TitleIX: Step Up & Step In! A Mobile Augmented Reality Game Featuring Interactive Embodied Conversational Agents for Sexual Assault Bystander Intervention Training on US College Campuses

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ABSTRACT

Despite the efforts of existing Title IX training programs in the US, current intervention and prevention programs fail to address the problems caused by sexual violence on US college campuses. To address this issue, we designed a mobile augmented reality (AR) game – *TitleIX: Step Up & Step In!* – that encourages students to become more active and supportive of bystanders through innovative game play, while aiming to improve current sexual assault bystander intervention training. Utilizing AR technology and embodied conversational agents (ECAs), this game provides highly immersive scenario based training for sexual assault bystander intervention while connecting the users to realistic campus experiences. This inventive game design leverages innovative technology to increase awareness of real-world problems; specifically, sexual harassment targeting women and LGBTQ+ students on college campuses. The design implemented in this paper can inform the future construction of AR serious games for social justice.

CCS CONCEPTS

• **Human-centered computing** → **Game Design** ; **Transformative & Transgressive Play**;

KEYWORDS

Sexual Assault Awareness, Bystander Intervention, Augmented Reality, Transformative Gaming, Serious Games, Embodied Conversation Agents

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1 INTRODUCTION

Sexual assault is a common and worldwide issue on universities and college campuses [32]. For example, in the US context, 1 in 5 women students, 1 in 16 men students, and 23.1 percent of transgender, gender queer, and nonconforming students have reported being sexually assaulted on college campuses [9]. These worrisome high rates have led to mandatory Title IX training programs for US university students, faculty, and employees. These programs provide training on consent and active bystander intervention techniques, helping them better understand how to identify, report, and prevent sexual harassment [37]. However, existing Title IX training programs also show several limitations, including tedious training modules, lack of engagement and active participation in the training and learning experiences, and lack of diverse perspectives regarding gender and sexuality [14, 17, 18].

To address these limitations, we designed a mobile AR game *TitleIX: Step Up & Step In!* to provide more active and engaging sexual assault bystander intervention training. This application administers highly educational experiences on US college campuses by leveraging advanced technologies, including augmented reality (AR) and Embodied Conversational Agents (ECA). More specifically, *TitleIX: Step Up & Step In!* leads students through location-based modules while teaching them to identify and prevent sexual harassment and assault, and reward them for being active bystanders to vulnerable student populations on universities and college campuses.

2 RELATED WORK

Title IX and Sexual Violence in Higher Education in the US context. Under the Title IX act, all US institutions receiving federal funding are legally required to protect students from sex-based harassment and sexual violence (rape, sexual assault, sexual coercion, and sexual battery) [23, 33, 34]. Many institutions implement Title IX training as part of their Title IX compliance to prevent sexual misconduct. How Title IX training is implemented varies from campus to campus, but the majority of the training is instructed online.

Title IX training consists of videos and documents on topics such as harassment, consent, coercion, and bystander intervention [35]. Students and advocacy experts have noted that these programs, while creating awareness, have not been as effective [18, 35]. Most training programs are one-off training only for first year and incoming transfer students [35]. Due to the mode and lengthy nature of instruction, many students feel disengaged with the materials [14].

In addition, existing Title IX training in the US seems to be limited regarding lesbian, gay, transgender, or gender nonconforming (LGBTQ+) students' unique experiences and challenges. Studies have consistently shown that female undergraduate students and students who identify as LGBTQ+ experience sexual assault at a higher rate than their cisgender, heterosexual counterparts on college campuses [12, 13, 17]. A 2015 report found that 23 % of undergraduate female students reported experiences of sexual violence on campus [9]. When looking at LGBTQ+ students, 16.1% of transgender students reported experiencing unwanted sexual contact, 10.2% reported experiencing sexual assault, 13.2% of lesbian, gay, bisexual, queer, and other students reported experiencing unwanted sexual contact, and 11.2% reported experiencing sexual assault. Comparatively, only 6.8% of heterosexual/straight students reported experiencing unwanted sexual contact, and 4.4% sexual assault [26]. Although the data alludes to a serious area of sexual harassment and assaults within this population, the very specific experiences of sexual violence facing this population are not reflected in the training documents and intervention programs of most US universities' Title IX compliance programs. It is important and necessary for current training programs to be inclusive of the experiences of their LGBTQ+ students.

Augmented Reality and Serious Games. Serious games, which are games for purposes beyond entertainment, have been developed for education, rehabilitation, learning, health, and training [21]. Augmented reality (AR) simulations overlay synthetic computer-generated information and entities over a predominantly real world scene, allowing for interactivity and engagement beyond a regular 2D screen [27]. As a result, AR has proven to be more engaging than traditional gameplay [8, 16], is a novel way to experience societal issues, has shown a higher retention rate of information as compared to traditional delivery methods [8], and is known to make people around the player curious and interested in the game [27]. AR serious games (ARSG) are especially characterized by immersive storylines and high engagement that promotes learning and behavior change. Examples include Street Smart AR for women's safety [11], Zombie, Run! AR for health fitness [15], and ATHYNOS, an AR game prototype designed to provide cognitive and behavioral therapy for children with ADHD [6].

Embodied Conversational Agent (ECA) Design. Embodied conversational agents are dynamic anthropomorphic interface agents that utilize a combination of verbal and nonverbal behaviors to mimic the experience of face-to-face human interactions [7, 10]. These behaviors include complex dialogue modeling and generation, speech recognition and generation, natural language processing, gestural animation, and gaze. Previous studies have proven that face-to-face human interaction (i.e., in-person, video call) provides far more effective communication than strictly verbal interaction (i.e., phone calls) [25]. This is largely due to the inclusion of nonverbal behaviors, such as nodding, direct eye contact, and frequent gesturing [7]. Research involving ECA-to-Human communication has shown that ECA interactions can produce social responses that are equivalent to human-human interaction [36]. Additionally, the usage of ECAs in stress-inducing interpersonal situational training can provoke realistic emotional responses with the user [28, 38]. If used in situational training, this could promote a higher quality learning environment than traditional instructional platforms.

With these considerations, our game design leverages AR and ECA technologies to innovate existing Title IX training in the US, and promote more compelling, interactive and socially engaging game experiences. In doing so, *TitleIX: Step Up & Step In!* increases awareness about real-world problems, such as sexual harassment especially targeting women and LGBTQ individuals on college campuses, providing implications for the future construction of serious games for social justice.

3 GAME DESIGN

3.1 Motivation

In *TitleIX: Step Up & Step In!*, the user is guided by an ECA, Val, who walks players through their university/college campuses, while putting their bystander intervention skills to the test. Using AR, players 1) witness, 2) choose how to intervene, and 3) watch the consequences of their intervention decision in real time. Within each scenario, people with diverse identities (e.g., different sexualities, gender identities, racial identities) are harassing and/or being harassed sexually.

First, all authors identify as women graduate-level STEM students in US universities, and either know someone, or are themselves someone who could have benefited from the presence of active and informed bystanders on their campus. Second, thinking back upon the university-mandated Title IX training courses we were required to complete as undergraduates at various institutions, we were struck by the similarities between our experiences - i.e., how tedious the courses were, how easy it was to click through the content without really absorbing it, and how content lacked diverse perspectives. We strongly felt there must be a way to make this training more (1) engaging, (2) memorable, (3) accessible, and (4) diverse. These lived experiences fuel a passion for creatively leveraging technology to foster safer campuses for women and non-women alike.

Thus, *TitleIX: Step Up & Step In!*, an AR mobile game, was created to meet these needs by requiring greater mental engagement with Title IX training material and physical engagement with their campus surroundings. By putting virtual scenarios directly in the context of players' offline world, our solution not only addresses (1) engagement, but also (2) memorability. Furthermore, using AR on mobile devices, which are portable and commonplace among college students, we better capitalize on immersive technology rather than more cumbersome embodied technology (i.e., VR) to address (3) accessibility. Finally, by representing a variety of identities and experiences with sexual assault and harassment, we better address (4) diversity.

3.2 Game Overview

Title IX: Step Up & Step In! requires players to use an AR mobile game geolocated to their specific college campus. In this game, users complete various levels designed to teach them bystander intervention skills. Guided by an ECA, Val, users put these skills to the test in various scenarios, in which digital humans roleplay as the respective harassers and victims. The goal of the game is to complete all levels with as many points as possible and reach the status of a "Good Bystander". Points are determined by how successful the player's chosen intervention strategy is at helping the victim.

Players use their smartphones to access the application and activate all AR-dependent requirements. In the app's home screen, users have a selection of three different icons: profile, map, or start. The profile page showcases the user's current progress and provides additional educational resources regarding bystander intervention. The map window provides a view of all key locations on campus. Pressing "start" activates the first level of training, or the players' current level if they have saved progress. Within the level, users receive verbal instructions from the ECA (Val) to go to the next location (Left most panel in Figure 1). Using the "map" icon, players can access a map of their college campus; in this view port, the next location is represented by a symbol, designed according to the level's subject matter (e.g., Lesbian Symbol for **Level 1 - Lesbian**). While walking towards the location, users can toggle between the map and the AR experience; during which, the ECA provides facts about the upcoming scenario (e.g., Level 1 -features statistics about assault of lesbians on college campuses) and good bystander intervention practices.

Upon arriving at the designated location, players see a floating image of the level's symbol in their view port(Panel second from left in Figure 1). Players step directly into the symbol to activate the level and introduce the digital human scenarios. Each level takes place at a different campus location and presents one scenario, with each level and its associated scenario focusing on the types of sexual harassment experienced on campus by a different sexuality/gender/racial, etc. identity category. For example, **Level 1 - Lesbian** features one woman digital human trying to pressure another woman digital human to give her her phone number, and begins accusing her of "not being a real lesbian" if she does not date her (Figure 1). Using their phone, players watch the harassment scenario unfold (Panel third from left, Figure 1).

After the scenario finishes, the ECA steps back into view and asks the player to choose an active bystander intervention option (Panel fourth from left, Figure 1). After reviewing the options and their implications, players are given a multiple-choice list of options from which to choose. For instance, in the first scenario, they are given five intervention options - Distract, Delegate, Document, Delay, Direct - to choose between. Players then pick the option they think is best, and watch the consequence of their decision play out in the scenario (Panel third from right in Figure 1).

The ECA then steps in and explains why or why not it was a good choice (Panel second from right in Figure 1), and awards the player points that range from +10 to -5. The "best" option in the scenario will have +10 points, with +8 for second best, +5 for neutral, 0 for second worst, and -5 for worst possible option. If the chosen option was not the "best" choice, the ECA explains why it was incorrect and offers the chance for the player to choose a different action. repeating the steps until the player earns enough points to satisfactorily pass the level and earn their ally badge. Once points are received, players are directed by the ECA to either keep going and complete all levels of the game, with the aim of earning their status as a "Good Bystander", or return to the main menu to finish another time. The goal of the game is to complete all the levels (10 in total) to gain enough points to be a "Good Bystander".

3.3 Game Design Process

Game design occurred in many brainstorming sessions, both in-person and online. Throughout these sessions, ideas were collected in a shared document. Once satisfied with the volume of ideas, the team discussed which type of game would be the best beneficial to society. Eventually, we decided on active bystander awareness training. This gameplay design aspect taps into the societal sector of transformative and transgressive play. We found that augmented reality (AR) would be an ideal platform for gameplay, considering the single-player aspect still includes outside individuals. We expect an effect similar to Pokémon GO, in which outside individuals noticed the game player in real life and become influenced to participate [27].

Keeping these two major aspects in mind, scenario selection, storyboarding, and scripting were completed over a few team discussions. Based on all these inputs and directions, the AR game was built with selection, viewing, answering, and scoring as the key mechanics. These mechanics were strategically designed to allow expansion of the levels, as well as to favor the inclusion of any type of scenario concerning any gender and could be set for any place in the world. Apart from this, the reward system was designed in such a way that would motivate the player to learn more. Also, we speculated that, if this game were to be used by any organization to increase awareness among the people in the organization, the reward system, and the progress bar would allow them to trace their performance and the game's effectiveness in achieving their goal.

3.4 Game Development

Title IX: Step Up and Step In! was developed in Unity 2021.1.25, utilizing a wide variety of C# scripts and plugin packages to implement its complex, multi-level design in a complete Android build [31]. Its overall framework includes a multitude of aspects, including Augmented Reality (AR), Embodied Conversational Agents (ECAs), multi-level design, collider triggers, and audio-synced digital humans. The most intensive aspects of this application include its AR implementation and ECA infrastructure.

AR is integrated into the application through the Unity ARCore and ARFoundation plugin packages [1]. ARFoundation provides AR technology on a variety of platforms in Unity, including Android, iOS, and HoloLens 2. Considering this application is completed in an Android build, the Google ARCore XR Plug-in is utilized to implement AR usage on a phone. Within the Unity scene, several ARFoundation assets work together to create augmented reality through the AR Software Development Kit (SDK). This list includes AR Session, AR Session Origin, ARCore Extensions, AR Default

Figure 1: Example Scenario Progression

Point Cloud, and AR Default Plane. All AR Session assets work in conjunction with the AR Core Extensions script, instilling that all 3D assets within the scene are properly rendered and combined with the phone's camera view.

Embodied Conversational Agents (ECA) are incorporated into this application through a multitude of resources, C# scripts and plugin packages. The ECA 3D model was created in Autodesk Character Generator (ACG), an online database of fully-customizable digital humans [5]. Body animations were downloaded from Adobe Mixamo, an online library of motion captured animations [3]. All gestural animations (i.e. waving, head nodding, arm gestures, etc) were animated in Maya 2021 [2]. In order to implement the conversational aspect of the ECAs, a combination of IBM Watson Assistant technologies, SALSA LipSync Suite v2, and gestural animations are utilized. IBM Watson is administered in three separate aspects: Text-to-Speech (TTS), Speech-to-Text (STT) and Watson Assistant [4]. Using a C# script in Unity, the application connects to IBM Watson through an application programming interface (API) reference, effectively creating a seamless verbal communication between the user and the ECA. The SALSA LipSync Suite v2 plugin package provides lip syncing capabilities for the ECA [30]. In real time, SALSA processes the phonemes in each IBM Watson audio file and matches the ECA facial blendshapes with the appropriate viseme. Additionally, gestural body animation is implemented during facial animation to create realistic nonverbal animation.

3.5 Gameplay Testing

We conducted several tests of the game using prototype methods for early-stage game development, as recommended by previous ACM researchers [20, 22]. First, we started with paper prototypes and storyboards to connect the narrative with the game's functionality. These prototypes enabled us to understand our intended game flow, important interface elements, and how the story and purpose fits into this design. Next, we designed our interface elements in Figma to support rapid prototype testing while creating our prototypes for the AR gameplay and ECA agent interactions in Unity, testing these separately and together. Through informal testing with teammates and student volunteers, we discover a few flaws with the game design using Nielsen's usability heuristics [24] and general user perceptions. In support of user recognition and the educational purpose of the app, we discovered the need to include a library prototype for supporting learning outcomes. We also discovered that the audio went far too quickly for users, which would make it particularly inaccessible for those with hearing or cognitive impairments as well as language-based hurdles to follow even with captions. As such, we slowed down the audio and team members recorded the script to help overcome this issue. Additionally, we found that the digital human body animations appeared unnatural, hurting the realism of the scenario for users. Our development team worked to modify the scenario triggers. In the future, we intend to expand testing of our prototype with a wider-range of individuals, such as undergraduate students who would likely be using this game.

4 CRITICAL REFLECTION

As we discussed in previous sections, this game aims to address challenges to Title IX training on US college campuses, particularly the often ineffectual nature of current training methods to inspire active bystander intervention [14, 29]. These interventions often also fail to capture the diverse experiences and identities of US college students [12]. Our aim with this game is to address the high-rates of sexual assault and harassment on US college campuses, particularly for those of a sexual- and/or gender-minority status who often face stigmatization [13, 17], and offer an additional resource that may overcome the issues in current active bystander training that prevent individuals from intervening in these problems. While we do not aim to replace the current methods in place, we believe our AR-based transformative gameplay can help address the challenges in making bystander intervention training more effective, while also encouraging greater empathy and recognition of issues of assault and harassment across student identities, particularly those stigmatized on US college campuses.

In doing so, our AR game approach has the potential to help, by making sexual assault and harassment training appropriately socially engaging, and connecting the users' experiences to the campus resource, culture, and overall community. As such, we believe that, broadly, our game can help US university students to become better active bystanders. Previous research asserts that virtual reality (VR) interventions can help increase users' intervention confidence and skills regarding sexual assault and harassment; however,

these interventions prove to be both costly to scale, particularly for equipment acquisition, and may prove to be too immersive, potentially triggering player trauma due to the realism of play [19]. In comparison, research on AR applications for supporting assault and harassment education suggests that this is an effective approach for enhancing real-time experiences, such as the Street Smart AR application, that educated women about safe locations throughout their communities [11].

Thus, we believe that our game can capitalize on the strengths of AR and give college students immersive experiences that can then translate to their real-world scenarios. For instance, if they learn how to report issues to an administrator in a simulated AR scenario outside a said building, they can then connect the problem with a tangible solution at an appropriate time in the future. Furthermore, we believe that our game can benefit those often stigmatized communities on college campuses tangentially by giving light to the pervasive issues facing these students, and encouraging all students on campus to both empathize with their experiences and act as allies when the situation demands it.

5 CONCLUSION AND FUTURE WORK

To address the high rates of sexual violence on US college campuses, *Title IX: Step Up & Step In!* aims to fill a gap in current Title IX active bystander training for sexual assault and harassment. In the game, users learn about diverse issues of sexual assault and harassment, and how they can become better active bystanders, while capitalizing on what they learn in their Title IX training. By making an AR smart phone game, we present a solution that may increase immersion to support user engagement, while also connecting their learning to their real-world campus experiences. Furthermore, we hope that presenting diverse and stigmatized groups that are under-supported and frequently victimized on campus can increase player empathy and encourage greater action. We believe that this game is a great first step toward these aims, which may also benefit such training outside the US context. For example, to support varying college campuses both within and outside US, we plan to find new test sites for this game and expand the location-based scenarios to those campuses interested in this option both within and beyond the US context. Together, we believe that these next steps offer both short-term and long-term goals that can scale this AR game into a suitably engaging and effective intervention for active bystander training on college campuses across the world.

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