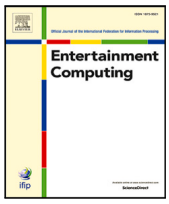
Entertainment Computing 52 (2025) 100919

Contents lists available at ScienceDirect

Entertainment Computing

journal homepage: www.elsevier.com/locate/entcom



Engaging youth in gender-based violence education through gamification: A user experience evaluation of different game modalities

Federica Gini [a,b,*], Eftychia Roumelioti [b], Gianluca Schiavo [b], Maria Paola Paladino [a], Boglarka Nyul [a], Annapaola Marconi [b]

[a] University of Trento Via Calepina, 14 38122 Trento (TN), Italy
[b] Fondazione Bruno Kessler Via Sommarive, 18 38123 Trento (TN), Italy

ARTICLE INFO

Keywords:
Gamification
Gender-based violence
Cooperation
Game modality
Sensitive topics

ABSTRACT

Gender-based violence (GBV) remains a critical human rights issue, deeply rooted in gender inequality and affecting individuals globally. The current study evaluated the user experience of a gamified platform designed to raise awareness about GBV. Gamification, using game elements in non-game environments. has been proven to promote online and offline learning, but its effectiveness has yet to be tested in the case of sensitive educational material. We explored how the platform motivated and engaged users through two versions: individual and cooperative. Using the MEEGA360 scale for user experience and the Geneva Emotion Wheel for emotions, 40 users were randomly assigned to one of the versions. Results showed the platform was well-received, with users finding it enjoyable, user-friendly, and effective in facilitating discussions on GBV. Positive emotions like involvement, amusement, and interest were common, though negative emotions like irritation and anger also appeared. Despite these positive outcomes, the platform faced usability challenges and requests for more complex activities and detailed feedback. The cooperative version scored higher on social interaction but did not significantly outperform the individual version. Further research is needed to explore these differences and improve the platform's effectiveness in GBV prevention.

1. Introduction

Gender-based violence (GBV) is a human rights violation, that deeply affects individuals, families, and communities worldwide [1]. Despite decades of efforts to combat it, GBV remains a widespread issue, deeply rooted in gender inequality and stereotypes [2,3]. The United Nations defines GBV as any act of violence based on gender that causes physical, sexual, or psychological harm or suffering [4]. It includes a wide range of abuses, such as threats and coercion, which can occur both offline and online, in public or private settings [1,5]. While GBV affects both men and women, it is often synonymous with violence against women due to the overwhelming evidence showing that women are disproportionately affected. This has severe implications for their health and well-being [6]. For instance, the World Health Organization reported that 30% of women between 15 and 19 have suffered GBV in their relationships [7]. The European Union Agency for Fundamental Rights also highlights that one in three European women has been a victim of sexual violence, including during childhood [6], with the rate of victimization rising when considering other forms of violence (e.g., 55% of women over 15 have reported sexual harassment).

The impact of GBV is not limited to immediate physical injuries, but it also results in long-term psychological and physical health issues, such as anxiety, depression, substance abuse, and chronic medical conditions like elevated cholesterol levels [8–10]. These effects can be further exacerbated during crises, such as natural disasters or pandemics, which have been associated with spikes in GBV incidents. For instance, the covid-19 pandemic led to a significant increase in domestic violence due to lockdowns and mobility restrictions, leaving many women trapped with their abusers and isolated from support networks [11,12]. Among all the populations, children are one of the most vulnerable affected by GBV, with exposure during childhood leading to negative effects on their development and lifelong well-being [13–15]. School-related gender-based violence involves acts or threats of sexual, physical, or psychological violence occurring in and around schools, often perpetuated by gender norms and unequal power dynamics [9,10,16]. Despite its prevalence, gender violence in schools is underreported, hindering effective prevention and intervention efforts [17,18]. Preventing GBV among young people is therefore crucial, given the long-lasting impact of early exposure to violence [13–15].

* Corresponding author at: University of Trento Via Calepina, 14 38122 Trento (TN), Italy.
E-mail address: federica.gini@unitn.it (F. Gini).

https://doi.org/10.1016/j.entcom.2024.100919
Received 10 August 2024; Received in revised form 6 December 2024; Accepted 18 December 2024
Available online 2 January 2025

Early intervention and prevention programs are vital in educational settings to create a foundation of gender equality [19]. Schools should be equipped with the tools and resources to recognize and combat GBV, providing a safe environment for all children to learn and grow.

One innovative approach for engaging youth in GBV prevention is gamification – the application of game design elements in non-gaming contexts [20]. By recreating similar experiences that users undergo while playing video games, gamification has been proven to be effective in promoting behavioral change [21]. Another field in which gamification has been widely used over the years is education and learning [22]. In this field, gamification has seen significant research interest in recent years due to the challenge of maintaining student engagement in educational settings [22,23]. In general, the literature on gamification in education and learning shows how gameful systems positively affect students' motivation, engagement, and performance [24,25]. Positive outcomes include increased participation, productivity, interest, ease of learning, and enjoyment [23]. However, mixed or negative results are also reported, with some studies showing no effect or even demotivation due to over-reliance on extrinsic rewards [26].

Contrary to other game-based methods – such as serious games [27] – gamification provides a flexible environment to raise awareness of sensitive topics while stimulating users' engagement and motivation. Indeed, structural gamification [28] separates the game elements from the layer of activities, allowing the customization of the content without changing the gameful design. Gamification holds potential for educating on sensitive topics like GBV, but it must be approached with caution due to possible drawbacks. Effective integration of gamification requires a careful design that aligns with both educational and ethical standards. While its ability to engage learners and encourage behavioral change is promising, there is still a lack of substantial research on its application in GBV education.

In our study, we employed gamification to design a platform intended to educate young adults about GBV and to promote healthy, respectful relationships. We developed two versions of the gamified platform: an individual version and a cooperative version, both designed to enhance user engagement and learning outcomes. The literature on gamification indicates that utilizing various game modalities can influence the effectiveness of gamification interventions [29]. Specifically, cooperative gamification and cooperative–competitive gamification – where both collaboration and competition are integrated, such as in team-based competitions – have demonstrated greater motivational impact and efficacy compared to individual or purely competitive game modalities [29]. However, further research is necessary to obtain more definitive evidence on this subject. Our goal was to compare the user experience of these two versions – individual and cooperative – in fostering awareness and prevention of GBV among young adults. By leveraging the interactive nature of games, we aimed to make the learning process more engaging and impactful, thereby contributing to the broader effort to prevent GBV from a young age. Our first and second research questions are: **RQ1** Can the gamified platform provide a good user experience? **RQ2** Is the user experience of a gamified platform – designed to prevent GBV – different between the cooperative and individual versions? Regarding RQ1, we do not have an apriori hypothesis and will investigate the users' experience in an exploratory manner. Conversely, based on existing literature, we hypothesize (HP2) that the cooperative modality will receive a higher user experience (UX) evaluation compared to the individual modality.

Furthermore, we aimed to investigate the emotional impact of the gameful system as a factor influencing its effectiveness in motivating and engaging users. Specifically, we sought to assess which emotions participants experienced while using the platform, given the sensitive topic that could evoke strong emotions. Our third research question is: **RQ3** What are the emotions experienced by users while using the platform in the cooperative and individual versions of the platform? We did not have an a-priori hypothesis as we used an exploratory approach.

The paper is structured as follows: in Section 2 we present other game-based solutions designed to address different forms of GBV, such as intimate partner violence and the recognition of GBV in the healthcare sector; in Section 3 we present the study and its results; in Section 5 we discuss these results in light of the literature. Finally, in Section 6 we present the conclusions to our paper.

2. Related work

Serious games and game-based learning have been increasingly adopted to address sensitive topics like GBV and bullying [30–32]. They are effective tools for raising awareness and educating students about the consequences of violence and the emotional responses involved in these situations [33]. For example, *Cooperative Cybereduca 2.0*, is a quiz game enriched by a narrative component, in which students can learn about cyberbullying by playing the role of the victim, perpetrator, or bystanders [34]. The game is part of an educational program called Cybereduca, aimed at identifying bullying and cyberbullying, understanding its consequences, and helping the development of social and emotional competencies that can hinder violent behavior.

In the realm of GBV, numerous serious games have been developed to address topics such as consent, gender stereotypes, and intimate partner violence (IPV), a form of GBV where the perpetrator is in a close relationship with the victim [35]. Barrera Yañez et al. [30] identified 32 serious games designed to raise awareness about different aspects of GBV. One example is *WonderCity* [36], a storytelling game in which players (mostly 8 to 13 years old girls) explore the relationship between gender and power while exploring concepts such as gender and body image. While these gameful solutions are becoming more widespread, few studies still identify the effectiveness of these tools. For example, Gilliam and colleagues [37] developed a narrative-based game tackling sexual violence – *Lucidity* – targeting the high-school population. After playing the game, during a follow-up interview, most participants reported having discussed gender-based violence with adults or peers, suggesting that game-based learning can be effective in raising awareness of the problem. Boduszek et al. [38] instead designed a role-playing serious game named *Jesse* to raise awareness and prevent IPV in the younger population. Participants can play different roles and experience the themes of IPV and gender inequality, as well as the physical and emotional consequences of IPV. The authors studied the impact of the game on participants' emotional and cognitive empathy. In terms of emotional empathy, the authors observed improvements in the experimental group, but not in the control group. Furthermore, these improvements were maintained at follow-up. However, there was no effect on cognitive empathy. *Campus Craft* is a simulation serious game designed by Jozkowski et al. [39] where participants learn about sexual assault prevention, specifically on campuses. The game was found to be partially effective, as some of the attitudinal scales showed an improvement after playing the game. While most serious games are designed to raise awareness in the younger population, some of the solutions are meant for adults and professionals. For instance, Almeida et al. [40] aimed to train healthcare professionals to recognize and deal with women who are victims of domestic violence, and to diminish the rate of discriminatory and oppressive practices by care professionals. The authors noted an acquisition of knowledge in healthcare professionals after playing the game (*Caixa de Pandora*).

Game-based approaches have generally been recognized as an effective way of raising awareness of GBV. However, most existing solutions in this area have primarily focused on serious games [8,30], while the potential of gamification remains rather unexplored. In contrast to serious games, applying gamification in the educational context can provide unique benefits, such as enhancing the learning experience and offering greater flexibility to address a broader range of educational objectives [41,42]. Indeed, *structural* gamification introduces game elements without altering educational content [43–45], making it easier to adapt to different contexts, thus representing a versatile

tool for teachers and educators. Reaching the same objectives with serious games would require substantial resources for development and more work to update or adapt the content for different scenarios. Structural gamification, on the other hand, does not alter the content of traditional activities while enhancing students' engagement through the application of game mechanics and dynamics, allowing learners to navigate sensitive subjects in a less intrusive way. Gamification elements such as progress bars, badges, and points have been shown to enhance user motivation, making learning more interactive and less overwhelming when dealing with difficult content [20,46]. Additionally, these elements encourage gradual, reflective learning through continuous engagement [47,48]. Unlike serious games, which tend to focus on specific, short-term scenarios, gamification offers the opportunity for continuous engagement, promoting the desired behaviors over time. Studies like those by Koo and Woo [49] highlight the benefits of using gameful systems in addressing sexual education in high schools. Furthermore, gamification has been seen to be effective in the context of other sensitive topics, such as bullying, cyberbullying, and online safety [50,51]. These strategies demonstrate the flexibility and scalability of gamification in tackling deeply rooted societal issues, and the potential of the application of gamification to topics such as GBV.

The literature suggests that gameful systems can help mitigate the emotional response associated with sensitive educational content such as GBV and bullying. While traditional educational approaches may evoke discomfort or resistance, gamification can transform these experiences into engaging and constructive lessons [52]. This is particularly important in the context of GBV education, where creating a supportive atmosphere is essential for effective learning [53]. Indeed, the design of gamified experiences must consider the emotional impact on participants – particularly when dealing with sensitive subjects. A study by Marine & Nicolazzo explores how educators can navigate discussions of sexual violence through a gender-expansive lens, emphasizing the need for sensitivity in educational interventions [54]. This highlights the importance of designing gamified experiences that allow for emotional processing and support, ensuring that participants feel safe and validated throughout their learning journey. However, it is crucial to approach gamification thoughtfully, as there are potential drawbacks. Educators must balance the motivational benefits of gamification with the need to create an inclusive and supportive learning environment, especially when addressing sensitive issues [55].

In this direction, Olalere focuses on the use of gamification as a tool for social change in South Africa. The study outlines how gamified interventions can raise awareness of GBV by engaging participants [56]. This aligns with the findings of Havronska et al. [57], who argue that effective prevention strategies for GBV must include innovative approaches that resonate with young audiences, such as gamification. Furthermore, Dembélé et al. discuss the necessity of sensitizing younger people about GBV and the importance of educational interventions that engage students in meaningful discussions. They argue that gamification can facilitate this process by creating a safe space for discussion and learning [58]. This is reflected in Le Mat et al.'s research, which highlights the role of education in addressing the root causes of GBV by critically raising awareness, suggesting that gamified approaches should incorporate elements that promote reflection and discussion among participants [59].

While acknowledging the promise of gameful systems in addressing sensitive topics, it is important to remember that gamification can also bring negative consequences to education [60,61]. For example, introducing game elements in class may oversimplify complex and serious topics such as GBV. Unbalanced designs may reduce the educational content to game mechanics and induce learners to focus on superficial achievements – like earning points – instead of engaging more in-depth with the lesson [62]. Therefore, gamifying sensitive educational content can facilitate the creation of a safe environment [58], but it can also hinder the seriousness of the topic if not done correctly. Another challenge faced during the gamification of sensitive educational content is represented by finding the right balance between simple and complex activities: when the task's demand becomes unnecessarily high or low, it lowers students' motivation. Flow theory [63,64] explains how individuals become deeply engaged in tasks when they experience a balance between challenge and skill, clear goals, and immediate feedback. In the context of gamification in education, this theory highlights how game elements can enhance learning by creating a state of flow where students are intrinsically motivated and fully immersed in the activity. The theory also offers insights into why gamification may not always effectively promote motivation in learning environments or enhance student performance. According to Flow theory, achieving a state of flow requires a careful balance between a student's skill level and the difficulty of the activities they engage in, along with clearly defined goals, immediate feedback, and a sense of control and autonomy over their tasks. Without this optimal balance, gamified elements may fail to sustain student engagement and motivation, ultimately undermining the intended educational benefits [63,64]. By providing tasks that are challenging yet achievable, offering real-time feedback, and allowing a sense of control and autonomy, gamified learning experiences can keep students engaged and motivated, leading to more effective skill development and a more enjoyable learning process. On the other hand, providing students with oversimplified activities can hinder the effectiveness of gamification and further lower students' motivation.

Other risks can arise from the choice of the game modality adopted: negative social comparisons through competitive elements like leaderboards [52] can become particularly problematic when addressing sensitive issues where the goal is to foster empathy, self-reflection, and thoughtful engagement [61]. To harness the benefits of gamification while mitigating these risks, careful design and alignment with educational goals and ethical considerations are essential [65].

In summary, although research on the impact of gamification on GBV education is still in its early stages, gamification has demonstrated effectiveness in similar sensitive areas. These findings suggest that gamification can also play a valuable role in GBV education by maintaining user engagement and promoting long-term learning. However, the current body of knowledge on using gamification for sensitive topics remains limited, underscoring the necessity for empirical research to substantiate its impact. Further exploration of how gamification can be effectively integrated into GBV education is crucial for maximizing its benefits and addressing the complexities inherent in sensitive issues.

3. The study

In the current study, we examined the user experience and emotions derived from the use of the educational gamified platform StandByMe (see Fig. 1) [66]. The platform, designed by an interdisciplinary team, includes more than 20 activities that foster awareness of GBV and gender stereotypes. A complete description of the activities can be found in [67].

The platform integrates different game elements tailored to address varying user motivations, ranging from achievement-oriented to curiosity-driven behaviors. These elements encourage a comprehensive interaction with the platform, enabling users to explore all its features while minimizing mistakes during the activities. Points are awarded for completing the activities and represent the most simple way to engage students with the educational material. Points allow users to progress through different ranks (i.e., experience levels) which are a graphic representation of their increase in knowledge (i.e., a progress bar). Badges have a different role based on the specific mission they are linked to: some encourage the exploration of different activities, while others motivate users to complete the activities without making mistakes (see Fig. 2 left). Finally, the platform uses storytelling to foster curiosity: a story is divided into four episodes and accompanies users during the whole time. Each episode can be unlocked in a different way: completing activities, participating in a forum conversation, etc (see

Table 1
Game elements included in the platform StandByMe.

Game element	Design rationale
Points	Reward the completion of each activity
Levels	Visually represent participants' knowledge increase as they progress through the platform
Mission & badges	Encourage participants in the exploration of different activities, and reduce the number of mistakes
Storytelling (episodes)	Stimulate participants' curiosity to encourage them to complete more activities to unlock new episodes

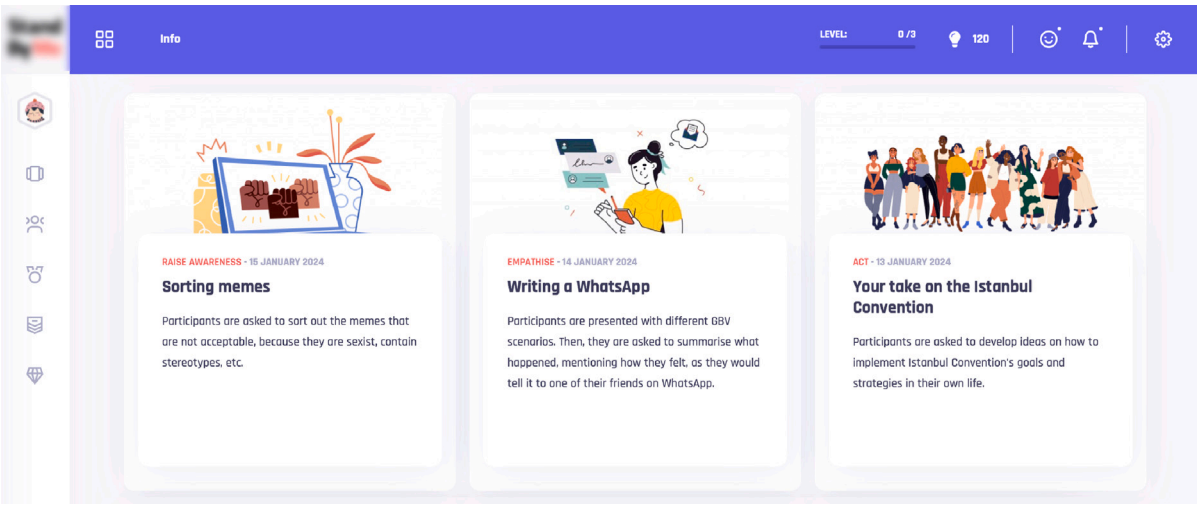


Fig. 1. Activities of the StandByMe platform.

Fig. 2 right). The rationale behind the choice of the game elements is briefly explained in Table 1. A more extensive explanation of the design choices can be found in [66].

In this study, we used a preliminary version of the platform that included four activities: *The Glossary*, *Red Light–Green Light*, *Sorting Memes*, and *The Istanbul Convention*. In the Glossary activity, participants matched terms with their corresponding definitions. The Red Light–Green Light activity required users to assess social media conversations and categorize them as either containing gender stereotypes or not. During the Sorting Memes activity, participants identified and selected memes depicting gender stereotypes. The Istanbul Convention activity involved reading Articles of the Istanbul Convention treaty – a European framework setting legally binding standards to combat GBV [68] – and then discussing these articles in the platform's forum. A more detailed description of the activities included in the platform can be found in [67]. The platform was offered in two different game modalities – individual and cooperative:

- *Cooperative modality*: in this version, participants completed the activities individually, but the points, badges, ranks, and story episodes were shared among them, fostering collaboration and teamwork. For example, unlocking story episodes depended on the group's cumulative performance rather than individual contributions.
- *Individual modality*: in this version, participants engaged with the gamified platform independently, with points, badges, ranks, and story episodes tied exclusively to their personal performance, promoting self-reliance and individual achievement.

The literature on game modalities indicates that different game modalities can impact the effectiveness of gameful systems [29]. Studies by Morschheuser et al. [69], Pajarito Rajales et al. [70], and Chen & Pu [71] suggest that cooperative and cooperative–competitive – i.e., mixing elements of cooperation and competition, such as in team competitions – gameful designs can have a better impact on users if compared to individual or competitive designs. Despite these initial findings on the outcomes of different game modalities in gameful systems, the topic needs to be further explored in several respects. With the following study, we aim to expand knowledge in this area and provide a foundation for a more comprehensive understanding of the differences between the individual and the cooperative modalities.

Gender-based violence education covers sensitive topics that can evoke strong emotions, such as anger, sadness, or distress [72,73]. Some participants may have personal experiences with gender-based violence, enhancing the strengths of their reaction to the topics. The use of gamification in raising awareness of such a sensitive topic also aims to create positive emotions and motivation while navigating the negative consequences that GBV has on society. Understanding the emotions experienced by participants while using the StandByMe platform has two objectives. Firstly, emotional states can significantly impact learning. Positive emotional engagement can enhance understanding and retention of information, while negative emotions can hinder the learning process [74]. By addressing emotions, facilitators can create a more conducive learning environment. Secondly, understanding participants' emotional reactions to the activities proposed in the platform can provide valuable feedback for facilitators and designers to better meet participants' needs.

The study was approved by the ethics board of the University of Trento, Italy.

3.1. Participants and procedure

A total of 40 participants, aged between 18 and 30 years (m = 23.55, sd = 3.10), were recruited in Rovereto, Italy. Among the participants, 17 identified as male, 22 as female, and one preferred not to answer. Participants were randomly assigned in equal numbers to two conditions: *individual* (N = 20, age m = 24.25, age sd = 3.46, female = 12, male = 8) and *cooperative* (N = 20, age m = 23.05, age sd =

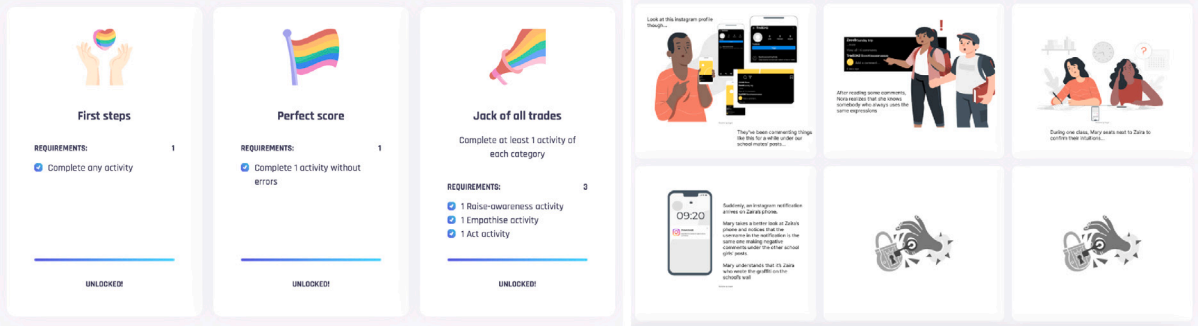


Fig. 2. Badges (left) and narrating episodes (right) of the StandByMe platform.

2.67, female $N = 10$, male $N = 9$, prefer not to answer $N = 1$).[1] Before running the analysis, we checked if gender and prior experience with video games were evenly distributed across the conditions (gender $chi - squared = 1.241$, $p{-}value = 0.538$; gaming habits $chi - squared = 4.662$, $p{-}value = 0.324$).

Although the platform was designed to raise awareness of GBV in adolescents, it was first tested on young adults to ensure ethical and practical safeguards. This approach allowed us to evaluate the platform's user experience and emotional response with a demographic better equipped to handle sensitive content, minimizing potential harm before introducing it to the target adolescent population. Testing with young adults also provided critical insights to refine the platform for safer and more effective implementation.

Participants were recruited through posts on social networks and a snowballing technique and then randomly assigned to either the individual or cooperative condition based on a randomized assignment list. Given the sensitive nature of the topic, in the informative form, participants were given contacts of centers specialized in GBV. All participants provided informed consent to participate in the study.

3.2. Material

Both the individual and cooperative groups used the platform for approximately 30 min. Participants in the cooperative condition used a gamified platform version in pairs, with shared rewards, whereas those in the individual condition used the platform alone, with individual rewards. After using the platform, participants completed the Geneva Emotion Wheel [75], and the MEEGA360 scale [76] to assess their user experience.

The Geneva Emotion Wheel visually represents 20 pairs of emotions in a circular format. Since our goal was to study the emotions felt by participants in an exploratory way, we decided to use the GEW as it provided a wider range of emotions. An Italian translation of the tool was used in the study, and participants were asked to indicate the intensity of the emotions they experienced while using the platform (1 = "I did not experience that emotion", 5 = "I strongly experienced that emotion").

The MEEGA360 scale, derived from the MEEGA+ scale [77], is a usability and user experience questionnaire designed to evaluate playful and gameful educational tools. Scores on the MEEGA360 scale are reported on a Likert-like scale (1 = "Disagree", 5 = "Agree"). In particular, six subscales were of interest: *challenge, motivation, social, fun, engagement, and perceived learning*. Furthermore, the MEEGA360 scale – as the MEEGA+ – presents three open-ended questions that ask users about the strengths and weaknesses of the application, other than for other comments they might have. In the study, an Italian translation of the tool was used.

An a-priori power analysis (*G*power 3.1.9.7.* was conducted for the MEEGA360's subscales, indicating a total sample of 28 participants for this mixed-design analysis (effect size f = 0.25, alpha = 0.05, beta = 0.95, N groups = 2, N measurements = 6, correlation among repetitions = 0.5, nonsphericity correction = 1, total sample size = 28). A sensitivity analysis (*G*power 3.1.9.7.*) for the MEEGA360's subscales of interest was run to test the robustness of the results, showing a medium effect size (alpha = 0.05, power = 0.8, N groups = 2, N measurements = 6, correlation among repetitions = 0.5, nonsphericity correction = 1, effect size f = 0.166). The same was done for the GEW (alpha = 0.05, power = 0.8, N groups = 2, N measurements = 20, correlation among repetitions = 0.5, nonsphericity correction = 1, effect size f = 0.115), also showing a medium effect size.

4. Results

4.1. User experience

To assess participants' user experience and the differences between the individual and cooperative versions of the platform, we analyzed participants' scores in the MEEGA360 scale (N = 40, cooperative condition $N = 20$, individual condition $N = 20$). The analyses were run using *R v4.3.1.* Since data were not normally distributed,[2] we used a Wilcoxon Rank-Sum Test to compare the overall score of the MEEGA360 scale in the two conditions (alpha = 0.05). The Wilcoxon Rank-Sum test – also known as the Mann–Whitney U test – is a non-parametric test used to assess if two samples are derived from the same population [78,79]. The results showed no significant difference in the overall user experience between the two groups (cooperative condition $m = 63.644, sd = 11.514$; individual condition $m = 63.522, sd = 6.451$; Wilcoxon test $W = 229.500$, $p{-}value = 0.432$). As the p-value is higher than 0.05 we fail to reject the null hypothesis. According to gamification literature, gameful systems have the characteristic of increasing users' motivation and enhancing their engagement with the performed activity [22,23]. Therefore, among the MEEGA360 subscales, we were particularly interested in *motivation* and *engagement*. Furthermore, according to the Flow Theory [63] balancing users' abilities and the difficulty of the task improves participants' focus and motivation. For this reason, we also focused on the subscale *challenge*. As the application is meant to raise awareness of GBV and therefore increase participants' knowledge on the topic, we were interested in the subscale *perceived learning*. Finally, the subscale *social* was included in the analysis due to our interest in game modalities. We used a mixed rank-transformed ANOVA (one factor manipulated between participants: *condition*, 2 levels: cooperative, individual; one factor manipulated within participants: *subscale*, 6 levels: challenge, motivation, social, fun, engagement, and perceived learning – Table 2) to explore eventual differences among

[1] The same participants were also involved in the evaluation of the effectiveness of the platform.

[2] For the current and following analyses, the Shapiro–Wilk and Levene tests were used to assess the normality and the homoscedasticity of the data.

Table 2
Subscale scores grouped by condition.

Condition	Subscale	Score (m, sd)
Cooperative	Challenge	m = 3.533, sd = 0.951
	Motivation	m = 4.175, sd = 0.936
	Social	m = 3.500, sd = 1.152
	Fun	m = 3.750, sd = 1.352
	Engagement	m = 2.867, sd = 1.162
	P. learning	m = 2.900, sd = 1.210
Individual	Challenge	m = 3.817, sd = 1.006
	Motivation	m = 4.000, sd = 0.903
	Social	m = 2.817, sd = 1.040
	Fun	m = 3.850, sd = 0.763
	Engagement	m = 3.367, sd = 0.878
	P. learning	m = 3.700, sd = 1.031

the subscales in the two groups (alpha = .05). We opted for a non-parametric test as the data did not distribute normally. We chose to use the Aligned Rank Transform using the R package ARTool as the more classic non-parametric tests – the Friedman test [80] and the Kruskal Wallis test [81] – are designed for one-way ANOVAs while our design was mixed. Results showed a significant main effect of the *subscale* factor ($F_{1,228} = 5.203$, p-value < 0.001) and a significant interaction effect *condition x subscale* factor ($F_{5,228} = 2.469$, p$-value = 0.033$), while there was no significant effect of the condition factor ($F_{5,228} = 0.8007$, p$-value = 0.372$). As for the main effect, Tukey post-hoc tests (alpha = 0.05) highlighted a significant difference between the subscales *engagement* and *fun* (engagement $m = 3.117, sd = 1.047$, fun $m = 3.800, sd = 1.085$, $t(228) = -3.238$, p$-value = 0.017$), the subscales *engagement* and *motivation* (engagement $m = 3.117, sd = 1.047$, motivation $m = 4.088, sd = 0.912$, $t(228) = -4.564$, p$-value < 0.001$). Furthermore, we found a significant difference between the *motivation* and *perceived learning* subscales (motivation $m = 4.088, sd = 0.912$, perceived learning $m = 3.300, sd = 1.181$, $t(228) = 3.515$, p$-value = 0.007$) as well as between the *motivation* and *social* subscales (motivation $m = 4.088, sd = 0.912$, social $m = 3.160, sd = 1.137$, $t(228) = 4.187$, p$-value < 0.001$). As for the interaction effect, the subscale *perceived learning* scores resulted higher in the individual condition (cooperative $m = 2.900, sd = 1.210$, individual $m = 3.700, sd = 1.031$; $t(228) = -2.249$, p$-value = 0.026$), while the *social* component scores resulted higher in the cooperative condition (cooperative $m = 3.500, sd = 1.152$ individual $m = 2.817, sd = 1.040$; $t(228) = 2.141$, p$-value = 0.033$, Table 2). *Motivation* seems to be higher in the cooperative condition, but the post-hoc tests do not reveal a significant difference between the two scores (cooperative $m = 4.175, sd = 0.936$, individual $m = 4.000, sd = 0.903$; $t(228) = 0.705$, p$-value = 0.4815$). The same thing for *engagement*, which seems to be higher in the individual condition, but the post-hoc tests do not highlight a significant difference (cooperative $m = 2.867, sd = 1.162$, individual $m = 3.367, sd = 0.878$; $t(228) = -1.309$, p$-value = 0.192$).

Analyzing qualitatively the responses to the open-ended questions, it was found that 23 participants described the platform as user-friendly (e.g., Participant 23: "It is easily understandable"). Ten (10) participants found the platform enjoyable (e.g., Participant 34: "It is fun, I really liked the ability to interact with other people"; Participant 24: "The more you play, even with not-so-immediate responses, the more you understand how subtle this type of violence can be"), while other nine found it captivating and involving. However, 23 comments highlighted weaknesses in the content, which was perceived as too easy, too short, or lacking explanations for why certain answers were correct or incorrect. Fifteen (15) participants identified usability issues, such as poorly positioned elements on the page and responsiveness to clicks (e.g., notifications: Participant 16: "To notify the user that an episode has been unlocked, I would prefer a red notification dot above the 'episode' icon"; Participant 32: "I couldn't understand what I had unlocked: it said 'episodes', but clicking on the notifications did not reveal anything"). Additionally, there were readability issues, with suggestions for larger fonts (e.g., Participant 21: "Increase the font size by a few pixels – I couldn't read well"). These issues likely contributed to findability problems noted by some participants (e.g., Participant 18: "The Istanbul post should have the option to comment directly within it. I wasted time looking for a way to write something, but it was on a completely different page"; Participant 21: "Improve the management of the stories – I almost missed them in the left menu").

4.2. Users' emotional responses

To explore participants' emotional experiences, we analyzed the scores in the Geneva Emotion Wheel [75]. Due to problems related to the data collection, the scores of two participants in the cooperative condition could not be analyzed (N = 18 in the cooperative condition, $N = 20$ in the individual condition). As shown in Fig. 3, there is a significant overlap in participants' emotional responses in both the cooperative and individual conditions. We performed a rank-transformed ANOVA (one factor manipulated between participants: *condition* 2 levels: individual, cooperative; one factor manipulated within participants: *emotion* 20 levels: listed in Table 3). We opted for a non-parametric test, as the data did not distribute normally (alpha = 0.05). Also in this case, we choose to use the Aligned Rank Transform using the R package *ARTool* as the more classic non-parametric tests – the Friedman test [80] and the Kruskal Wallis test [81] – are designed for one-way ANOVAs while our design was mixed. Furthermore – to focus on the couples of emotions that received extreme values in greater amounts – we explored which emotions were experienced more strongly, by counting the frequency of 4s and 5s in the Likert scale.

The results in the ANOVA showed a significant main effect for both factors (condition $F_{1,19} = 9.606$, p$-value = 0.002$; emotion $F_{1,19} = 13.081$, p$-value < 0.001$), but not a significant interaction between the two (condition *x* emotion $F_{1,19} = 0.662$, p$-value = 0.857$). Post-hoc tests (alpha = 0.05) revealed that participants in the individual condition scored higher values if compared to the cooperative condition (individual $m = 1.918, sd = 1.124$; cooperative $m = 1.761, sd = 1.146$, $t(720) = -3.099$, p$-value = 0.002$). Considering the post-hoc tests for the *emotion* factor, *Involvement/Interest* scored significantly higher than the other emotions (Involvement/Interest $m = 3.947, sd = 1.038$; p-value < 0.001 for all the comparisons, except for Irritation/Anger $m = 1.263, sd = 0.601$, p$-value = 0.002$), apart from *Amusement/Laughter* for which the difference did not result significant (Involvement/Interest $m = 3.947, sd = 1.038$; Amusement/Laughter $m = 2.763, sd = 1.218$; $t(720) = 3.450$, p$-value = 0.070$). These three pairs of emotions are also the ones that reported the highest frequency of 4s and 5s in the Likert scale in both conditions (*Involvement/Interest* $N = 10$ in the cooperative condition, $N = 18$ in the individual condition;*Amusement/Laughter* $N = 7$ in the cooperative condition, $N = 6$ in the individual condition; *Irritation/Anger* N = 4 in the cooperative condition, $N = 3$ in the individual condition). *Amusement/Laughter* also scored significantly higher than *Happiness/Joy* (Amusement/Laughter $m = 2.763, sd = 1.218$; Happiness/Joy $m = 1.658, sd = 0.966$; $t(720) = 4.664$, p$-value <$ 0.001) and *Pride/Elation* (Amusement/Laughter $m = 2.763, sd = 1.218$; Pride/Elation $m = 1.737, sd = 1.057$; $t(720) = 4.439$, p$-value = 0.002$). Considering the frequency of 4s and 5s in the Likert scale, *Feeling disburdened/Relief* (N = 4 in the cooperative condition, none in the individual condition) and *Pity/Compassion* (N = 4 in the cooperative condition, $N = 2$ in the individual condition) reported high scores only in the cooperative condition. The opposite trend can be found in *Happiness/Joy* (none in the cooperative condition, $N = 3$ in the individual condition). Though, as already mentioned, the interaction between the two factors (condition, emotion) was not significant.

Table 3
Mean and standard deviation of participants' scores in the Geneva Emotion Wheel in the overall, in the individual, and in the cooperative modalities (1 = "I did not experience that emotion", 5 = "I strongly experienced that emotion").

Emotion	Overall (m, sd)	Individual (m, sd)	Cooperative (m, sd)
Involvement/Interest	m = 3.947, sd = 1.038	m = 4.300, sd = 0.801	m = 3.556, sd = 1.149
Amusement/Laughter	m = 2.763, sd = 1.218	m = 2.700, sd = 1.174	m = 2.833, sd = 1.295
Pride/Elation	m = 1.737, sd = 1.057	m = 1.900, sd = 1.071	m = 1.556, sd = 1.042
Happiness/Joy	m = 1.658, sd = 0.966	m = 1.900, sd = 1.119	m = 1.389, sd = 0.698
Enjoyment/Pleasure	m = 1.763, sd = 0.943	m = 1.950, sd = 0.999	m = 1.556, sd = 0.856
Tenderness/Feeling love	m = 1.605, sd = 0.916	m = 1.650, sd = 0.813	m = 1.556, sd = 1.042
Wonderment/Feeling awe	m = 1.474, sd = 0.762	m = 1.350, sd = 0.587	m = 1.611, sd = 0.916
Feeling disburdened/Relief	m = 1.579, sd = 0.948	m = 1.400, sd = 0.503	m = 1.778, sd = 1.263
Astonishment/Surprise	m = 1.816, sd = 1.087	m = 1.950, sd = 1.099	m = 1.667, sd = 1.085
Longing/Nostalgia	m = 1.132, sd = 0.529	m = 1.100, sd = 0.308	m = 1.167, sd = 0.707
Pity/Compassion	m = 1.974, sd = 1.102	m = 1.950, sd = 1.050	m = 2.000, sd = 1.188
Sadness/Despair	m = 1.789, sd = 0.963	m = 2.050, sd = 0.999	m = 1.500, sd = 0.857
Worry/Fear	m = 2.026, sd = 1.127	m = 2.350, sd = 1.182	m = 1.667, sd = 0.970
Embarrassment/Shame	m = 1.474, sd = 0.797	m = 1.450, sd = 0.686	m = 1.500, sd = 0.924
Guilt/Remorse	m = 1.263, sd = 0.601	m = 1.300, sd = 0.470	m = 1.222, sd = 0.732
Disappointment/Regret	m = 1.526, sd = 0.922	m = 1.550, sd = 0.826	m = 1.500, sd = 1.043
Envy/Jealousy	m = 1.079, sd = 0.273	m = 1.100, sd = 0.308	m = 1.056, sd = 0.236
Disgust/Repulsion	m = 2.079, sd = 1.124	m = 2.150, sd = 1.089	m = 2.000, sd = 1.188
Contempt/Scorn	m = 1.684, sd = 0.989	m = 1.700, sd = 0.865	m = 1.667, sd = 1.138
Irritation/Anger	m = 2.500, sd = 1.268	m = 2.550, sd = 1.191	m = 2.444, sd = 1.381

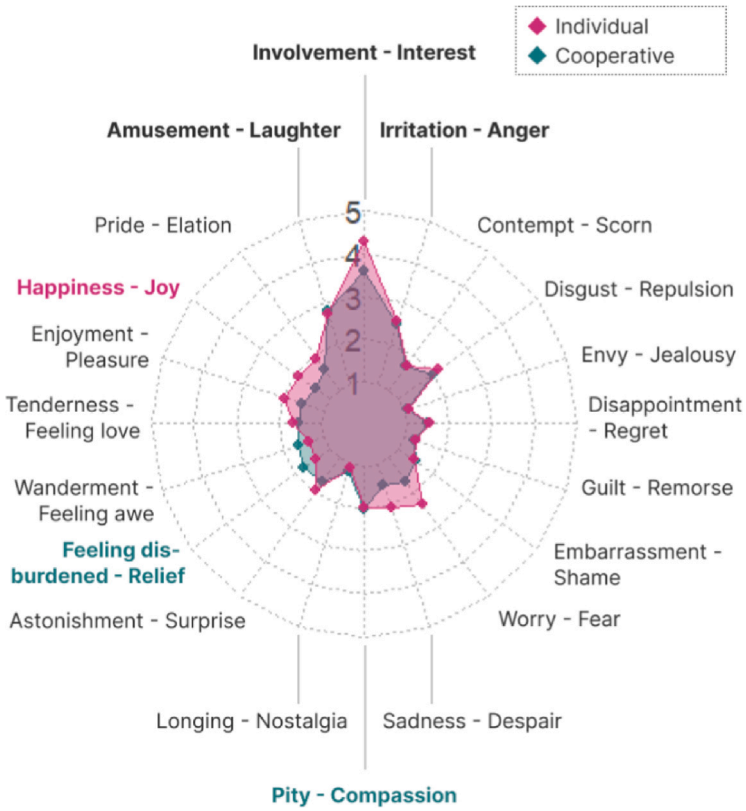


Fig. 3. Spider plot of participants' score in the Geneva Emotions Wheel.

5. Discussion

The overall assessment indicated that the platform was positively perceived by users, whether used collaboratively or individually (RQ1). Both scores ranged between 42.5 and 65 indicating a positive user experience [77]. Most participants found the platform to be user-friendly and enjoyable, yet informative, fostering reflections on gender-based violence and encouraging peer discussions. This positive evaluation is further supported by the results of the Geneva Emotion Wheel (RQ3), which revealed positive emotions such as amusement, laughter, involvement, and interest, along with negative emotions like irritation and anger, reflective of the topic's nature. Regarding the gamification aspect, participants found the platform fun. However, their responses indicated that the playful elements did not overshadow the seriousness of the topic, as many comments focused on the content of the activities, their difficulty, how to improve them, and the feedback provided. This result is also supported by the findings in the Geneva Emotion Wheel, in which *Involvement/Interests* and *Amusement/Laughter* scored higher than *Happiness/Joy* and *Pride/Elation*, suggesting that the gameful design supported participants' engagement with the activities, without eliciting too much playfulness during the activities (RQ3).

Despite the positive evaluation, some common issues were identified, including usability concerns related to the positioning of certain elements, their interaction with the user, and the findability of specific

features. Some elements of the platform may not have impacted the user experience as intended, as certain pages (e.g., the episodes) were difficult to locate. This was particularly true for the storytelling game elements, which played a significant role in the platform's design and offered a distinctive feature compared to the typical PBL triad of *points, badges, and leaderboards* [22]. For some participants, these storytelling elements were challenging to find, which could have affected the overall effectiveness of the design by limiting users' engagement with this key feature. Additionally, participants sometimes found the activities too simple. While the platform was generally deemed informative, participants would have appreciated more complex activities and more detailed feedback. Given the crucial role of feedback in the learning process, it is essential to address this aspect to ensure that the platform becomes an effective tool for raising awareness of GBV. Numerous researchers have explored the components of effective feedback for students, highlighting a strong positive correlation between feedback quality and students' understanding of learning goals [82–85].

Conversely, they have reported that poor feedback quality can have a demotivating effect, underscoring the significance of high-quality feedback in educational settings. The quantitative analysis highlighted that perceived learning was significantly lower than motivation, suggesting that, despite the motivating effect of the topic and the gameful design, participants did not feel they were learning new information. This is supported by comments highlighting the low difficulty of the activities and suggestions to increase their quantity. Furthermore, the desire for more detailed feedback, explaining why certain answers were correct or incorrect, indicates that learning could have been more effective and further highlights the platforms' limitation in providing users with useful feedback. This finding aligns with other studies where motivation and learning were not always equally enhanced by gamification [22,23]. The difference in scores between fun, engagement, and motivation is also reflected in the open-ended questions, where participants often highlighted the fun aspect of the platform more than its engagement or motivational qualities. As for other differences in the subscales, it is unclear which elements of the gameful system might have influenced these factors.

Contrary to our expectations, we did not find differences in the overall score in the MEEGA360 between the two conditions (RQ2). One possibility is that the design of the platform does not have strong social components in the cooperative versions and thus the benefits of cooperation are not sufficiently strong to cause differences in the UX evaluation. On the other hand, the social subscale scored significantly higher in the cooperative version, indicating that the difference could also be attributed to other factors. Further investigation to clarify the role of a cooperative gameful design is needed.

The Geneva Emotion Wheel revealed that the emotions with the highest frequency of elevated scores, present in both individual and cooperative conditions, were *Involvement/Interest*, *Amusement/Laughter*, and *Irritation/Anger* (RQ3). These emotions can be linked to the role of gamification – such as *Involvement/Interest* (potentially influenced by personal interest) and *Amusement/Laughter* – as well as the subject matter of the activities, which possibly elicited *Irritation/Anger*. Importantly, the StandByMe gamified platform did not elicit high levels of negative emotions such as *Sadness/Despair*, *Worry/Fear*, *Disgust/Repulsion*, or*Guilt/Remorse*, which could have potentially disturbed users. Additionally, some emotions (e.g., *Feeling disburdened/Relief*) were more prevalent in only one of the two conditions, suggesting a potential difference between them. On the other hand, the ANOVA did not show any significant interaction between the game modality and emotions, indicating that individual differences might be responsible for the observed variations. These findings warrant further investigation to determine whether they are associated with the game modality or arise from differing personal reactions within the two groups. For instance, emotions such as *Feeling disburdened/Relief* and *Pity/Compassion* might be more pronounced in the cooperative modality due to the interactive nature of engaging with other users. The ANOVA revealed a significant difference in the overall scores of the Geneva Emotion Wheel between the individual and cooperative conditions (RQ2/RQ3). Participants in the individual condition scored higher, possibly due to the opportunity for introspection and personal reflection, which might have evoked stronger emotions. This aligns with higher perceived learning and prior findings from the platform's effectiveness evaluation [86], which indicated a slight advantage for the individual modality in raising awareness of GBV compared to the cooperative condition and a control group.

Overall, these findings – along with the results about the effectiveness of the platform [86] – suggest that the individual game modality might be more effective in raising awareness of GBV. This result is in contrast with the literature on game modality [29,69–71], which highlights the benefits of the cooperative and cooperative–competitive game modalities over the individual and competitive ones, suggesting that the literature on game modalities and gamification may differ significantly from research on the gamification of sensitive educational content. Therefore, the design of gameful systems for educating sensitive topics needs to be done carefully. This preference for the individual setting is further supported in the choice of the activities by the qualitative findings presented in [86], where participants highlighted the importance of having the "right person" to perform activities with, noting concerns about judgment from others. As a result, incorporating moments of individual reflection may be more beneficial than focusing solely on group activities, as it allows users to process and engage with the material in a more personal and comfortable setting.

Considering the limitations of the study, the number of participants – 20 per condition – is relatively low. This limitation arose from challenges in recruiting additional participants in the city where the laboratory is located. However, as this was a preliminary evaluation of the platform's first version, the primary focus was on gathering feedback to refine the tool rather than achieving a larger sample size. Future studies will conduct evaluations with an improved version of the StandByMe platform and a more suitable number of participants. The limited number of participants in the study did not allow for a more in-depth exploration of factors such as individual (e.g., personality and player type), as well as demographic (e.g., age and gender), and cultural differences among participants. From the literature, it is known that these factors shape how users perceive the gamification design and influence the effectiveness of gamified tools [22,87,88]. Therefore, future research should also focus on understanding how individual, demographic, and cultural differences among users influence the perception and effectiveness of gamification for sensitive educational content.

6. Conclusions

In the current manuscript, we presented an evaluation of the user experience of the gamified platform StandByMe, designed to raise awareness about GBV. We assessed both the quality of the platform and the emotions experienced by 40 participants while engaging in the activities. The platform demonstrated overall good quality according to the scoring of the MEEGA360 scale, revealing both strengths and weaknesses that can inform future improvements. For example, the platform layout could be informative about what participants can do while using the tool, and the buttons could be positioned better. Additionally, we assessed participants' emotional responses to ensure that the sensitive nature of the topic did not excessively negatively impact their mood, indicating that StandByMe can represent a promising tool to motivate participation and foster engagement in GBV awareness activities. Contrary to our hypotheses – that deemed the cooperative game modality more effective – the results indicate that the individual game modality might be more appropriate in the education of sensitive topics, especially when considered along with the data about the effectiveness of the StandByMe platform [86]. While the platform does not present significant usability or user experience issues, the relationship between

game modality and user appreciation requires further investigation. In the future, it will also be important to tailor the activities' complexity to users' knowledge of the topic, as some participants found them too simple or the learning path too short. Additionally, the feedback provided on the platform will be improved, as sometimes it was not considered adequately educational by some participants. Future studies should also focus on the impact of personal, interpersonal, and cultural differences on the perception and effectiveness of gamified education of sensitive content.

CRediT authorship contribution statement

Federica Gini: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Eftychia Roumelioti:** Writing – review & editing, Writing – original draft, Software, Resources. **Gianluca Schiavo:** Writing – review & editing, Supervision, Methodology, Formal analysis. **Maria Paola Paladino:** Writing – review & editing, Supervision, Resources, Funding acquisition. **Boglarka Nyul:** Writing – review & editing, Resources. **Annapaola Marconi:** Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

The StandByMe platform is the result of the collaboration between the Psychology and Cognitive Science Department of University of Trento, responsible for the analysis of the socio-technical requirements of the platform and the content of the activities, and Fondazione Bruno Kessler, responsible for the design and development of the platform and the gamification mechanisms involved in it. The design of the platform and the content of the activities have also been informed by domain experts and activists of Amnesty International, Amnesty Italia, Amnesty Poland, Amnesty Hungary, and Amnesty Slovenia.

The StandByMe platform is part of the European Union-funded projects StandByMe with project number 101005641, and StandByMe 2.0 with project number 101049386. The content represents the view of the authors only and is their sole responsibility. The European Commission does not accept any responsibility for the use that may be made of the information it contains.

Data availability

Data will be made available on request.

References

[1] P. Ali, M.M. Rogers, Gender-Based Violence: A Comprehensive Guide, Springer, 2023.
[2] C.M. León, E. Aizpurua, Do youth dream of gender stereotypes? The relationship among gender stereotyping, support for feminism, and acceptance of gender-based violence, Int. J. Environ. Res. Public Health 20 (3) (2023) 2439, http://dx.doi.org/10.3390/ijerph20032439.
[3] M.G. Muratore, C. Villante, L. Scarnicchia, Looking at gender stereotypes to fight gender-based violence, Rassegna Ital. Criminol. (3) (2023) 211–225.
[4] UN declaration, Declaration on the elimination of violence against women, 1993, URL http://research.un.org/en/docs/ga/quick/regular/48.
[5] A. Speed, C. Thomson, K. Richardson, Stay home, stay safe, save lives? An analysis of the impact of COVID-19 on the ability of victims of gender-based violence to access justice, J. Crim. Law 84 (6) (2020) 539–572, http://dx.doi.org/10.1177/0022018320974691.
[6] H. Rights, Violence Against Women: An EU-Wide Survey, Publications Office of the European Union, Luxembourg, 2014.
[7] World Health Organization, Violence Against Women Prevalence Estimates, 2018: Global, Regional and National Prevalence Estimates for Intimate Partner Violence Against Women and Global and Regional Prevalence Estimates for Non-Partner Sexual Violence Against Women, World Health Organization, 2021.
[8] D.A. Rodríguez, A. Díaz-Ramírez, J.E. Miranda-Vega, L. Trujillo, P. Mejía-Alvarez, A systematic review of computer science solutions for addressing violence against women and children, IEEE Access (2021) http://dx.doi.org/10.1109/ACCESS.2021.3068132.
[9] A. Peterman, J. Bleck, T. Palermo, Age and intimate partner violence: an analysis of global trends among women experiencing victimization in 30 developing countries, J. Adolesc. Health 57 (6) (2015) 624–630, http://dx.doi.org/10.1016/j.jadohealth.2015.08.008.
[10] M.C. Black, Intimate partner violence and adverse health consequences: implications for clinicians, Am. J. Lifestyle Med. 5 (5) (2011) 428–439, http://dx.doi.org/10.1177/1559827611410265.
[11] M. İnce Yenilmez, U. Bingöl, Fighting with the gender-based violence amid the pandemic, Int. J. Contemp. Econ. Adm. Sci. 10 (2) (2021) http://dx.doi.org/10.5281/zenodo.4429772.
[12] K.R. Lynch, T. Logan, Rural and urban/suburban victim professionals' perceptions of gender-based violence, victim challenges, and safety advice during the COVID-19 pandemic, Violence against Women 29 (5) (2023) 1060–1084, http://dx.doi.org/10.1177/10778012221110892.
[13] S.L. Wood, M.S. Sommers, Consequences of intimate partner violence on child witnesses: A systematic review of the literature, J. Child Adolesc. Psychiatr. Nurs. 24 (2011) 223–236, http://dx.doi.org/10.1111/j.1744-6171.2011.00295.x.
[14] T. Bisika, P. Ntata, S. Konyani, Gender-violence and education in Malawi: A study of violence against girls as an obstruction to universal primary school education, J. Gend. Stud. 18 (2009) 287–294, http://dx.doi.org/10.1080/09589230903057183.
[15] A. Hungerford, S.K. Wait, A.M. Fritz, C.M. Clements, Exposure to intimate partner violence and children's psychological adjustment, cognitive functioning, and social competence: A review, Aggress. Violent Behav. 17 (2012) 373–382, http://dx.doi.org/10.1016/j.avb.2012.04.002.
[16] K.D. Duckworth, M.N. Trautner, Gender goals: Defining masculinity and navigating peer pressure to engage in sexual activity, Gend. Soc. 33 (2019) 795–817, http://dx.doi.org/10.1177/0891243219867913.
[17] UNESCO, School-related gender-based violence (SRGBV): A human rights violation and a threat to inclusive and equitable quality education for all, 2020, Available online: https://unesdoc.unesco.org/ark:/48223/pf0000374509. (Accessed 1 April 2022).
[18] J.D. Goldman, Unesco's guidance on puberty and sexual health education for students aged 9–12 years compared to an upper primary school curriculum, Health Educ. J. 74 (2015) 340–350, http://dx.doi.org/10.1177/0017896914541620.
[19] N. Stanley, J. Ellis, N. Farrelly, S. Hollinghurst, S. Downe, Preventing domestic abuse for children and Young people: A review of school-based interventions, Child. Youth Serv. Rev. 59 (2015) 120–131, http://dx.doi.org/10.1016/j.childyouth.2015.10.018.
[20] S. Deterding, D. Dixon, R. Khaled, L. Nacke, From game design elements to gamefulness: defining "gamification", in: Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments, MindTrek '11, Association for Computing Machinery, New York, NY, USA, 2011, pp. 9–15, http://dx.doi.org/10.1145/2181037.2181040.
[21] S. Bassanelli, N. Vasta, A. Bucchiarone, A. Marconi, Gamification for behavior change: A scientometric review, Acta Psychol. 228 (2022) 103657, http://dx.doi.org/10.1016/j.actpsy.2022.103657.
[22] J. Koivisto, J. Hamari, The rise of motivational information systems: A review of gamification research, Int. J. Inf. Manage. 45 (2019) 191–210, http://dx.doi.org/10.1016/j.ijinfomgt.2018.10.013.
[23] N. Zeybek, E. Saygı, Gamification in education: Why, where, when, and how?—A systematic review, Games Cult. 19 (2) (2024) 237–264, http://dx.doi.org/10.1177/15554120231156938.
[24] R. Hadi Mogavi, Y. Zhao, E. Ul Haq, P. Hui, X. Ma, Student barriers to active learning in synchronous online classes: Characterization, reflections, and suggestions, in: Proceedings of the Eighth ACM Conference on Learning @ Scale, in: L@S '21, Association for Computing Machinery, New York, NY, USA, 2021, pp. 101–115, http://dx.doi.org/10.1145/3430895.3460126.
[25] A. Perttula, P. Tuomi, Gamification at school, in: EDULEARN17 Proceedings, in: EDULEARN17, IATED, 2017, http://dx.doi.org/10.21125/edulearn.2017.0756.
[26] R. Hadi Mogavi, B. Guo, Y. Zhang, E.-U. Haq, P. Hui, X. Ma, When gamification spoils your learning: A qualitative case study of gamification misuse in a language-learning app, in: Proceedings of the Ninth ACM Conference on Learning @ Scale, in: L@S '22, Association for Computing Machinery, New York, NY, USA, 2022, pp. 175–188, http://dx.doi.org/10.1145/3491140.3528274.
[27] C. Abt, Serious Games, University press of America, 1987.
[28] K.M. Kapp, What is gamification, The gamification of learning and instruction: game-based methods and strategies for training and education (2012) 1–23.
[29] F. Gini, S. Bassanelli, A. Bucchiarone, et al., The role of game modality in the outcomes of gamification: A research agenda, GamiFIN (2023) 67–78.
[30] A.G. Barrera Yañez, C. Alonso-Fernandez, B. Fernandez Manjon, Review of serious games to educate on gender equality, in: Eighth International Conference on Technological Ecosystems for Enhancing Multiculturality, 2020, pp. 662–668.

[31] A. Nocentini, V. Zambuto, E. Menesini, Anti-bullying programs and information and communication technologies (ICTs): A systematic review, Aggress. Violent Behav. 23 (2015) 52–60, http://dx.doi.org/10.1016/j.avb.2015.03.012.

[32] A. Calvo-Morata, C. Alonso-Fernández, M. Freire, I. Martínez-Ortiz, B. Fernández-Manjón, Serious games to prevent and detect bullying and cyberbullying: A systematic serious games and literature review, Comput. Educ. 157 (2020) 103958, http://dx.doi.org/10.1016/j.compedu.2020.103958.

[33] G. Baptista, T. Oliveira, Gamification and serious games: A literature meta-analysis and integrative model, Comput. Hum. Behav. 92 (2019) 306–315, http://dx.doi.org/10.1016/j.chb.2018.11.030, URL https://www.sciencedirect.com/science/article/pii/S074756321830565X.

[34] M. Garaigordobil, V. Martínez-Valderrey, Technological resources to prevent cyberbullying during adolescence: The cyberprogram 2.0 program and the cooperative cybereduca 2.0 videogame, Front. Psychol. 9 (2018) 745, http://dx.doi.org/10.3389/fpsyg.2018.00745.

[35] World Health Organization, et al., Global and Regional Estimates of Violence Against Women: Prevalence and Health Effects of Intimate Partner Violence and Non-Partner Sexual Violence, World Health Organization, 2013.

[36] Games for Change, Wonder city, 2013, http://wonderwomendoc.com/wondercity_act01/. (Accessed 01 September 2020).

[37] M. Gilliam, P. Jagoda, E. Jaworski, L.E. Hebert, P. Lyman, M.C. Wilson, "Because if we don't talk about it, how are we going to prevent it?": Lucidity, a narrative-based digital game about sexual violence, Sex Educ. 16 (4) (2016) 391–404, http://dx.doi.org/10.1080/14681811.2016.1170737.

[38] D. Boduszek, A. Debowska, A.D. Jones, M. Ma, D. Smith, D. Willmott, E.T. Jemmott, H. Da Breo, G. Kirkman, Prosocial video game as an intimate partner violence prevention tool among youth: A randomised controlled trial, Comput. Hum. Behav. 93 (2019) 260–266, http://dx.doi.org/10.1016/j.chb.2018.12.027.

[39] K.N. Jozkowski, H.R. Ekbia, "Campus craft": A game for sexual assault prevention in universities, Games Heal. J. 4 (2) (2015) 95–106, http://dx.doi.org/10.1089/g4h.2014.0085.

[40] L.R. Almeida, L.S. Machado, A.T. Medeiros, H.F. Coelho, J.M. Andrade, R.M. Moraes, The caixa de pandora game: Changing behaviors and attitudes toward violence against women, Comput. Entertain. (CIE) 16 (3) (2018) 1–13, http://dx.doi.org/10.1145/3209430.

[41] R. Al Azawi, M. Bulshi, F. farsi, Educational gamification vs. Game based learning: Comparative study, Int. J. Innov. Manag. Technol. (IJIMT) 7 (2016) 131–136, http://dx.doi.org/10.18178/ijimt.2016.7.4.659.

[42] M. Oliveira, S. Petersen, The choice of serious games and gamification, in: M. Ma, M.F. Oliveira, J. Baalsrud Hauge (Eds.), Serious Games Development and Applications, Springer International Publishing, Cham, 2014, pp. 213–223.

[43] P.T. Palomino, et al., Exploring content game elements to support gamification design in educational systems: Narrative and storytelling, J. Educ. Technol. Soc. 24 (3) 45–57.

[44] A.C. Filatro, et al., Structural and content gamification design for tutor education, Rev. Bras. Educ. 25, 1–16.

[45] S. Hallifax, et al., Structural gamification for adaptation based on learning analytics, in: Proceedings of the 21st ACM Conference on Learning at Scale, pp. 34–43.

[46] J. Koivisto, J. Hamari, The rise of motivational information systems: A review of gamification research, Int. J. Inf. Manag. 45 (2019) 191–210.

[47] J. Majuri, J. Koivisto, J. Hamari, Gamification of education and learning: A review of empirical literature, in: Proceedings of the 2nd International GamiFIN Conference, GamiFIN 2018, CEUR-WS, 2018.

[48] Y. Takbiri, A. Bastanfard, A. Amini, A gamified approach for improving the learning performance of K-6 students using easter eggs, Multimedia Tools Appl. 82 (13) (2023) 20683–20701, http://dx.doi.org/10.1007/s11042-023-14356-7.

[49] K. BonJin, W. HoSung, Using gamification development of sex education program (ethical perspective) for youth, J. Res. Publ. Ethics 5 (1) (2024) 19–27.

[50] G. Schiavo, E. Roumelioti, G. Deppieri, A. Marconi, Gamification strategies for child protection: Best practices for applying digital gamification in child sexual abuse prevention, in: Proceedings of the 23rd Annual ACM Interaction Design and Children Conference, IDC '24, Association for Computing Machinery, New York, NY, USA, 2024, pp. 282–289, http://dx.doi.org/10.1145/3628516.3655813.

[51] B.M.B. Dick Schoech, N. Elias-Lambert, Gamification for behavior change: Lessons from developing a social, multiuser, web-tablet based prevention game for youths, J. Technol. Hum. Serv. 31 (3) (2013) 197–217, http://dx.doi.org/10.1080/15228835.2013.812512.

[52] J. Martí-Parreño, E. Méndez-Ibáñez, A. Alonso-Arroyo, The use of gamification in education: a bibliometric and text mining analysis, J. Comput. Assist. Learn. 32 (6) (2016) 663–676.

[53] Y.S. Rao, R.W. Mee Mee, K. Abd Ghani, L.S. Pek, W.Y. Von, M.R. Ismail, T.S. Tengku Shahdan, et al., Gamification in education for sustainable development, in: European Proceedings of Multidisciplinary Sciences, European Publisher.

[54] S.B. Marine, Z. Nicolazzo, Campus sexual violence prevention educators' use of gender in their work: A critical exploration, J. Interpers. Violence 35 (21–22) (2020) 5005–5027.

[55] Y.-F. Wang, Y.-F. Hsu, K.-T. Fang, L.-T. Kuo, Gamification in medical education: identifying and prioritizing key elements through delphi method, Med. Educ. Online 29 (1) (2024) 2302231.

[56] F.E. Olalere, Gamification as a tool for social change: A case of gender-based violence in South Africa, J. Humanit. Arts Soc. Sci. (EHASS) 3 (13) (2022) http://dx.doi.org/10.38159/ehass20223135.

[57] T. Havronska, I. Krasnolobova, V. Bortniak, D. Bondar, A. Boiko, The role of public authorities in combating gender-based violence, Cuestiones Políticas 39 (71) (2021) 387–404.

[58] F. Dembélé, Z. Keita, S. Goita, O. Sylla, et al., Gender-based violence in mali: A hidden disaster in schools, Open J. Soc. Sci. 8 (02) (2020) 242.

[59] M.L. Le Mat, H.K. Altinyelken, H.M. Bos, M.L. Volman, Mechanisms of adopting and reformulating comprehensive sexuality education policy in ethiopia, J. Educ. Policy 35 (5) (2020) 692–712.

[60] L. Scholes, C. Jones, C. Stieler-Hunt, B. Rolfe, Serious games for learning: games-based child sexual abuse prevention in schools, Int. J. Incl. Educ. 18 (9) (2014) 934–956, http://dx.doi.org/10.1080/13603116.2013.860195, URL http://www.tandfonline.com/doi/abs/10.1080/13603116.2013.860195.

[61] A.M. Toda, P.H.D. Valle, S. Isotani, The dark side of gamification: An overview of negative effects of gamification in education, in: A.I. Cristea, I.I. Bittencourt, F. Lima (Eds.), Higher Education for All. From Challenges to Novel Technology-Enhanced Solutions, Springer International Publishing, Cham, 2018, pp. 143–156.

[62] E.L. Deci, R. Koestner, R.M. Ryan, A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation, Psychol. Bull. 125 (6) (1999) 627–668, http://dx.doi.org/10.1037/0033-2909.125.6.627, URL http://doi.apa.org/getdoi.cfm?doi=10.1037/0033-2909.125.6.627.

[63] M. Csikszentmihalyi, M. Csikzentmihaly, Flow: The Psychology of Optimal Experience, vol. 1990, Harper & Row New York, 1990.

[64] M. Csikszentmihalyi, M. Csikszentmihalyi, S. Abuhamdeh, J. Nakamura, Flow, Flow and the Foundations of Positive Psychology: The Collected Works of Mihaly Csikszentmihalyi, Springer, 2014, pp. 227–238.

[65] J. Waycott, G. Wadley, S. Schutt, A. Stabolidis, R. Lederman, The challenge of technology research in sensitive settings: Case studies in 'ensitive HCI', in: Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction, OzCHI '15, Association for Computing Machinery, New York, NY, USA, 2015, pp. 240–249, http://dx.doi.org/10.1145/2838739.2838773, URL https://dl.acm.org/doi/10.1145/2838739.2838773.

[66] E. Roumelioti, F. Gini, A.L.P. Jakobi, A. Marconi, B. Nyúl, M.P. Paladino, G. Schiavo, M. Zancanaro, Standbyme: a gamified educational platform to raise awareness on gender-based violence, in: Companion Proceedings of the Annual Symposium on Computer-Human Interaction in Play, 2023, pp. 108–113.

[67] M.P. Paladino, A.L.P. Jakobi, F. Gini, A. Marconi, E. Roumelioti, G. Schiavo, J. Vaes, M. Zancanaro, 13. Multidisciplinary Framework for Developing a Gamified Digital Platform to Combat Gender-based Violence.

[68] Council of Europe, Convention on preventing and combating violence against women and domestic violence (Istanbul convention), 2011, https://www.coe.int/en/web/conventions/full-list/-/conventions/rms/090000168008482e, Adopted on 11 May 2011, Istanbul, Turkey. [Accessed: 06-May-2022].

[69] B. Morschheuser, J. Hamari, A. Maedche, Cooperation or competition–When do people contribute more? A field experiment on gamification of crowdsourcing, Int. J. Hum.-Comput. Stud. 127 (2019) 7–24, http://dx.doi.org/10.1016/j.ijhcs.2019.01.002.

[70] D.F. Pajarito Grajales, A. Degbelo, M. Gould, Collaboration or competition: The impact of incentive types on urban cycling, Int. J. Sustain. Transp. 14 (10) (2020) 761–776, http://dx.doi.org/10.1080/15568318.2019.1709533.

[71] Y. Chen, P. Pu, HealthyTogether: exploring social incentives for mobile fitness applications, in: Proceedings of the Second International Symposium of Chinese CHI, 2014, pp. 25–34.

[72] E. Lange, S. Young, Gender-based violence as difficult knowledge: pedagogies for rebalancing the masculine and the feminine, Int. J. Lifelong Educ. 38 (3) (2019) 301–326, http://dx.doi.org/10.1080/02601370.2019.1597932.

[73] B. Dadvand, H. Cahill, Structures for care and silenced topics: Accomplishing gender-based violence prevention education in a primary school, Pedagog., Cult. Soc. 29 (2) (2021) 299–313, http://dx.doi.org/10.1080/14681366.2020.1846473.

[74] R. Pekrun, Emotions and learning, in: Educational practices series, vol. 24, UNESCO International Bureau of Education and International Academy of Education, 2014, Document code: IBE/2014/ST/EP24.

[75] V. Sacharin, K. Schlegel, K.R. Scherer, Geneva Emotion Wheel Rating Study, Center for Person, Kommunikation, Aalborg University, NCCR Affective Sciences. Aalborg University, Aalborg, 2012.

[76] F. Gini, S. Bassanelli, The relationship between fun and the overall score of the MEEGA360 scale, 2022, Unpublished paper.

[77] G. Petri, C.G. von Wangenheim, A.F. Borgatto, MEEGA+: A Method for the Evaluation of Educational Games for Computing Education, INCoD–Brazilian Institute for Digital Convergence, 2018, pp. 1–47.

[78] H.B. Mann, D.R. Whitney, On a test of whether one of two random variables is stochastically larger than the other, Ann. Math. Stat. (1947) 50–60.

[79] M.P. Fay, M.A. Proschan, Wilcoxon-mann-whitney or t-test? On assumptions for hypothesis tests and multiple interpretations of decision rules, Stat. Surv. 4 (2010) 1.

[80] M. Friedman, The use of ranks to avoid the assumption of normality implicit in the analysis of variance, J. Am. Stat. Assoc. 32 (200) (1937) 675–701.
[81] W.H. Kruskal, W.A. Wallis, Use of ranks in one-criterion variance analysis, J. Am. Stat. Assoc. 47 (260) (1952) 583–621.
[82] C. Ott, A. Robins, K. Shephard, Translating principles of effective feedback for students into the CS1 context, ACM Trans. Comput. Educ. (TOCE) 16 (1) (2016) 1–27.
[83] C. Beaumont, M. O'Doherty, L. Shannon, Staff and student perceptions of feedback quality in the context of widening participation, High. Educ. 1 (August) (2008) 1–71.
[84] T. Jessop, Y. El Hakim, G. Gibbs, The whole is greater than the sum of its parts: A large-scale study of students' learning in response to different programme assessment patterns, Assess. Eval. High. Educ. 39 (1) (2014) 73–88.
[85] P. Black, D. Wiliam, Assessment and classroom learning, Assess. Educ.: Princ. Policy Pract. 5 (1) (1998) 7–74.
[86] F. Gini, E. Roumelioti, F. Fiori, A.L.P. Jakobi, B. Nyúl, A. Marconi, M.P. Paladino, G. Schiavo, M. Zancanaro, Tackling gender-based violence through gamification: a preliminary evaluation, in: Proceedings of the 2024 International Conference on Advanced Visual Interfaces, 2024, pp. 1–9.
[87] J. Koivisto, J. Hamari, Demographic differences in perceived benefits from gamification, Comput. Hum. Behav. 35 (2014) 179–188.
[88] A.C.T. Klock, I. Gasparini, M.S. Pimenta, J. Hamari, Tailored gamification: A review of literature, Int. J. Hum.-Comput. Stud. 144 (2020) 102495.