Gamified Educational Learning Path on HIV/AIDS Stigma and Discrimination (REDXIR): Design, Development and Pilot Study

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Abstract

Background: HIV/AIDS-related stigma and discrimination are among the main barriers to controlling the HIV epidemic. Discriminatory behavior in healthcare settings deprives people of accessing high-quality health services.

Methods: This study presents the design, development, and pilot study of a novel web-based application ("REDXIR"), which is designed based on behavioral and gamification principles and aims to eliminate HIV/AIDS-related discriminatory behavior among health professions students. REDXIR storyline is set in an imaginary world where the students' journey is like a 10-level game, in which each level consists of several missions with a certain amount of score. The participants have to accomplish the mission to reach the minimum amount of score to pass each level. Finally, each becomes an individual who has not only the knowledge but also the competency to educate and advocate appropriately in the field.

Results: The pilot was done in six medical sciences universities in Tehran, Iran. The feasibility of the instructional design, specifically gamification strategies in the field of HIV education, and the executive functions to run the program on a bigger scale were evaluated. In total, 241 students were included and performed 1952 missions. The program evaluation showed a mean satisfaction score of 4.16 (from 1, the lowest, to 5, the highest) and participants considered their learning practical and gamification method appropriate for HIV education.

Conclusion: A meaningful gamification design for an online medical education program could be a suitable, functional, and applicable learning model to reduce HIV/AIDS stigma and discrimination among health professions students.

Keywords: HIV, AIDS, Stigma, Discrimination, Gamification, Education, Medical Education

Introduction

HIV/AIDS-related stigma and discrimination are one of the significant barriers against global efforts to control the epidemic in different ways. HIV-related stigma is described as" irrational or fear-driven negative attitudes, behaviors, and judgments towards people living with HIV (PLHIV), their partners and families and key populations," which can lead to discriminatory behaviors (1). The Joint United Nations Program on HIV/AIDS (UNAIDS) defines HIV-related discrimination as "any distinction, exclusion, or restriction based indirectly or directly

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↑What is "already known" in this topic:
Stigma and discriminatory behaviour in the healthcare setting deprive people of accessing health services or enjoying quality healthcare. An effective educational program for health professions students can reduce discriminatory behaviour toward people living with HIV.

→What this article adds:
A meaningful gamification design for an online educational program with the aim of changing attitudes and behaviour could be a suitable, functional, and applicable learning model to affect HIV/AIDS stigma and discrimination among health professions students.

on a person's real or perceived HIV status" (2). Discriminatory behaviors in healthcare settings take many forms, such as unreasonable postponement of care, denial, unnecessary precautions and using judgmental language by healthcare providers, which all can compromise access to appropriate health care by reducing the willingness of PLHIV to seek necessary HIV services and adherence to HIV medication and treatment (3, 4). Finding the root causes of stigmatized attitudes and discriminatory behavior is complicated. Discriminatory behavior among healthcare providers toward PLHIV can be categorized into predefined behavioral patterns rooted in the sociocultural context of the people and also in interaction with the context and situation of the works place (5). Hence, UNAIDS 2016–2021 Strategy, adopted in October 2015, has a clear target of eliminating HIV-related discrimination, with a particular focus on healthcare, the workplace, and education settings (6).

Many educational programs worldwide have been held to reduce stigma and discrimination in healthcare settings, predominantly targeting healthcare providers. Interestingly, it's observed that one of the target groups that do not receive enough attention and remains underrated is health professions students who will be the future healthcare providers in the next few years (2). Technological development has provided more extensive opportunities for creativity and innovation in education. One of the innovative methods of teaching is gamification which has gained so much attention in recent years. Deterding et al. defined gamification as "the use of game design elements in non-game contexts" (7). Gamification is showing considerable efficacy in educational programs that target younger generations due to the popularity of games, a considerable number of game players, and more adaptability to technology among them (8, 9). The appliance of gamification in education improves specific skills of students by involving them in different activities, engages students in different challenges that give extra meaning to the learning process, and can result in behavior changes by incentives and penalties (10). Through gaming principles and overlaps between gamification methodology and health behavior change techniques, gamification can provide the possibility of behavioral changes (11).

With these visions in mind, an innovative gamification-based educational program is designed to target young health professions students, aimed to educate them about HIV/AIDS in order to eliminate discriminatory behavior against PLHIV in their future careers. This pilot focuses on the evaluation of the impact and feasibility of this method on motivating students to fill their knowledge gap in the field of HIV/AIDs, building stigma-free attitudes and non-discriminatory behavior among them, and teaching the right approach to a person living with HIV/AIDS in the healthcare environment in order to deliver full health services to them and adequate preventing measures in situations with the possibility of contamination.

Methods

This study is a descriptive quantitative health system research aimed to introduce and evaluate the feasibility of

the program (REDXIR). The program was run in two pilot phases, each with a period of 3 months in the medical sciences university of Tehran. In the beginning, we aimed to seek the feasibility of the instructional design with more emphasis on gamification strategies in HIV/AIDS-related education. In the second one, we assessed the executive functions, including both opportunities and limitations, to run the program on a bigger scale with a more significant number of students. Alongside the implementation of the virtual program, we designed new educational workshops (in accordance with the leveling defined), awareness campaigns in the week before World AIDS Day, designed and implemented HIV/AIDS movie review sessions, and some other related events. Demographic data, users' performance and users' feedback were collected longitudinally during the pilot phases. The data were analyzed using IBM SPSS statistical software (version 26.0). The study was approved by the Ethics Committee of Tehran University of Medical Sciences (IR.TUMS.VCR.REC.1397.498).

Gameplay

REDXIR is a web-based application implemented based on the Moodle open-source learning platform and was designed based on behavioral design and gamification principles. It aimed to educate young health professions students about HIV/AIDS in order to eliminate discriminatory behavior against people living with HIV/AIDS (PLHIV) in their future careers. REDXIR storyline is set in an imaginary world where the players are the young task force against a secret hidden and mysterious enemy who empowers HIV/AIDS-related discrimination and stigma. The goal is to fight back against the enemy to overcome and achieve victory finally. Their journey is like a 10-level game, the of several missions with a certain amount of score. The participants have to accomplish the mission to reach the minimum amount of score to pass each level. Finally, each becomes individual who has not only the knowledge but also the competency to educate and advocate appropriately in the field.

Game Mechanics and Dynamics
Missions

To target the roots in behavior and beliefs that end up in discriminatory behavior toward PLHIV, we designed five main types of missions:

– Type A: Missions of self-assessment and self-development

– Type B: Missions of assessment of HIV/AIDS-related issues in healthcare and actions toward solving them

– Type C: Missions of assessment of HIV/AIDS-related issues in PLHIV living and actions toward solving them

– Type D: Missions of assessment of HIV/AIDS-related issues in society and actions toward solving them

– Type Z: Missions of increasing knowledge about HIV/AIDS

Each mission has a mission description that guides the users by describing how the mission should be done. Some of the missions were done virtually, including missions related to social media or online knowledge courses, and the others had to be done in person, including par-
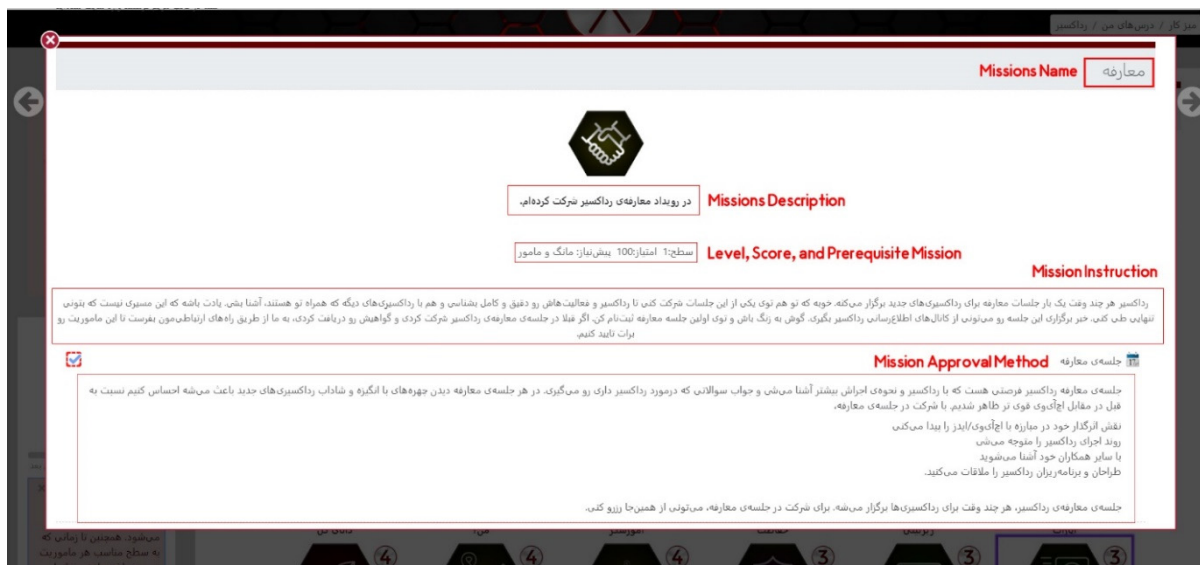
Figure 1. Example of a Mission information

ticipating in or holding workshops, events and volunteer work. To engage more students and increase their attachment to the program, different learning styles have been considered in designing and defining missions. Figure 1 shows a piece of mission information on the platform.

Levels

In design, levels are used to change the scenery with a sense of progression and accomplishment. All missions are placed ordinarily in ten levels. As they reach higher levels, they face more difficult, practical, and specialized missions. This pattern allows users to gradually become ready and capable of more complicated and important missions at the higher levels and go through the learning curve. Passing each level requires attaining approximately 60% of the total score of each level; in other words, there's no obligation to accomplish all the missions in each level. Having different types of missions at each level allows users to choose the missions which were in accordance with his/her talents and desires. Table 1 provides detailed information about the mission leveling and mission information, including name, description, level, and

Table 1. Leveling and Some Missions Information (Mission Level, Name, Description, and Type); PLHIV: People Living with HIV

Level	Mission Name	Mission Description	Mission Type
1	Their Stories	I've read several stories about the lives of people living with HIV.	Z
1	Pessimist Glasses	I've studied about HIV/AIDS related stigma and discrimination.	Z
2	Donation	I've donated money to an HIV/AIDS related charity or NGO.	C
2	+Club	I've visited positive clubs to get familiar with activities done there.	C
3	Make it a Trend	I've shared REDXIR social media pages on my social media.	D
3	Chat	I've talked with one of the healthcare personnel about PLHIV patients and their health-related challenges.	B
4	Me?	I've tested for HIV.	A
4	Red Ribbon	I've made and distributed 50 red ribbons among others.	D
5	Volunteer	I've volunteered for voluntary activities in one of HIV/AIDS related charities or NGOs.	C
5	Don't Be Silent!	I've posted #nodiscrimination under discriminative posts about HIV/AIDS on social media.	D
6	Blood Pressure	I've got a blood pressure for a PLHIV patient.	A
6	Behind Enemy lines	I've studied occupational and non-occupational HIV/AIDS exposures.	Z
7	MedCinema	I've held an HIV/AIDS related movie review session.	D
7	Invisible	In the role of a person living with HIV/AIDS, I've gone to the healthcare centers to evaluate the challenges and problems a PLHIV face with.	B
8	A Blood Drop	I've done a blood sugar test for a person living with HIV/AIDS.	A
8	Iran and the World	I've studied national and international strategies for HIV control.	Z
9	Smear	I've done a peripheral blood smear test for a person living with HIV/AIDS.	A
9	Hotline	I've worked as a consultant in online counseling at Iran National Center for AIDS.	C
10	Tip of Needle	I've done an intravascular injection for a person living with HIV/AIDS.	A
10	Researcher	I've written a research article about HIV/AIDS.	Z

To prepare the users to do more complicated missions at the higher levels, we defined some requirements for the missions. If a mission has one or several requirements, the user should first accomplish the required mission(s), which is usually in the lower levels and then do the respective mission.
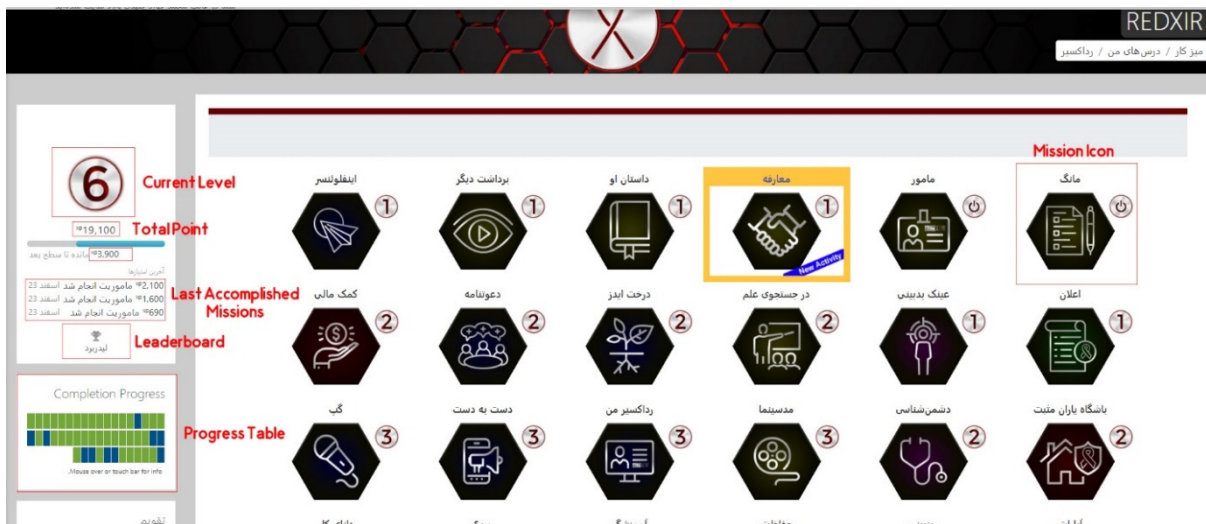
Figure 2. Example of a user profile in level 6. The missions' icons are in black shapes. Clicking on each of them would open a pop-up describing the missions' description, prerequisite missions, and other information. At the left and upper corner, the current level and point of the user and the number of points needed to pass the current level are shown. Below the box is the progress table which shows the accomplished missions colored in green and the non-accomplished ones in blue.

score. Figure 2 shows the main page display of a random mission in level 6.

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Scores and Approval
Scores give every action, one of the types of feedback it needs; one of the many usages for point systems in a gamified design and a way to show progression. Each mission has completion criteria that should be considered by the user. After each mission, the user sent the completion form, including all the documentation needed for the approval criteria, to the support team. After evaluating the performance of the user, they would send written and comprehensive feedback on the mission and also the result of approval or rejection. If the mission is approved, its score is added to the user's points, and if it is rejected, the user can do the mission again. The users who reach level 5 and beyond can request to be in charge of evaluating other users' missions in the levels below.

Leaderboard
On the leaderboard, as one of the gamification elements used in the design, the usernames are sorted based on the total score. To increase the competition among the users and a sense of status and recognition university-based leaderboard was also provided. To enhance the curiosity, the leaderboard was only shown up to 5 ranks higher and lower than the user level. This localized type keeps the discouraging part of a bad-designed leaderboard away.

Status, Achievement and Recognition
In the REDXIR social media and the platform, accomplishing new, important, or challenging missions and also outstanding and creative performances were announced and encouraged. Also, the announcement of related events, whether held by the REDXIR team or other related qualified events, was done in the NEWS section as some sort of help, bonus and even surprise for players.

Gamification Design
We utilized Octalysis, the gamification framework by Yu-Kai Chou, for the program design (12). Some of the main cores used are briefly described below.

Epic Meaning & Calling
People tend to devote themselves to something higher than personal needs and ideas, specially for the good of their fellows and humanity. By showing the importance of their efforts in this field through storytelling, we try to show students the effect and the magnitude of their work on the life of millions of people to make them more motivated and engaged in what they do.

Development and Accomplishments
Everyone loves to accomplish something in work, life, and everything in between. Points, badges and bonuses defined for the missions are part of the motivation and interest of the students to accomplish the missions. So, using elements like a scoreboard and ranking, badges and different prizes in exchange for some of the missions will increase the competition among students.

Creativity and Feedback
Autonomy (also discussed in the self-determination theory (13) is an essential need for humans and a powerful motivator to accomplish hard tasks. There's no limitation

on how to accomplish a mission. So, the users will do the mission based on their creativity, knowledge, and capability. We assess ourselves and our progression by the feedback we get. Evaluation of missions and giving feedback on the performance are some of the main mechanics of the platform.

Social Influence and Relatedness

People seek relatedness (from Self-Determination Theory) as an essential part of everyday life. To support this intrinsic need, we designed some missions in a way that requires users' cooperation with each other. They learn together and try to accomplish the mission by helping each other. The competitive environment, in addition to cooperation, makes the accomplishment of the mission more motivating and enjoyable. Encouraging pioneer students and outstanding performances in social media and the platform was one of the routine applications of this core drive for recognition.

Scarcity

The availability of missions depends on how players proceed. So not every mission is available to everyone at the same time. This scarcity, along with a somehow adaptive and personalized path for every player, creates the scarcity of elements. In addition, to do some missions, users had to meet some criteria and prerequisites. For example, defining deadlines for some missions.

Unpredictability

We all love surprises and mysteries. For simulating these kinds of situations, users could only see the missions of their current and next level, but just the missions in their level were available to be done. All other missions in higher levels were locked, and no information was shown about them. Other examples of this core drive include introducing sudden and new missions at a time with a limited number of users who can apply and announcing invitations for events from foreign organizations.

Results
Demographic Data

In total, 241 people have registered on the panel from 6 medical sciences universities in Tehran. Other students from other cities, would fill out a contact form to be notified of the future implementation of the program in their cities. More than twenty fields of study were registered but the four most of them were medicine, pharmacy, nursery and dentistry. The distribution of females and males among registrations was 64% to 36%, accordingly. More details on the demographic data of the users are provided in Table 2.

Students' Performance

88% of the students performed at least one mission, and the remaining, although registered, didn't start their activity. There were 59 missions distributed in ten levels. Out of 59 missions, 34 of them (58%) were designed as virtual missions and the remaining were physical events. In total,

Table 2. Distribution of participants based on their fields of study. Other fields include public health, Operating Room Technician, Family Health, Veterinary, Epidemiology, Pharmacoeconomics and Administrative Pharmacy, Medical Engineering, Quality Control and Industrial Food Science, Traditional Medicine, Microbiology, Medical Librarianship, and Professional Health Engineering.

#	Fields of Study	Percent (%)
1	Medicine	58.51
2	Pharmacy	7.88
3	Nursery	7.05
4	Dentistry	9.13
5	Medical Laboratory Sciences	4.15
6	Radiotherapy	2.07
7	Physiotherapy	1.66
8	Chemical Pharmacology	1.66
9	Midwifery	1.24
10	Genetic	0.83
11	Radiology	0.83
12	Others*	4.99

1952 missions were performed. Nearly 80% of performed missions were virtual/online and the remaining were non-virtual. Type Z missions were among the three most performed missions in each level. The highest level achieved in the given time was level 6 and the distribution of users in each level is shown in Figure 3. On the other side, the qualitative assessment of missions showed great adherence and dedication to program goals as missions were done creatively and critically.

Due to some executive and administrative limitations in providing the facilities to do some missions in the limited time of the pilot, specifically, on-site events like campaigns and workshops, and also reduced number of virtual missions as levels went higher, this pattern of users' accomplishments was expected. Also, we turned this limitation into an opportunity by transferring the responsibility of holding events to users of higher levels. By this, we could engage users in the process of educating others, and enhancing their learning by targeting higher learning objectives, according to Bloom's taxonomy.

Program Evaluation

Five questions were asked online after the pilot program termination. The response rate was 26.14%, and the results are provided in Table 3.

The mean total satisfaction score was 4.16. The gamification method, with a mean score of 4.30, was considered appropriate for HIV education. Nearly all the respondents stated that they would continue REDXIR after the pilot program, which is considered a great achievement.

Discussion

We designed a gamified educational program on the topic of HIV/AIDS-related stigma and discrimination for young health professions students. This program is the first reported use of gamification in the education of health professions students in the field of HIV/AIDS stigma and discrimination. Results of a sexual health education program for adolescent students through game-based learning and gamification showed significantly higher results on increasing motivation, attitude, knowledge, and engagement among students (14). Many
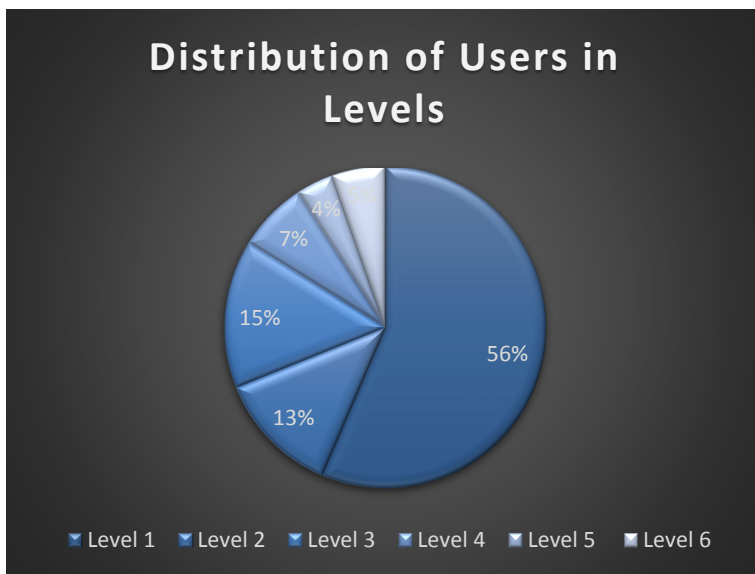
Figure 3. Distribution of users in levels. The highest level achieved is level 6

Table 3. Program Evaluation; due to limitations, the survey was conducted online, and the response rate was around 26%

Question	Mean ± Standard Deviation (Range)	
From 1 (the lowest) to 5 (the highest), how much are you satisfied with REDXIR?	4.16 ± 1.11 (1:5)	
From 1 (the lowest) to 5 (the highest), how much do you consider your learning from REDXIR, practical in the workplace?	4.38 ± 0.72 (3:5)	
From 1 (the lowest) to 5 (the highest), how much do you think the gamified educational method for HIV education is appropriate?	4.30 ± 0.79 (2:5)	
From 1 (the lowest) to 5 (the highest), how much have you become sensitized to HIV-related stigma and discrimination in the workplace?	4.52 ± 0.59 (3:5)	
Question	Yes (%)	No (%)
Would you continue to participate in REDXIR, if REDXIR had continued?	98.4	1.6

educational programs have been held for medical professionals and have resulted in reduced negative attitudes toward PLHIV (15, 16). In a cross-sectional study, being a physician and receiving in-service training in HIV/AIDS was in accordance with higher knowledge of HIV/AIDS and lower discriminatory behavior (17). We do emphasize the young generation as the target group for this educational program. Because, in case of proper and vigorous education, when they become in charge of decision-making and providing care for PLHIV, they may be the game changers of stigma and discrimination in upcoming years. There have been studies showing that more years of education are associated with a higher level of knowledge (18) and also younger students have a higher tendency for learning and reduced discriminatory behavior than experienced providers (19). Another benefit of choosing the students as the target group is that we can educate them before they encounter PLHIV in real-life situations. This would result in a better attitude toward HIV/AIDS, and subsequently higher determination to provide healthcare services to PLHIV (20, 21).

Based on the first evaluation we did, it seemed that students tended considerably to participate in in-person events. We applied the tendency as the motivation to do more missions and reach higher levels by putting at least one in-person event, for example, an educational workshop or HIV awareness campaign, at each level. Educational workshops are one of the main educational methods

for improving knowledge and attitude toward HIV education (19). Another report on the perceptions of medical students about student-run HIV/AIDS campaigns highlighted significant improvement in their leadership, communication skills and health advocacy (22). Noticeably, distance education or online learning systems have also been effective in the context of increasing knowledge of medical providers. Hence, designing a hybrid educational program that consists of both online and in-person learning material would fulfill the educational needs of students (23).

The role of PLHIV as instructors for health professions students, in the context of a simulated clinical encounter, has been reported as a part of pre-clerkship education for medical students and reduced HIV-related stigma among medical students and increased comfort in providing HIV-related care (24). There were also several missions in our program with PLHIV as the main asset for providing HIV-related education to the students. For example, we permitted three users of higher levels to participate as observers in one of the group meetings of PLHIV, with the informed consent of PLHIV. On the open interview feedback session, they claimed that "the session has changed the way they think and expect of PLHIV" and also stated that "this mission should be placed at a level in which every user in the program has the chance to participate in these types of sessions".

Gamification is a rapidly growing field in medical edu-

cation and has been shown successfully in numerous sectors, most notably education, according to a thorough research assessment done by Hamari et al. (25) Games have the potential to promote learning, boost engagement, enable real-world application, and enhance collaboration (26). There are multiple reports of utilizing gamification in residency training programs (27, 28). A gamification-based knowledge program for internal medicine residents was held and showed high acceptance among the residents, high knowledge retention and engagement (29). However, the lack of standard and comprehensive studies to evaluate the efficacy of games and gamification in medical education may have limited the use of these methods more often in medical education. This program is applicable to national and international scales and can be modified according to the cultural context. The online nature of the program with predefined guidelines and tutorials are the main properties making the larger scale implementation possible. Also, the model could be applied and redesigned to other subjects rather than HIV education, with defining new educational outcomes.

Conclusion

Considering the success of gamification in many educational settings, the implementation of game elements in HIV/AIDS education could enhance the learning experience and result in favorable outcomes.

Disclaimer

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Ethics approval

This study was approved by the ethics committee of Tehran University of medical sciences (IR.TUMS.VCR.REC.1397.498).

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Conflict of Interests

The authors declare that they have no competing interests.

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