CASE REPORT

Online, Game-Based Learning (GBL) on Melanoma: The Learning Experiences of a Medical Student

Tessa Li Chyin Lim

Jeffrey Cheah School of Medicine and Health Sciences, Monash University Malaysia Campus, Johor Bahru, Johor, Malaysia

Summary

The use of GBL in dermatology education is not uncommon. GBL provides education to audiences around the world, wherever their learning environment allows them. The paper serves to present the experience of a medical student who developed a GBL program for malignant melanoma (MM) without prior skills in the development of GBL software or computer programming. The commercial GBL software used is 'Chat Mapper'. The program can be published in HTML and embedded in Moodle. It allows the creation of non-linear branching dialogue trees. The users will interact with a virtual physician which discusses the clinical features, risk factors, management, staging and prognosis of MM. A 6-minute GBL program was practical to have a basic coverage of MM. To limit learner fatigue, the program is completed with audio, graphics and dialogue menus. It tailors to English-speaking users with visual and auditory learning styles. A straightforward navigating system can accommodate users at all levels of computer literacy. The program is compatible with laptop, desktop but not all phones. A period of one week was used to master the software, resolve any technical issues and to develop this program. Users who completed the program will be able to know more about MM. The program can be viewed at: https://tlderm.webnode.com/. Physicians may consider integrating GBL programs into routine practice. The development, however, might be hampered by the time factor, cost factor and the need for technical experts.

Key words: *Melanoma; educational gaming; game-based learning*

Corresponding Author
Ms Tessa Li Chyin Lim
Faculty of Medicine, Nursing and Health Sciences,
Monash University Malaysia Campus,
80100 Johor Bahru, Johor, Malaysia
Email: tessalim15@gmail.com

Introduction

The use of game-based learning (GBL) programs in education is not uncommon and is increasing throughout the years. GBL provides education to audiences around the world, wherever their learning environment allows them. Not only does it provide opportunities for patient and interdisciplinary education, it also works as a medium for promoting health professions.[1] Therefore, it is essential to have critical effective online education interventions with the increasing use of Internet for health information. GBL programs can used for dermatology patient education, for example, education on malignant melanoma (MM).[1,2]

According to Centers for Disease Control and Prevention (CDC), MM is the sixth most common cancer among males and females in the United States in 2016, which is the latest year for which statistics are available. The state with the highest

incidence is Utah and the lowest incidence is Texas. In general, for every 100,000 people, there were 22 reported cases of new MM cases and 2 deaths due to MM.[3] Thus, there is a need to create content which can help to raise and spread awareness about MM to the public. A research which was carried out by Nishita (2018) highlighted that it is imperative to improve MM patient education materials through GBL programs as well as written materials.[1]

This paper serves to present the experience of a medical student who developed a GBL program for MM without prior skills in the development of GBL software or computer programming.

Materials and Methods

The commercial GBL software used was 'Chat Mapper'. It is a full featured visual editor for managing storylines for games. It allows the creation of non-linear branching dialogue trees which imitate the normal interaction in real life. The core is a lean, efficient conversation system.[4] Numerous branching conversations which were created enabled the users to interact and have a medical interview with a virtual physician who will then discuss with them the basic clinical features, risk factors, management, staging and prognosis of MM. All the information regarding MM would be discussed in layman's terms to make the contents straightforward, concise and simple to understand. The information used to create the GBL program were obtained from DermNet NZ. Under the clinical features, the users would be exposed to the 'A-B-C-D-E' rule for detecting MM.[5,6]

After designing the conversations, a conversation simulator was used to present all the dialogue trees as a game. This ensured that the game would work as intended in the final product.[4] Our GBL program would start off with a short question as illustrated in Figure 1. The user would then have to respond accordingly as shown in Figure 2. Users are free to choose any action decisions. Selecting a different action decision will lead to a different response and this conversation will continue.

All these conversations were designed with the help of on-screen buttons, menu options, right-click context menus, as well as shortcut keys. The layout was also fully configurable with interface elements and tabs. To automise workflow to the maximum, the command line tools of 'Chat Mapper' was used to automate the publishing and exporting process. This project was published in the form of HTML5 player.[4] A website was created under 'Webnode'

which can remain free for unlimited time. The GBL program was then embedded into the website for easy viewing by the users.

Figure 1. The introduction part of the GBL program

Figure 2. The response options following introduction
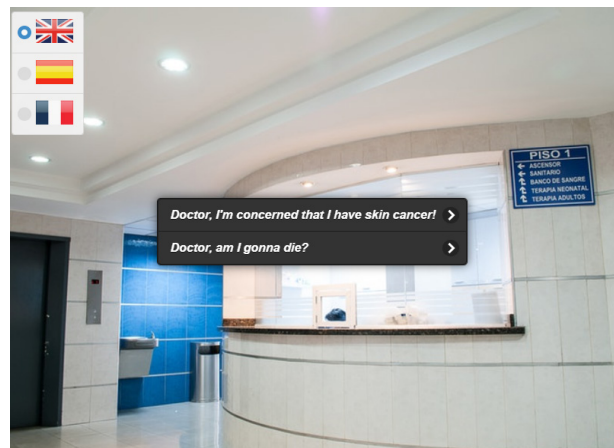
The GBL program can be viewed at: https://tlderm.webnode.com/. Users who completed the whole program will be able to know more about MM.

Discussion

The aim of our GBL project is to improve the confidence of users towards skin cancer detection and identification, in particular MM. It also aims to increase the level of preparedness of users to make appropriate dermatology referrals when suspicious lesions appear and when they have risk factor(s) of MM.

According to an article by BMC Medical Education, there are several elements which are important in the architecture of gamification. It starts with goal setting, followed by the capacity to overcome challenges, the provision of feedback on game performance, reinforcement of information,

comparison of progress, social connectivity, and lastly fun and playfulness.[7] In short, when GBL programs are effective, they play a tremendous part to improve knowledge and skills acquisition and can provide repetitive learning experience and useful feedback.[1,7]

'Chat Mapper' software is a novel approach to facilitating dermatology education, be it for patients, medical students or any audience. The total duration of our GBL project is approximately 6 minutes. A time period of 6 minutes is practical. The range and depth of the knowledge in our GBL project is enough to have a basic coverage and help users learn quickly. This is because many people, especially those who are working nowadays might face time constraints and can lose motivation and interest if the program is taking too long.[7]

Our GBL project is not a one-time game. It can be played as many times as the users want, depending on their level of personal motivation. Therefore, only users who play the game more than once can have a repetitive learning experience which will reinforce their knowledge and learning objectives. No feedback is provided for our GBL project. There is also no context for recall. These could potentially be a few areas to look at when developing GBL programs.

Furthermore, for our GBL project, users can always clarify any misconceptions with the instructors. This will in turn improve instructor-user relationship, or even doctor-patient relationship if this GBL program is carried out in a hospital or clinic setting. Therefore, in general, GBL programs should be carried out in a safe environment, provide user autonomy and independence, and if possible, put a positive impact on assessment.[1,7]

'Chat Mapper' was chosen as it is user-friendly and stylish. The building blocks are also easy to learn as no scripting is required. This saves time and is suitable for people who wish to develop GBL dermatology programs without prior experience in computer programming. A large collection of included, optional add-ons make it quick and easy to drop conversations into the project through a visual node-based editor. As 'Chat Mapper' can combine HTML5 Text to Speech with the web player to create realistic conversations, this program helps to save a lot of money and time on real voice actors.[1,4] This shows that the success of the creation of any GBL program depends a lot on money and

time factor.

'Chat Mapper' software also has a straightforward navigating system which can accommodate users at all levels of computer literacy. The HTML5 player works out well on modern Internet browsers, for example, Internet Explorer, Google Chrome and Safari. The project can also be exported into game engines or e-learning systems. Common formats are XML, JSON, RTF, PDF, JPEG, EXCEL and Zip packages. If there is a need for more formats, custom exporter creation services are available. For e-learning integration, it can be embedded in Moodle, SCORM, Adobe Captivate, Articulate Storyline and Lectora. After publishing the project online, it can be shared with anyone for feedback and testing.[4] Thus, it is preferable to select GBL softwares which are user-friendly, compatible with most of the common Internet browsers, have e-learning integration, as well as exporters for common formats.

This GBL project also tailors to users who have a good proficiency in English. However, multiple languages can be defined for the dialogue trees. Thus, 'Chat Mapper' can be used to create dermatology contents in other languages which suit other users. In the creation of GBL programs, it is worth taking note of the languages most well understood by the audience they want to reach for maximum learning benefits.

Some of the GBL programs engagement factors include safe learning environment, prize, surprise, excitement, fun and pride in achievement or accomplishment.[1] In this GBL project, some of the engagement factors are lacking, for example, surprise and prize (reward). It can be useful to implement surprise and prize into the GBL programs. However, this ultimately depends on the type of software and content which the developers choose to deliver. Other than that, this GBL project is also suitable for users with visual and auditory learning styles. However, this can be a barrier if there is a mismatch of learning styles of some users. Thus, to enhance the motivation and interest of the users, the key is to provide a learning variety which is also learner oriented. It can attract more users if the GBL program is appealing to users with diverse learning styles aligned with their preferred learning styles. If possible, these programs can even be made to involve all the senses of the users including their eyes, ears, touch and mind. This can be in the form of music and colorful illustrations which can

generate excitement and spark the imagination of the users at the same time.

The disadvantages of GBL programs are only mentioned in one citation. However, it is due to the competitive nature of the game which intimidates the users and this element is not present in our GBL project.[7] One drawback is the pricing of $45 billed every month for its commercial license but can be unsubscribed anytime. A commercial package comes as a single license, but a team package consists of 3 licenses. When no license is being purchased, an evaluation trial can be opted for, but it does not allow exportation, thus the game cannot be published online.[4,8] This GBL project is compatible with laptop, desktop but not all phones. A period of one week was taken to master the software, resolve any technical issues and to develop this program. Ideally, a GBL program should have good functions with low price, and is compatible with as many smartphones, tablets and computers as possible for better accessibility. It is also essential to consider the type of subscription for the software which the producers want and need. The time taken to develop any project will depend on the amount and type of content covered.

It is established that lack of enthusiasm from the participants, an organization's culture, time factor, cost factor, and a combination of all these can become barriers to prevent the implementation of GBL program whereas engagement factors can be learner-dependent. Some of the engagement factors include cognitive skills such as problem-solving, decision-making, active or deep learning, mental challenge and knowledge reinforcement. Other engagement factors will depend on interaction skills, for example, collaborative, cooperative and interactive learning, competition with peers, and peer learning.[1] All these are factors to consider when creating a GBL program.

Moreover, it is also imperative to look at some potential barriers. Lack of cooperation of the users can lead to game failure and insufficient information learned during the game.[1,7,9] Since our GBL project is straightforward and short, there is significantly less chance of game failure. It is important to note that there can also be users do not want to be involved in the program because of anxiety and fear of embarrassment or rebuke if they do not complete the game. Users can also potentially be bored of the GBL program leading to demotivation and quitting. When the contents are too wordy and serious, it can

eventually lead to loss of gaming characteristics and consequent loss of enjoyment. The overall game design is another factor to look at.[1,7,9]

Conclusion
Physicians may consider integrating GBL programs into routine practice so that patients can better understand their own diseases or even common diseases like MM. The development, however, might be hampered by some factors, for instance, time factor, cost factor and the need for technical experts. To better understand how GBL programs could be used in dermatology education, further research should be carried out to investigate the most motivating and engaging factors, and the type of content best-suited to be delivered to the targeted audience. In reporting the rationale, the author seeks to help other healthcare professionals to employ the advantages that GBL programs has to offer.

Conflict of Interest Declaration
The author has no conflict of interest to disclose.

Acknowledgements

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