character must make a decision that leads to two possible paths, with consequences that impact both the crew's mood and the course of the night. This approach enables the incorporation of branching narratives, which are integral to the game's structure. To ensure consistency throughout the story, the entire narrative with all possible endings is mapped out, including choices,

consequences, mood changes, locations, and other elements as can be seen in Figure 5.

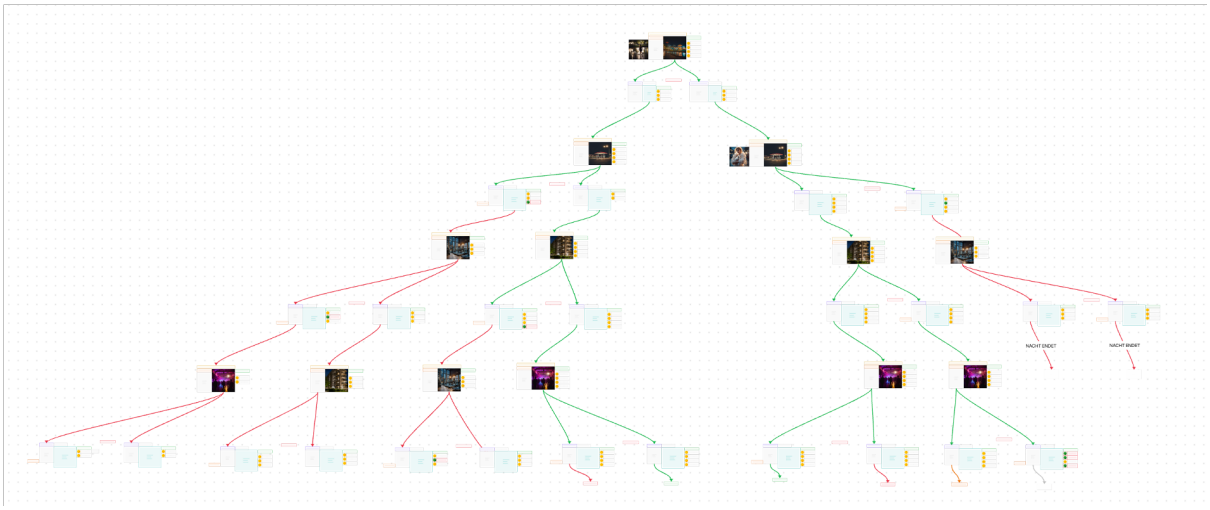


Figure 5: The possible changes in mood, due to a decision made by the players.

A key aspect of this approach was the importance of meaningful choices for players, which also had to be reflected in the consequences. This concept is closely related to the notion of meaningful play, which can be defined as "the relationship between actions and outcomes ...[being] both discernible and integrated into the larger context of the game" [23].

- Discernible is the case when its results are communicated in a perceivable way (short-term feedback)
- Integrated is the case when it holds global significance during the play experience by affecting long-term development (long-term feedback) [23]

The following example will illustrate this point: The crew goes to the water park because Maxwell wants to sell his home-grown cannabis. Meanwhile, Briana goes swan hunting with Eustakia. However, Peter wants to mooch off of Maxwell again and wants the weed. Below, the options and their consequences are described, and it is important to note that the consequences can only be seen after the players have made their choice.

- **Option A**: Maxwell gives Peter his weed, even though he does not earn any money from it, he prefers knowing his friend is consuming his clean weed.
- **Consequence**: Maxwell gives Peter his weed, which lowers Maxwell's spirits as he is not making any money from it, but at least he knows what his friend is using. Peter's mood is lifted as he has enough weed for the night. Briana did not catch a swan because she did not have enough time.

When Option A is chosen, the following outcome is discernible: Maxwell provides Peter with marijuana, but does not gain any financial benefit from it, and Peter enjoys using it, resulting in an improved mood. The integrated outcome is that Maxwell has less money on him and cannot pay for food or drink in the future, and Peter has a good high, which is reflected in his actions.

- **Option B**: Maxwell is fed up with Peter always scrounging his weed. He tells Peter to get his own weed and stop mooching off of him.
- **Consequence**: Due to Peter's persistent behavior, Maxwell tells him to grow his own weed and refuses to give him any. Maxwell feels satisfied for finally standing up for himself and successfully making a sale in the park. Meanwhile, Peter, frustrated at being denied weed for the night, unknowingly purchases synthetic cannabis at the water park and consumes it — only to suffer a severe adverse reaction.

If Option B is chosen, the discernible consequence would be that Maxwell profits from the sale of the cannabis, while Peter, driven by his desire for the substance, resorts to buying it from an unknown dealer. This leads to an integrated outcome - Maxwell has money and can buy food and drink if necessary, but Peter's unfamiliarity with the dealer leads him to unknowingly buy and consume synthetic cannabis, triggering a negative experience commonly known as a 'bad trip'. As a result, his mood deteriorates, affecting not only himself but the rest of the crew, and possibly leading to an early end to the game.

The collective functionalities of the prototype were designed to facilitate optimal immersion in the stories and scenarios, thereby encouraging reflection among players.

3.2. Evaluation

The prototype was evaluated in a workshop at the *Youth Center Donaufeld.* Additionally, a second evaluation was conducted, in which a student assistant incorporated a second story generated during the workshops, titled *Mischkonsum* (meaning 'poly-drug use'), integrating the previously discussed research into the narrative. This narrative was then inserted in the *Figma*[21] prototype blueprint of the first narrative and tested with a group of students from the *Höhere Technische Lehranstalt (HTL) St. Pölten* ('Higher Technical Institute' is an Austrian secondary school specializing in technical and engineering education). This evaluation will be discussed separately in Chapter 3.3.2.

Two distinct methods were used to evaluate the prototype:

- The **survey method** is employed to obtain direct feedback from the participants, with surveys incorporating structured questionnaires that focus on the experiences and perceptions of the young people during the game scenarios. The questions cover topics such as risk perception, decision-making and emotional reactions, thereby providing valuable information about the subjective impressions and the learning effect of the prototype on the topic of mixed consumption.
- The **observation method** is used to record the actual behavior and emotional reactions of the participants in the game situations. A range of non-verbal phenomena, including facial expressions, gestures, posture and general behavior, are systematically documented while the subjects, who are young people, are engaged in the prototype.

This methodological approach facilitates the identification of unconscious reactions and spontaneous behavioral patterns that may not be revealed during interviews, and the observations thus provide a supplementary perspective on the subjects' reactions and serve to enhance the data collected through the survey instrument.

3.3. Results

In this chapter the results of the evaluation will be delved into.

3.3.1. Youth Center Donaufeld

The results from the workshop with the youth center were as follows:

A total of eight young people participated in the study, comprising of three female and five male participants, with a diverse range of cultural backgrounds. Four of the participants had previously engaged in the story development workshop.

The project was introduced in a preliminary session, followed by an explanation of the story creation process and the commencement of prototype development. The young participants were shown the respective screens on a projector, starting with the location and situation, followed by the two possible decisions for each character. A group discussion ensued, leading to a consensus-based decision. When consensus could not be reached, majority rule was applied. Most participants arrived at a consensus relatively quickly, with only four individuals requiring additional time. The discussion was highly engaging, with three participants (one girl and two boys) actively contributing, while another girl and boy remained more reserved. The discussion primarily focused on the characters' backgrounds,

personalities, and moods. During the first playthrough, the group's objective was to ensure the crew's safety, which they successfully achieved. However, this did not necessarily result in a happy end. In the second playthrough, some participants became curious about the consequences of risky decisions. As a result, the crew did not survive the night. By the third attempt, achieving a happy end became a priority, leading to extensive discussion and ultimately a successful outcome. A key focus was placed on assessing the crew members' moods after each decision. The young participants had previously attended a workshop with Checkit! [24], where they were introduced to the concept of mixed consumption, which influenced their decision-making. The discussion was characterized by engagement and occasionally heated exchanges, yet remained respectful and non-aggressive. Notably, the young people expressed satisfaction with the continuation of their narrative from the initial workshop, in which some of them had participated.

3.3.2. HTL St. Pölten

The second story prototype was tested with two groups, each consisting of four participants. Group one included four male participants, while group two comprised three male and one female. To ensure optimal observation, the tests were conducted separately for each group. The group setting for the test proved to be a wise choice, as the students engaged in lively discussions about which choices to make. Some preferred a safer approach, while others adopted a more experimental attitude, demonstrating a 'let's see what happens' mindset. Some participants drew parallels between the situations and behaviors depicted in the prototype and their real-life experiences. For example, one participant noted that they knew someone who had engaged in similar behavior without facing any adverse consequences. The discourse within the group focused intently on the implications of the choices at hand, emphasizing the significance of risk and consequences. The pursuit of a favorable outcome emerged as a collective desire, albeit one that necessitated a process of experimentation, refinement, and, on occasion, a degree of humor in the face of setbacks. Over time, however, the initial elation gradually gave way to a more noticeable sense of disappointment. Conversely, successfully navigating a decision was met with celebratory gestures and high excitement. Notably, students showed heightened interest when informed that they could experience the most unfavorable outcome, rather than just a positive result.

In conclusion, the desired reflection did take place, supporting the argument that *LEWELJU* achieved its intended purpose.

4. Conclusion

In summary, the involvement of both citizen scientists and addiction experts in the project proved to be a highly positive experience. This involvement enabled a more profound understanding to be achieved with respect to the perspectives and needs of the young people and the target group. Furthermore, it facilitated a more complete realization of the realities experienced by the target group, thus enabling the development of more engaging and relevant content. Moreover, the game medium, as experienced by players, represents a protective world as described by Visch[4], thereby enabling a more experimental approach towards the story, as evidenced by the results of the evaluation. This protective world empowers players to learn about the repercussions and consequences of certain poly-drug use or potential risk minimization techniques without the necessity of trying them out in real life. Consequently, it is imperative to encourage both the risk-focused and "happy ending" approaches among players.

The evaluation demonstrated that the interaction with the prototype elicited dynamic discourse among the groups of young people, thereby functioning as a catalyst for reflection on risk competence and responsibility. This phenomenon presents a continuous opportunity for content generation by the target group for the target group, which can subsequently be integrated into the prototype. This approach fosters a more diverse representation of scenarios and realities within the game, thereby enhancing its relatability and recognition among a broader player base. For future application, it is recommended that both the prototype be utilized as a risk competency workshop tool and the workshop

concept be employed with story boarding as a means to encourage reflection and the development of potentially new behavioral patterns, to achieve the most influential effect on the adolescents.

Furthermore, all five characteristics of meaningful learning are covered when using the workshop and prototype method. The active learning aspect is realised through the interaction of the target group with the prototype and their observation of their own actions and the resulting consequences. This process fosters the construction of novel meanings and encourages reflection on their understanding. The intentional learning component is integrated into the process by encouraging students to set goals of achieving the best or worst possible night, and the collaborative aspect is reinforced by having a group of adolescents use the prototype collectively and discuss potential choices they should make. This step is revisited during the story creation process of the "supernight" within groups. Finally, the authentic aspect is addressed by the creation of locations, scenarios and characters **by** the target group **for** the target group, thereby achieving a relatable context within the prototype.

For the purpose of future research, it would be of interest to test the stories "Der Schwan" and "Mischkonsum" with a more extensive sample of at-risk youth, with a means to determining the extent of the relatedness that can be achieved and the restrictions that may be imposed. In addition, it would be valuable to extend this methodology to encompass not only at-risk youth but also adolescents not within this risk group. This would allow for a comparative analysis of experiences and the potential for harm or support.

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References

[1] S. A. a. M. H. S. Administration (US), O. o. t. S. General (US), THE NEUROBIOLOGY OF SUBSTANCE USE, MISUSE, AND ADDICTION, in: Facing Addiction in America: The Surgeon General's Report on Alcohol, Drugs, and Health [Internet], US Department of Health and Human Services, 2016. URL: https://www.ncbi.nlm.nih.gov/books/NBK424849/.

[2] C. Ross, E. Nicholson, Incorporating Inclusivity into Substance Use Disorder (SUD) Treatment, 2024. URL: https://www.naatp.org/resources/blog/incorporating-inclusivity-substance-use-disorder-sud-treatment.

[3] N. G. Guerra, C. P. Bradshaw, Linking the prevention of problem behaviors and positive youth development: Core competencies for positive youth development and risk prevention, New Directions for Child and Adolescent Development 2008 (2008) 1–17. URL: https://onlinelibrary.wiley.com/doi/abs/10.1002/cd.225. doi:10.1002/cd.225, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1002/cd.225.

[4] V. Visch, N. Vegt, H. Anderiesen, Persuasive Game Design: A model and its definitions. (2013).

[5] R. M. Ryan, E. L. Deci, Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being, The American Psychologist 55 (2000) 68–78. doi:10.1037//0003-066x.55.1.68.

[6] F. Laamarti, M. Eid, A. El Saddik, An Overview of Serious Games, International Journal of Computer Games Technology 2014 (2014) 358152. URL: https://onlinelibrary.wiley.com/doi/abs/10.1155/2014/358152. doi:10.1155/2014/358152, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1155/2014/358152.

[7] D. Michael, S. Chen, Serious games: Games that educate, train, and inform (2006).

[8] G. Trépanier-Jobin, Differentiating Serious, Persuasive, and Expressive Games, Kinephanos. Revue d'études des médias et de culture populaire (2016) 107–128. URL: https://www.kinephanos.ca/ojs/index.php/revue/article/view/132.

[9] I. Bogost, Persuasive Games: The Expressive Power of Videogames, The MIT Press, 2007. URL: https://direct.mit.edu/books/monograph/4392/Persuasive-GamesThe-Expressive-Power-of-Videogames. doi:10.7551/mitpress/5334.001.0001.
[10] R. Hammady, S. Arnab, Serious Gaming for Behaviour Change: A Systematic Review, Information 13 (2022) 142. URL: https://www.mdpi.com/2078-2489/13/3/142. doi:10.3390/info13030142, number: 3 Publisher: Multidisciplinary Digital Publishing Institute.
[11] Y. L. Wong, T. J. D. T. J. D. Bothma, A. E. Smith, Effects of meaningful choices in serious games for meaningful learning (2024). URL: https://repository.up.ac.za/handle/2263/101552. doi:10.17083/ijsg.v11i3.745, accepted: 2025-03-18T08:47:18Z Publisher: Serious Games Society.
[12] Das Konzept – risflecting®, 2025. URL: https://risflecting.eu/konzept/.
[13] Socientize, White Paper on Citizen Science for Europe, ZSI - Centre for Social Innovation (2015). URL: http://www.zsi.at/object/publication/3717.
[14] T. Phillips, The Hangover, 2009. IMDb ID: tt1119646 event-location: United States, Germany.
[15] S. Größbacher, P. Judmaier, L. Schöffer, D. Malischnig, N. Bilek, M. Kreiger, All Tomorrow's Parties: Empowerment Game for Young Adults, in: 22nd International Conference on Human-Computer Interaction with Mobile Devices and Services, ACM, Oldenburg Germany, 2020, pp. 1–4. URL: https://dl.acm.org/doi/10.1145/3406324.3410545. doi:10.1145/3406324.3410545.
[16] S. Font-Mayolas, F. Calvo, Polydrug Definition and Assessment: The State of the Art, International Journal of Environmental Research and Public Health 19 (2022) 13542. URL: https://pmc.ncbi.nlm.nih.gov/articles/PMC9602920/. doi:10.3390/ijerph192013542.
[17] M. Jongenelis, S. Pettigrew, D. Lawrence, W. Rikkers, Factors Associated with Poly Drug Use in Adolescents, Prevention Science 20 (2019) 695–704. URL: https://doi.org/10.1007/s11121-019-00993-8. doi:10.1007/s11121-019-00993-8.
[18] checkit!, Substanzinfos, n.d.. URL: https://checkit.wien/substanzinfos/.
[19] checkit!, Ecstasy / MDMA, n.d.. URL: https://checkit.wien/substanz/ecstasy-mdma/.
[20] A. Springer, Was ist „harm reduction"? (n.d.).
[21] Figma - Free Online Web Design Tool for Teams, 2024. URL: https://www.figma.com/web-design/.
[22] Obsidian - Sharpen your thinking, 2024. URL: https://obsidian.md/.
[23] R. Cardona-Rivera, J. Robertson, S. Ware, B. Harrison, D. Roberts, R. Young, Foreseeing Meaningful Choices, Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment 10 (2021) 9–15. URL: https://ojs.aaai.org/index.php/AIIDE/article/view/12716. doi:10.1609/aiide.v10i1.12716, publisher: Association for the Advancement of Artificial Intelligence (AAAI).
[24] checkit!, Über checkit!, 2024. URL: https://checkit.wien/en/ueber-checkit/.