

Submitted: 30 Nov 2022
Accepted: 30 Jan 2023
Published online: 4 July, TAPS 2023, 8(3), 45-49
<https://doi.org/10.29060/TAPS.2023-8-3/SC2921>

Gamification through collaborative learning in medical education

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Abstract

Introduction: Introduction to Health Profession (IHP) was designed to teach first-year medical students the importance of self-directed learning, accountability, and teamwork in healthcare. Due to the COVID 19 pandemic, the course was delivered virtually, incorporating elements of gamification.

Methods: Gamification features included collaborative teamwork to simulate and record the roleplay for assignments based on crisis management scenarios. The syllabus involves knowledge checks to promote self-directed learning and personal accountability as well as online questionnaires to identify personality traits followed by discussion. Games like Chinese whispers and charades were introduced to identify listening skills. Additional gamification features include progress mechanics for collecting badges upon successful completion of knowledge checks / assessments and completing collaborative teamwork activities.

Results: Results from the descriptive study on the educational usefulness of the IHP module was found to be satisfactory. The feedback was encouraging as >95% of students gave positive feedback that the IHP activities enabled them to understand the value of teamwork, effective communication, professional behavior and enabled them to be resilient and adaptable. 92% agreed that the IHP activities helped to make connections and network with their peers during the pandemic

Conclusion: Gamification of IHP course was successful in terms of practicality and usefulness in promoting communication, collaborative work, experiential learning, and teamwork. Students were empowered to take charge of their own learning of both content and development of interpersonal skills and teamwork through gamification. The isolation caused by the pandemic was alleviated by the networking that occurred during collaborative group activities.

Keywords: *Gamification, Self-directed Learning, Collaborative Learning*

I. INTRODUCTION

Introduction to Health Profession (IHP) course was initiated during Covid-19 pandemic and conducted at the beginning of our medical program enrolment to introduce freshmen to the real world and value systems of health professional. The learning activities were designed to provide real life experiences, exposing to communication skills within the community and peers, professionalism including teamwork and ethics, and the value of self-reflecting practice. The isolation caused by the pandemic was alleviated by networking that occurred during collaborative group activities and online

interactive discussion with invited speakers of health professionals. The group activities were gamified to make learning fun, memorable, engaging and motivating. It is designed to promote a sense of accomplishment while learning through discovery and during the social interaction.

Gamification in education has existed since time immemorial but with the advent of wireless technology, it has given rise to unique ways to improve student engagement (Dodson, 2021) in learning. Gamification is defined as “the craft of deriving all the fun and addicting

elements found in games and applying them to real-world or productive activities” (Chou, 2012). There is growing evidence for gamification in a wider pedagogical context and the concept is gaining traction within the medical education community. These “fun and addicting elements” include progress mechanics such as badges, narrative structure and immediate feedback. The gamification features introduced in the IHP module are badges, immediate feedback, challenges in the form of knowledge checks and roleplay in virtual reality in crisis management scenarios.

II. METHODS

Collaborative group activities were conducted by dividing 171 first year students into 16 small groups. Activities were carried out using synchronous and asynchronous virtual platforms to accommodate about 40 % of international students who were still in their home countries. Lessons in IHP consisted of recognising personality traits, application of communication skills, ethics and professionalism and recognising teamwork as intrinsic requirements for delivery of effective healthcare.

Asynchronous sessions required students to individually go through the prepared learning materials followed by knowledge checks. Test repetition without penalty is allowed within an allotted time frame until learners reach a satisfactory result. Following successful completion of knowledge check, students would earn their badge of completion.

Activities like ‘discovering personality traits’ are conducted as online synchronous workshops and facilitated by a group of psychologists. Self-administered questionnaire was administered to determine personality traits, followed by a psychologist-led group discussion to share feedback and reflection. Having the session on a virtual platform provided the students with a degree of anonymity, which enabled them to share profound reflections and feedback. Through the questionnaire responses, the psychologists were able to identify red flags and reach out to the students.

During the online ‘communication skills’ workshop, games such as Chinese whispers and charades were used to cultivate active listening skills and understand nonverbal communication. Students were assigned to group works comprising of preparing oral presentations on scenarios involving ethics and professionalism. In addition, they were tasked to solve issues in selected

crisis management scenarios using role-plays and virtual reality. Creativity is highly encouraged and weighted with high percentage. This encourages social interaction and influences learning by creating a subjective sense of presence to facilitate virtual experiential learning.

Upon completion of the IHP activities, students are required to complete a self-administered questionnaire to feedback on the efficacy of the module, hence implied consent is given. The questionnaire measured whether the gamification of IHP achieved the learning outcomes of enabling the understanding of the value of teamwork, effective communication, professional behaviour and to be adaptable and resilient. In addition, the questionnaire inquired if participation in IHP activities helped them create contacts and network with their peers. Open comments are sought after for thematic analysis.

III. RESULTS

51.4% of the cohort responded to the self-administered online questionnaire. Feedback was encouraging as >95% of students gave positive feedback. They felt IHP activities enabled them to understand the value of teamwork, effective communication, professional behaviour and being resilient and adaptable. Most agreed IHP activities helped to make connections and network with peers during the pandemic. Many agreed they developed some insight about themselves during IHP activities. Several themes were drawn from the collected feedback. The primary theme is teamwork where students demonstrate co-operation in working together in teams to attain mutual goals and learn leadership qualities. Majority felt they developed skills in active listening, organisation, patience, self-confidence, and showing empathy. Other characteristics learnt were resilience building, controlling emotions, adaptation, overcoming challenges, professionalism and ethical behaviour.

Common comments on areas to improve are their lack of confidence and discomfort in expressing one's thoughts. Both being too rigid and overly flexible were commented. Other comments were not feeling at ease with working in a team, becoming overwhelmed, paying excessive attention to detail, and becoming frustrated. Being shy and quiet as well as not being assertive were among the constructive feedback (See Table 1). A copy of the survey questions and the additional tables of survey results are openly available at <https://doi.org/10.6084/m9.figshare.21656864>.

OPEN FEEDBACK FROM STUDENTS

NO.	THEMES	Majority of the positive responses are as follows:	Common comments on areas to improve self:
1	Teamwork	<ul style="list-style-type: none"> • Learnt patience as a group leader despite challenges faced • Developing confidence in providing ideas and working together as a team in future • Learning time management and flexibility in scheduling meeting timings with team • Managing team discussions • Developing organizational and leadership skills 	<ul style="list-style-type: none"> • Lack of confidence to provide ideas and working as a team • Difficulties to voice out opinions when there are other dominant people in the same team • Dislike of noncontributing team members • Difficulty in following instructions, especially unimportant ones amongst the team
2	Effective Communication	<ul style="list-style-type: none"> • Communicating empathetically • Communicating easily in a team • Confidently communicating views and opinions with peers • Good listener 	<ul style="list-style-type: none"> • Not active in the discussion • Not good in expressing self • Need to be more outspoken and voice out opinions
3	Professional Behavior	<ul style="list-style-type: none"> • Identifying the ethics and fundamental part of being a healthcare professional • Reminding self about the pledge of professionalism in future career 	<ul style="list-style-type: none"> • Lazy to attend so many meetings • Easy to get frustrated when things do not go their way, but try to resolve them properly and professionally
4	Adaptability and resilience	<ul style="list-style-type: none"> • Resilience in completing tasks • Learnt adaptability to different and changing environments and with peers • Discovered ability to control emotions when placed in an extremely stressed environment 	<ul style="list-style-type: none"> • Managing workload without getting unduly stressed • Learnt that there is need to adapt, improvise and overcome challenges in life
5	Making connections and networking with peers	<ul style="list-style-type: none"> • Found that IHP is good channel to allow the students to have a brief idea about entering medicine program before starting on the core subjects. • Found IHP a good way to make new friends by working together online as a team especially during the pandemic when movement was restricted • IHP served as a great medium to get to know each other better through working together to complete the tasks • IHP is interesting and fun due to collaborative learning and working together as a team to complete the tasks • Felt that IHP is a great module overall to learn about professionalism • Got to interact a lot with group members who were later closely related to Problem Based Learning and Clinical Skills teaching-learning groups 	
6	Insight to self	<ul style="list-style-type: none"> • Discovery of being a huge people pleaser • Questioning own leadership skills even though has taken up many leadership positions in the past • Discovered that being a shy and quiet person sometimes makes it harder to contribute • Discovered obsession to detail • Discovered easy agitation when not meeting work schedule • Discovered rigidity and inflexibility in tackling problems 	

Table 1. Student Feedback from IHP Cohort ME121

IV. DISCUSSION

IHP is a new course with the objectives of introducing students to the real world and value systems of the health professional, focusing on communication skills, medical ethics, teamwork, and the importance of self-reflective practice. The learning is mainly facilitated by group work and formative assessment through immediate provision of feedback and self-reflection. Due to pandemic-related restrictions, the initial plans for real life experience and exposure in IHP course had to be converted to the online platform. An instructional method such as gamification was selected to help retain student engagement and encourage participation (Chou, 2012). Applying the design elements and principles found in games to education was useful in sparking student interest and motivation (Chou, 2012).

Knowledge checks challenged the minds, improved cognition and knowledge retention (Singhal et al., 2019). Progress mechanics in the form of earning 'a badge on completion' of assigned activities, going through the provided learning material and completing the knowledge check to an acceptable level, promoted self-directed learning, created a sense of achievement and retained student engagement. This reward system fosters student participation, as it is a tangible reward (Dodson, 2021).

The seclusion from real life interaction is feared to mentally and psychologically affect students. A study in Switzerland has shown a significant impact on the mental health of learners due to the lockdown in 2020 (Elmer et al., 2020). In another study, social interaction is recognised as an important factor for enhancing learning especially in areas of critical thinking and problem solving (Hurst et al., 2013). The group works in the IHP course, though set virtually, have assisted students in networking and socialising during the pandemic. This was agreed by majority of the students who participated in IHP activities.

Effective leadership is essential in delivering high standards of clinical practice. The students learnt leadership skills through organising group work, delegating roles and responsibilities among team members. Among the examples of group work are problem-solving scenarios like managing a fire in CCU or multiple vehicle accident on the highway. The instructional content was related to the teamwork and roles and responsibilities of the different health professionals involved in managing the crisis and it was gamified by adding elements of game fiction such as the different themes, settings and characters. As students had to self-produce scripts after some brief research of relevant contents, they had some autonomy over the

depth and breadth of their learning. Working in teams towards common goals lead to improved productivity and self-esteem and created supportive relationships during the collaborative learning (Singhal et al., 2019). Narrative synthesis and role playing in scenarios managing crisis situations stimulated reflective practice whilst integration of cause and effect enabled experiential learning.

Overall feedback was encouraging as almost all students enjoyed the activities and found them both educational and engaging. They discovered characteristics in themselves that helped them to improve team spirit and communication. The groupwork on the various projects developed learning communities and promoted interpersonal skills, integrating diverse learner types with a wide range of knowledge, skills, past experiences and personal attributes. This was effectively utilized in the groupwork and collaborative learning.

Some setbacks occurred when both the faculty and students were unfamiliar with online gamification. The synchronous sessions with international students in different time zones, made group discussions challenging. Support from the Information Technology team is valuable but poses an exorbitant cost. Students having expectations of medical school learning to be more didactic, instead had to adapt to being adult learners, for more extensive self-directed learning and reflective practice.

V. CONCLUSION

In conclusion, gamification of IHP module encouraged student engagement, teamwork and collaborative learning. IHP course was accessible virtually, which was a boon for our international students who could interact virtually with peers and access and take part in the lessons. The gamification features used were reproducible. Gamification is useful in medical education and can be pursued as a method to deliver lessons and engage students. It is a tool to allow learning in depth and for experiential learning on the virtual platform.

Notes on Contributors

Dr Sasikala Devi Amirthalingam is the first author, contributing to the abstract, introduction, discussion and literature review. She agrees to be accountable for all aspects of the work.

Dr Shamala Ramasamy is the second author, contributing to methodology, results and literature review. She agrees to be accountable for all aspects of the work.

Prof Sharifah Sulaiha Hj Syed Aznal is the third author, contributing to abstract, introduction, discussion and revising it critically for important intellectual content. She agrees to be accountable for all aspects of the work.

Ethical Approval

The dean of School of Medicine, International Medical University has given a letter to say that there is no objection to sharing of findings for educational purpose.

Data Availability

The data that support the finding are openly available in the Figshare repository.

<https://doi.org/10.6084/m9.figshare.21656864>

Acknowledgement

We would like to acknowledge Fareeza Marican Bt Abu Backer and Norhasliza Binti Hashim from E Learning Department from International Medical University for the technical assistance in the gamification features to the module.

Funding

There is no financial support or any financial relationships that may pose a conflict of interest.

Declaration of Interest

There is no conflicting interest to any parties concerned.

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