



Quiz gaming competitions for undergraduate medical students: Questioning the MediQuiz

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ABSTRACT

Many medical schools worldwide incorporate a quiz competition centered around medical subjects as part of their extracurricular activities. This 'MediQuiz' is distinct from scheduled formal curricular quiz assessments, and is usually characterized by festive informality, as a quizmaster conducts it on stage before an audience. Studies have shown that such quiz games promote active learning, and provide motivational impetus. They also enhance meaningful knowledge retention by igniting interest and placing theoretical subjects in a real-world perspective. Questions about medical subjects can be either 'interesting' (general knowledge or 'trivia'), or 'useful' (suitable for a *viva voce* assessment). For the purposes of this study (and to avoid cognitive bias) these have been classed as extracurricular and curricular questions. This study polled students at five such quizzes and attempts to find out the optimal balance of education and entertainment that quizmasters should aim for. It also assessed students' perceptions of stress, bias, equity, usefulness and relevance of such 'edutainment' exercises. That game-styled quiz competitions based on curricular subjects can be an effective tool to increase interest and motivation and enhance learning is established beyond doubt. Students overall preferred a predominance of questions from outside their textbooks over examination-type questions. This preference for extracurricular questions was slightly stronger among the audience, in students with prior quiz experience, and among foreign students and male students. Participants reported that stress levels were very high on stage, but felt it to be character building as they also learnt to deal with anxiety, to work as a team and to develop a healthy competitive spirit. Most of the audience felt that the medi quiz showed that learning could be fun.

KEY WORDS: *Medi quiz; Medical school; Mauritius; Questionnaire; Medical quiz game; Extracurricular question*

INTRODUCTION

The undergraduate medical curriculum is vast and spread over several years. While students are taught material focused upon the functional aspects of the subject (i.e. what they need to know to treat patients), there are many peripheral bits of information that lend colour and spark interest in the subject. It is well established that intrinsic interest is a strong motivator towards learning and promotes knowledge retention. Given the huge

amounts of information that need to be conveyed in lectures, it is expected that teachers do not waste time on non-essentials such as the etymology of medical terms, or the historical basis and geographical background of diseases and interventions. However, these peripheral details help to create a complete picture of the topic and place it in perspective such that students develop an interest in the subject and are motivated to learn more, and may even opt to pursue a career in that subject^{1,2}.

On-stage 'television style' medical quiz gaming competitions have become very popular in medical colleges throughout the world. They are usually conducted as part of the extracurricular activities that constitute college week festivities or annual celebrations, and become a regular fixture in most cases³. They are appreciated by both students and teachers as a fun and novel way to reconnect with curricular material and are viewed favorably by administrators and policy makers as didactic tools in the guise of entertainment. Some of these 'quiz bowl' or 'quizzing bee' type contests are inter-college and even international⁴.

Many of these quizzes are confined to one subject³⁻⁸. This obviously has the advantage of providing a fair level ground for all participants. However, they lack the wider interest that a quiz on the whole of medicine (that takes in all subjects at all levels) would have; indeed they may appear like alternately formatted formal assessments.

Quizzes based on the entire field of medicine tend to incorporate a lot more of history, geography, current affairs, awards and celebrities relevant to the field. These are more like a general knowledge quiz with questions that link to medicine. Such questions obviously do not form a part of the formal syllabus and do not directly contribute to the learning of students.

Criticism levied against such questions includes that they perpetuate obscure facts such as rare diseases, eponymous syndromes or uncommon disease presentations, which work against efficient learning.

But such questions can also act peripherally and subtly to enhance learning in many ways. First, they fuel interest by placing the subject in a real-world context. In addition, they motivate students to find out more about a certain topic because they have encountered an interesting or curious aspect of it¹.

The questions asked in these mediquizzes fall somewhere along the spectrum from curricular to extracurricular. There is no standardization (and there shouldn't be) on how serious or frivolous a question is. On the whole, it is seen that some quizmasters prefer asking questions which could be posed in a formal examination, while others prefer questions that would be considered irrelevant or unimportant in a formal assessment. This is neither to say that an 'examination-worthy' question cannot be interesting or framed informally, nor that extracurricular questions never have practical value. To illustrate, nearly every participant looks up the current Nobel Prize in Medicine and Physiology, something that undergraduates otherwise rarely bother with. Knowing soon-to-be-forgotten names may be of no use, but awareness of cutting edge research has immense potential.

MATERIALS AND METHODS

As part of the annual extracurricular competitions at Sir Seewoosagur Ramgoolam Medical College, Mauritius, a medical quiz is conducted as an on-stage game before an audience consisting of teachers and students of all levels. The authors, as teachers, have conducted this 'MediQuiz' over the last five years.

Teams are constituted by mandating one member from each year. This limits

participants' choice of teammates but mitigates the inequity that a team consisting only of juniors would face. Unfortunately it also reduces excitement levels as compared to the general knowledge quiz where the competition is year-wise and there is a high element of batch rivalry and team support from the audience. There is a preliminary written round to select the teams that will take part in the finals held on stage.

The quiz is conducted with an emphasis on the fun element, to distance it from a formal *viva voce* examination. In addition to the popular rapid-fire and buzzer rounds, most questions are enhanced with video, visuals or soundtracks. Text for both questions and answers is projected on slides so as to hold interest. The atmosphere is of a game; popular themes, music and audience interaction all contribute to informality.

Students (quiz participants as well as those in the audience) were polled about their opinions and observations regarding the quiz. The questionnaire was designed with the colorful logo and festive theme of the mediquiz and informally distributed so as to encourage voluntary and therefore meaningful responses. Participants however were mandatorily required to complete it.

The questionnaire was semi-structured (**Annexure 1**), with a section for demographic data, an opinion segment for ticking, and space for free-text comments. The demographic data collected was: gender, nationality, year/level, previous quiz participation, previous mediquiz participation, and previous prizes for quiz. The opinion questions were related to preferred ratio of extracurricular to curricular questions, performance stress, fairness (to different levels of students), bias (created in teachers in the audience) and usefulness (overall benefit).

RESULTS

Three exclusive groups were defined: finalists, non-finalists and non-quizzers. The rationale was that the viewpoints of students making it to the finals on stage could differ from those who had competed but failed to qualify, and from those who had little experience or interest in quiz contests. Therefore the data was analyzed by considering respondent characteristics regarding quiz participation in two ways. In one, 'quizzers' were defined as finalists (all on stage) as well as non-finalists (who took part in the selection rounds). This was against 'non-quizzers', students who never intended participating. A second division was considered between finalists (all on stage) against the audience (non-finalists and non-quizzers).

All the participants completed the questionnaire and we received 145 completed forms from the audience. Some students did not write comments, as this was optional.

There were 221 respondents, of whom 80 (36.2%) were finalists, 47 (21.3%) had not made it past the preliminary rounds (non-finalists) and 94 (42.5%) were non-quizzers who had no intention of participating. Of all respondents, 125 (56.6%) were males, 93 (43.1%) were seniors and 121 (54.7%) were local students. Of all respondents, 42 (19%) had participated in quiz competitions prior to entering medical school (7 i.e. 3.2% of them having won prizes) and 75 (33.9%) had participated in a previous mediquiz.

The preferred ratio of extracurricular to curricular questions being the key point of this study was statistically explored. The frequency distribution for the preference is charted in **Figure 1**. Statistical analysis was done by calculating the chi-square and p-value for each respondent characteristic using a web applet⁹ to compare the trend with that of the surveyed population as a whole. None of the findings were statistically significant (**Table 1**). We

therefore graphed the distribution to visually estimate the preference trends (Figure 2). It was seen that extracurricular questions were marginally more favored by

respondents with the following characteristics: male, foreign, audience and non-quizzers and students who had won previous quiz prizes.

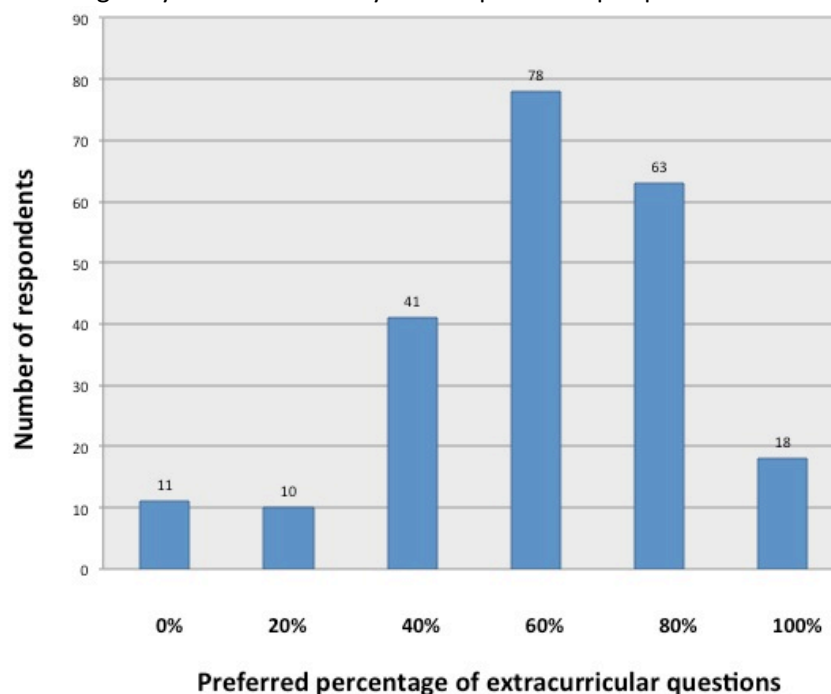
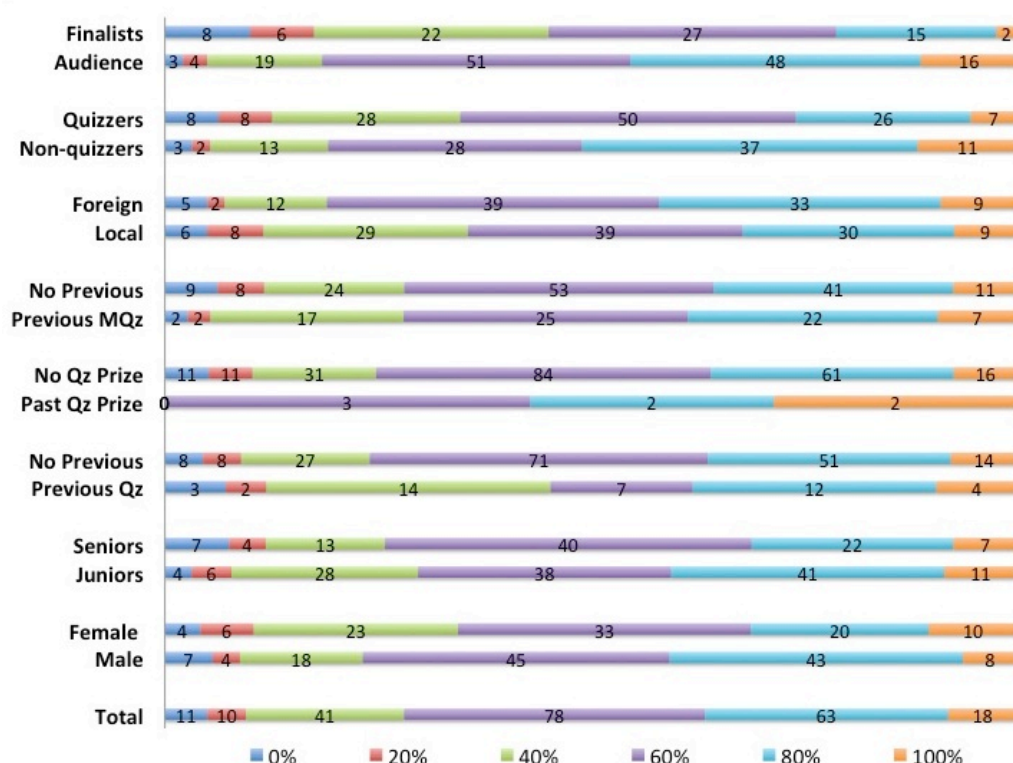


Figure 1: Preferred ratio of extracurricular to curricular questions

Table 1: Extracurricular question preference sorted by respondent characteristics

Respondent Characteristics	Extracurricular Question Percentage Preference						Total	chi-square	p-value
	0%	20%	40%	60%	80%	100%			
Total Respondents	11	10	41	78	63	18	221		
Males	7	4	18	45	43	8	125	2.453	0.784
Females	4	6	23	33	20	10	96	3.369	0.643
Juniors	4	6	28	38	41	11	128	2.229	0.817
Seniors	7	4	13	40	22	7	93	3.183	0.672
Previous quiz	3	2	14	7	12	4	42	7.872	0.163
No Previous Quiz	8	8	27	71	51	14	179	1.274	0.938
Past Quiz Prize	0	0	0	3	2	2	7	invalid	
No Quiz Prize	11	11	31	84	61	16	214	1.696	0.889
Previous MediQuiz	2	2	17	25	22	7	75	1.81	0.875
No Previous MediQuiz	9	8	24	53	41	11	146	0.684	0.984
Local students	6	8	29	39	30	9	121	2.427	0.787
Foreign students	5	2	12	39	33	9	100	3.748	0.586
Non-quizzers	3	2	13	28	37	11	94	6.275	0.280
Quizzers	8	8	28	50	26	7	127	4.424	0.490
Audience	3	4	19	51	48	16	141	5.599	0.347
Finalists	8	6	22	27	15	2	80	10.587	0.060
	0%	20%	40%	60%	80%	100%			



Preferred percentage of extracurricular questions
(Synoptic for respondent characteristics)

Figure 2: Extracurricular question preference sorted by respondent characteristics

The free-text comments were assessed individually according to respondent characteristics and grouped for relevance. Comments from teachers too were taken into account, though their scoring was excluded from the tally.

On question content

The audience (non-finalists and non-quizzers) were in favor of more extracurricular questions because they felt that it added to the general interest of the quiz and reduced the 'examination flavor' of the event. Quizzers who had won prizes in the past too showed a preference for extracurricular questions perhaps because they felt that with their quizzing experience they stood a better chance of winning. Male and foreign students too showed less preference for curricular questions. This is

probably because they felt they could try to guess the answers whereas with curricular questions they dared not as they felt that many in the audience knew the answer (specifically teachers) and they would 'look foolish'.

The audience showed a clear preference for extracurricular questions. They felt that this was more in the nature of a general knowledge quiz where one is not provided with a syllabus and part of the fun is in anticipating where the next question is coming from. Interestingly, the finalists too showed a preference for extracurricular questions but to a lesser degree. We followed up on a few comments and it appears that students are acutely conscious of the fact that their teachers are in the audience and feel embarrassed if they are unable to answer what has been taught in

class whereas they have no hesitation in making wild guesses on topics not covered formally in class. Overall, respondents felt that there should be a mix of curricular and extracurricular questions but the curricular questions should not be dry recall of facts but should have an interesting twist to them or else the quiz merely replicates a stressful public *viva voce*.

On stress

Students were very afraid of not being able to answer something taught in class and their ignorance being exposed in front of the teacher who had taught them that subject, their current and future teachers, and worse, their peers and juniors. The quizmaster tries to counteract this inhibition by assuring them that even subject teachers would not be able to answer questions adequately under pressure, and that being finalists itself was an obvious achievement.

Regarding performance anxiety, finalists rated their stress levels as very high, some describing it as worse than before a university examination as there was no defined syllabus and they could not prepare adequately. Many students however commented upon the stress as a beneficial character-building exercise. Overall, as the stakes were comparatively low (not winning a prize as against failing a course) stress was not considered a deterrent to participation and the thrill of performing before an audience of peers and teachers gave added impetus.

On fairness

Students felt that the quiz was biased in favor of senior students who had completed formal teaching on more subjects, but it was fair to all teams. They could not fault our vertically-sliced team composition or suggest a more equitable alternative format.

On usefulness

The highest-ranking comments on usefulness (as listed in the questionnaire) were as follows:

The audience learnt:

1. That learning can be fun.
2. Useful and not so interesting facts.
3. Interesting and not so useful facts.

Participants learnt:

1. How to think and answer under pressure.
2. How to work as a team with a mixed group.
3. Healthy competition spirit (how to handle victory or defeat).

On bias

Students felt that good performance on stage created a positive bias and such students could be favored by teachers in the future. They however did not feel any negative bias accrued from poor performance on stage.

DISCUSSION

Studies have shown that medical quizzes improve students' comprehension and enhance interest levels in the subject. These however have been mostly on single subject quizzes, delimited by the curriculum and are really a traditional assessment in a new format³⁻⁸. Studies comparing traditional test scores before and after a quiz-exercise show irregular improvement in scores¹⁰⁻¹¹.

Goud *et al* in a comparative cross-sectional study of 96 medical students to evaluate quiz competitions as teaching learning methodology found a statistically significant improvement in their performance¹². Schlegel *et al* using audience response technology developed a fast-paced interactive stimulating quiz game on dermatology on the last day of class. They concluded that such educational game competitions provided formative assessment and feedback to both learners

and teachers and furthered collaborative skills and academic performance⁵.

Webb *et al* used a 'Jeopardy!' game show model to as a instructional tool to teach geriatrics to surgery residents and showed that quiz type competitive gaming sessions can lead to better post-test performance, learner satisfaction and sustained knowledge retention⁶. In a randomized controlled trial conducted with 145 medical students Boeker *et al.* found that game-based e-learning was more effective than a script-based approach for the training of urinalysis in regard to cognitive learning outcome and had a high positive motivational impact on learning with students reporting more fun¹³.

Beylefeld *et al* used a quiz type board game successfully to impact positively on students' attitudes and interest towards microbiology. They felt that the positive experience during learning enhanced team effort and communication in addition to enhancing recall of factual knowledge¹⁴. In their study on Team Based Learning, Vasan *et al* showed that student performance improved and students perceived it as motivational collective team learning that was self-directed and fostered peer respect¹⁵.

Mediquiz has also been used ingeniously as a tool to identify common misconceptions among students in a subject¹⁶. Students who opt to participate in quizzes generally perform better than average because they tend to belong to a more hard-working and/or intelligent subset. Studies evaluating student perceptions about comprehensive medical quizzes also agree that students find them interesting and useful.

However, the benefit in quantifiable learning outcomes may not be as direct or tangible as we may like to believe. Selby *et al.* compared the performance of students taught about child development by interactive lecture and by a game based on charades. Students taught by lecture

performed slightly better but there was no difference in long-term performance in the subject¹⁷. In a meta-analysis of learning outcomes of medical educational games, Akl *et al* could neither refute nor confirm the utility of such games as effective teaching strategy and outlined the need for better-designed studies to assess this¹⁸. Boeker *et al* too reported that most recent systematic reviews and meta-analysis of studies on game-based learning and e-learning in the medical professions have shown only limited effects¹³.

We did not find stress to be an inhibition to participation, though fear of failing in front of teachers and peers was a matter of concern for many quizzers. In their analysis of responses to a two year weekly e-mailed medical quiz, Lauw *et al.* found that the response was low (7.3%) and the questions with high response rates were the ones with most correct answers. They also noted that most responses were for questions within the specialized field of the respondents and suggested that doctors are 'afraid to fail among their peers'¹⁹.

De Pablo *et al* measured the anxiety of second year medical student examinees in Barcelona and showed a positive correlation between the importance attributed to an examination and its resultant anxiety, and a negative correlation between the importance of an examination and the importance attributed to chance in the marking²⁰. Arndt *et al.* in their study of anxiety in preclinical students just before a viva voce examination found that there was no correlation of heightened anxiety with overall examination performance²¹. These factors could explain why stress was not seen as a deterrent to mediquiz participation among our students.

The present study was aimed at exploring which aspects of the mediquiz students find most useful, which the most interesting, and what would be the ideal balance

between the two, not presuming that they are mutually exclusive.

Our results show an overall moderate preference for 'interesting' questions provided that the answers linked back meaningfully with the subject.

CONCLUSION

That game-styled quiz competitions based on curricular subjects can be an effective tool to increase interest and motivation and enhance learning is established beyond doubt. This study takes the enquiry further in trying to establish the optimal fulcrum between frivolity and functionality in the context of the undergraduate medical curriculum.

It appears that students like both extracurricular and curricular questions with a slight or greater preference for the former depending on whether they sit on stage or in the audience. They did not like questions straight out of textbooks or lectures and preferred that the question be adorned with fringe features of interest but that the answer be relevant to their studies. Students abhorred questions and questioning that made the quiz feel like a *viva voce* examination conducted before an audience of peers and teachers. They appreciated the festive themed atmosphere in which the quiz is held.

Students on stage described the quiz as very stressful but felt that this was a character-building exercise. They felt that they learnt how to work as a team with members from outside their immediate circle, and how to respond under pressure before an audience. They felt that it promoted group interaction and rapid recall.

Suggestions to be considered are holding MediQuiz for each year/level separately and hosting a nationwide invitational quiz meet involving other medical institutes.

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ANNEXURE: 1**MEDIQUIZ 20XX --- Questionnaire****You:**

Junior (First/Second MBBS) <> Senior (Final MBBS I&II)
 Male<>Female
 Mauritian<>Foreign (Indian/South African/Specify-)
 Audience <> Participant
 (Finalist<>Preliminary round entrant)
 Previous general quiz participation: No <> Yes
 (Quiz prizes: Won<>none)
 Previous medical quiz participation: No <> Yes

Your opinion:

On type and mix of questions:
 Questions can come from what is taught in class or from outside.
 What ratio of (useful: interesting) questions would you prefer?
 0:100 20:80 40:60 60:40 80:20 100:0
 On performance pressure:
 How stressful did you find the quiz?
 Very stressful / Mildly stressful/ Not stressful at all

On fairness:

Given the mixed composition of teams do you judge the selection of questions to be fair?
 Biased towards seniors/ Balanced / Biased towards juniors

On bias:

Does performing well on stage create a positive bias in teachers?
 Yes/ No
 Does performing poorly on stage create a negative bias in teachers?
 Yes/ No

On usefulness:

What did you learn from this quiz? (rank at least three in order of agreement)
 Useful but not so interesting facts.
 Interesting but not so useful facts.
 How to handle stress.
 How to think and answer under pressure.
 How to work as a team with a mixed group.
 Healthy competition spirit (how to handle victory or defeat).
 That learning can be fun.

Your comments and suggestions...