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Challenge GP: using gamification to bring the reality and uncertainty of a duty doctor's surgery to early year medical students

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ABSTRACT

Exposing medical student cohorts to the lived reality of uncertainty and complexity experienced by GPs is challenging to achieve. We present a novel teaching concept: 'Challenge GP' designed for early years students. Gamification methodology is used to reproduce key elements of the 'duty GP' experience in a classroom setting where working in teams, students play a competitive card game. Cards drawn at random pose scenarios based on practical, logistical, and ethical dilemmas of a duty doctor surgery. Each team discusses whether to score by reporting a decision or play special cards to pass the dilemma onto, or collaborate with, another team. Answers are facilitated and scored by a GP tutor.

Student feedback demonstrated highly effective learning for clinical reasoning, risk management and problem-solving. Students were exposed to the uncertainty and complexity of real-life medicine. Gamification, through competitiveness, increased task engagement. Students learned the value of working in teams under time pressure and grew in confidence by sharing knowledge in a safe environment. Students were enabled to think, feel and practise as real-life clinicians. This became a powerful force in contextualising their theory-based knowledge, aided understanding of the GP role and opened their eyes to a possible career in general practice.

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Medical Education; primary care; transformational learning; gamification; game based learning; uncertainty

Background

The importance of exposing medical students to primary care during the undergraduate curriculum has been long established [1]. However, the current challenges facing general practice in the UK in terms of workload and workforce impact on the logistics of introducing medical students to primary care early in the course. The number of general practitioners (GPs) has decreased by 1850 full-time equivalents since 2015 [2], whilst medical student numbers are rising, with a 10% increase in 2018 alone [3]. Patients seen by GPs have become more complex, with GPs managing greater uncertainty [4]. These challenges, if extrapolated correctly, can be employed as a means of teaching the important concepts of complexity and risk within the undergraduate medical curriculum.

Gamification relates to the application of game elements to a non-gaming context [5]. Whilst considered a relatively novel educational concept, it has been used elsewhere by the marketing industry to engage with customers via mechanisms such as point cards and rewards memberships [6]. Some authors distinguish gamification from game-based learning or

serious games. They state that game-based learning reflects when a game is the framework through which the learning is delivered [7] and games are considered serious when they have a pedagogical purpose [8]. However, there is a recognition that these terms are often grouped together in the literature and used interchangeably [9].

Gamification appeals to several learning theories. One theory is the behaviourist approach to learning which states that behaviour can be influenced through reward and facilitated by providing stimuli to learn [10]. Gamification achieves this through the increase in production of the feel-good neurotransmitter, dopamine [11]. It also applies to the social comparison theory, where learners can increase their performance through self-evaluation by upward/downward comparison to identify discrepancies in their knowledge [12] via mechanics such as points and/or scoreboards.

Gamification lends itself well to transformative learning [13], by using the unfamiliar scenarios of the game to encourage the learner to reflect on their current knowledge by placing them outside their

comfort zone. A systematic review of gamification indicates promising results, showing improved or equal academic performance in comparison to the control groups [12]. Separately, when utilising gamification, the implementer needs to ensure their chosen motivators for the game, i.e. a leader board, match the intrinsic values of the user otherwise this will impede learning [14].

The use of gamification in clinical education has increased tenfold over the past 5 years [12] and presents an opportunity to reproduce some of the key challenges of being a GP in the classroom as placements for medical students become increasingly under pressure. A literature review revealed only one example of gamification being used in an American nursing education programme to deliver primary care teaching [15] and none for medical primary care teaching. Our aim was to develop and evaluate a novel gamified learning session to introduce third year medical students to the uncertainty and challenge of being a GP in the pre-clinical classroom.

Method

Setting

The University of Aberdeen (UoA) runs a traditional system-based early year (Years 1–3) course. In Year 3, students have seven tutor-facilitated face-to-face teaching sessions on campus prior to undertaking clinical placements in Year 4. The ‘Challenge GP’ game was played as one of these sessions after initial piloting.

Game design and intended learning outcomes (ILOs)

The session was designed to play a team-based game with the goal of putting the students in the duty GP driving seat in a safe supportive environment, with the intended learning outcomes (ILOs) as listed in [Box 1](#).

Box 1. Intended Learning Outcomes.

Intended Learning Outcomes (ILOs):

By the end of the session students will be able to:

1. Apply key non-technical skills in problem-solving, time-management, prioritisation, teamwork and leadership in the context of solving primary care challenging dilemmas
2. Use clinical reasoning to judge clinical risk appropriately
3. Integrate knowledge, skills, and attitudes to formulate responses which are safe, pragmatic and wise
4. Appraise and evaluate the relative merits of different solutions and responses considering the holistic and value-based approach of general practice

Box 2. Challenge GP: “Back of the box” instructions for students.

“It’s a Monday morning duty GP session, you, your teammates, a trusty stethoscope, and an intermittent internet connection must navigate each patient encounter with slick, timely and clinically brilliant responses to score maximum points from your GP mentor. Beware unsafe, unwise and unrealistic decisions will result in NEGATIVE scores.

The other teams are hot on your heels ready to SWIPE, DUMP or perhaps strategically COLLABORATE to see which team will emerge as the GP Team of 2023.

Good Luck!”

Prior to the session, students are given limited information. They are aware that the session involves playing a game and are given ‘back of the box’ instructions, as if it were a real-life game (see [Box 2](#)).

Scenarios were written by author LL, a practicing GP and were based on her lived clinical experience. These included challenging practical, logistical and ethical dilemmas ranging from the slightly ridiculous (‘there is a cow in the car park’) to the very serious (‘police call, 32 yr old patient hung himself’).

They are written as typical duty doctor triage presentations with limited information, and many unknowns. Students are encouraged to formulate a response, identifying any further information needed and how to prioritise their actions.

How to play

The game is played using a standard deck of playing cards with Jokers discarded. Aces, Jacks, Queens, and Kings become special play cards, the functions of which are summarised in [Figure 1](#).

Each special play card may only be used once then discarded. The block card can be played once in response to a dump/collaborate or swipe special action card. The opposite team cannot counteract a block card by using their block card.

Students play in four teams. A semi-circle is formed with the tutor in the centre. Each team is issued with a set of the four special play cards (see [Figure 1](#)). The remaining cards are shuffled and placed face down in the centre of the room. The tutor has a grid of 36 scenarios corresponding to each of the remaining cards in the central pack.

Team responses are graded by the tutor at their own discretion based on a realistic GP response on a +3 to –3 scale (with minus points for unsafe or unrealistic answers). The winning team is the team with the most points by the end of the game. The game end is dictated by the end of the teaching session.



Figure 1. Special card functions.

Rules of the game

- (1) A different spokesperson for the team is to be appointed each round and to rotate so all team members have the opportunity to present answers.
- (2) In the event of multiple teams wishing to play a special action card (after this has been declined by the team in play) this will go to the fastest team to declare.
- (3) Tutors are encouraged to manage time and ensure all teams have had an equal number of goes by the end of play.

Flow of the game

- (1) A student from the group whose turn it is draws a random card which is face down and hands it to the tutor.
- (2) The tutor reads aloud the card's scenario from the tutor grid (e.g. two of hearts corresponds to a 'patient presenting with unilateral leg swelling and pain')
- (3) Groups have one minute to discuss amongst themselves how to approach the scenario as duty GP. All groups should discuss the scenario.
- (4) At the end of the minute the group in play is asked if they would like to take the scenario or use a dump or collaborate card. If they choose to play either of these, then the affected group can use their 'block' card (if not used already). If block is not an option, then the group affected are expected to answer immediately.
- (5) If, on the other hand, the group in play decides to keep and answer the scenario, then one of the other three groups can bid to swipe or collaborate unless the group in action chooses to overrule this by playing their block card.
- (6) The spokesperson for the group (or two collaborating groups) now in action give their answer which is explored/facilitated by the GP tutor. The tutor awards the group(s) a score.
- (7) The tutor checks if there are any questions from anyone at the session before moving play to the next group.

Evaluation

Three feedback sessions with 4–6 medical student volunteers were conducted by PC immediately following three of the teaching sessions, each with different tutors and of 4–6 rounds. Their feedback was transcribed and analysed collectively by all three authors (LL, PC and VW). Students were informed of the planned feedback session in advance by email and asked to volunteer on the day. They were consented prior to recording with the understanding that any comments used would be anonymised.

Results

Feedback was consistently positive with students stating *'it's new, it's different to the norm of just lectures . . . , it was more stimulating'*. Equally, students felt that it met the ILOs, stating that it better prepared them for uncertainty *'it shows how you reason when you don't know things'*. They found that it aided their prioritisation skills *'working under time pressure, and thinking about not taking too long'*. Students felt that it provided some insight into GP practice *'I think it was just a good learning opportunity to see what GPs actually do because a lot of the GP teaching we do is theory of GP, whereas that probably made me really consider a career in GP'*. They appreciated the opportunity to apply and consolidate some of their learning *'things that we learn in our clinical handbook that we don't really get . . . it's nice to start thinking about it in a more clinical sense'*. They believed that it was *'good clinical reasoning. Just in general. . . it's like a muscle. You kinda practice, going through the thought process'*.

Feedback touched on some core concepts of gamification. Students found the points system and the competitiveness in general, a powerful motivator, stating that *'medic's competitive spirit, it kind of sings to us. So it's just kind of our thing, so really engaging'*. They also found that the game elements facilitated reflection of their abilities, *'you had that instinct- oh no, that's ENT, I don't like that, or this is GI let's steal that one. So it made each of us and teams, think about what's our weaker points and stronger points'*. The collaborate card reinforced the concept of teamwork for the students, *'I would like to reinforce the collaborate cards, sometimes it's good to speak to other specialities when it is outside your remit or your knowledge'*. The team working element of the game added an element of psychological safety *'Personally, I felt more confident in giving answers after the discussion element with your team first'*.

Crucially, students touched on the challenges of playing a new game, *'I think initially people were a little bit*

more hesitant. . . but as the rounds went on, became more comfortable and really got into it'. There was acknowledgement that tutor facilitation was key to successful learning, *'I think the tutors did a really good job . . . as time went on, I felt I was able to get more into that GP mindset'*. Some students approved of the concept of a prize, *'It was good that there was an edible prize'*, whilst another student disagreed. Practically, students liked the time constraints for the discussion, *'I quite liked the fact we were only given a minute to discuss in our teams because then it didn't kind of feel like it was dragging'*. They enjoyed the ethical and holistic real-life considerations of some of the scenarios *'And some of the medical defence union . . . things that I learned which were completely new to me that I had never come across before in terms of death certificates and dealing with police and different things like that'*.

Tutors introduced a token prize for the winning team in two of the three sessions. Each GP tutor played the game slightly differently with one tutor introducing the concept of having to identify and use other members of the multi-disciplinary team strategically. Scoreboards were introduced for the last two sessions.

Discussion

The overall student response to this novel gamified teaching session exploring the challenge and complexity of being a GP was very positive. The varied and unpredictable nature of this session lent itself well to transformative learning [13] in a safe environment. With the aid of tutor facilitation, students felt that they improved their clinical reasoning and non-technical skills, by reflecting on pre-existing knowledge and assumptions, and applying it to the day of a duty GP. Equally, students appreciated the opportunity to challenge their learning and apply it practically to real-life scenarios, enabling ILOs to be placed on a higher level of Bloom's taxonomy of knowledge [16]. The session has been easily adapted to year 1 and 2 teaching.

As mentioned previously, the choice of motivator in gamification is important. However, there is evidence to suggest that points and scoreboards are powerful motivators in postgraduate medical education [17]. Undergraduate medical students by their own admission were equally very competitive. There was good justification for incorporating these motivators into this teaching. Anecdotally, it was noted that several students slightly lost interest once it became apparent that their group would not be dealing with the scenario. To address this going forward, after the group has given their answer, it will be opened up to the other groups to add additional points and possibly score a bonus point.

Students appreciated the quick-fire nature of group case discussion, but a few did mention ideally they would prefer slightly longer, e.g. 2 min. Regardless, cognitive scientists have established that having a fast-paced gamification session, with an element of unpredictability, is key to increase dopamine production and, by extension, increase learner engagement [18]. This was consistent with the student feedback.

We present this as a teaching exchange and plan full evaluation to include the tutor perspective. As this was a novel session, there was a degree of flexibility in how it was delivered. This was evident by some GP tutors introducing prizes for their sessions despite not being a pre-agreed part of the teaching session. Ultimately, this meant slight learner variation in experiences occurred from session to session. There was the potential for selection bias in terms of student feedback recruitment as the self-selecting minority may not necessarily have accurately reflected the opinions of the student cohort.

Conclusion

We conclude the use of gamification and transformational learning in the context of primary care has great potential. Its time constraints provided an awareness into the challenge of general practice, served as an additional means of keeping students' attention and provided an insight into prioritisation. Gamification provided an engaging platform for learning whilst simultaneously making these students, as yet still confined to mostly theoretical campus-based learning, aware of the uncertainty and complexity of the real world of medicine.

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