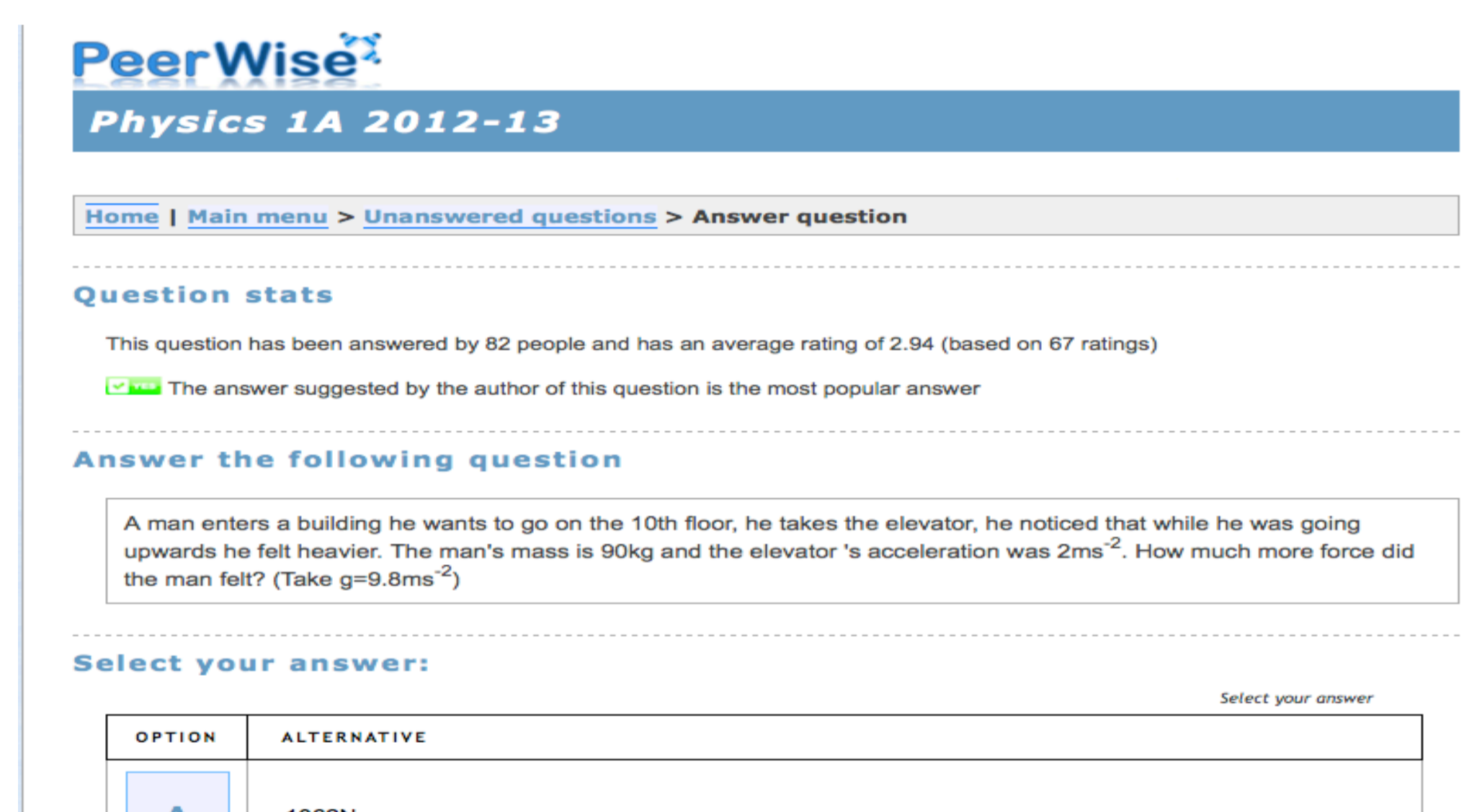


PeerWise

PeerWise [1][2] is an online tool that enables students to write multiple-choice questions (MQCs), share them with their peers, and answer, rate and comment on each other's questions.

Implementation

PeerWise was implemented in a 1st year undergraduate course on Newtonian mechanics at the University of Edinburgh. The course was taken by ~280 students; about half were studying for a physics degree, with most of the rest taking degrees in other science subjects.



PeerWise counted for 4% of the course mark. There were minimum requirements in terms of the number of questions to be authored, answered and commented on, however most students contributed more than the minimum.

PeerWise activity	Min req.	Mean contrib.	Max contrib.
Number of questions authored	2	2.4	11
Number of questions answered	10	25.8	256
Average comment length (chars)	-	105.4	538
Days of activity	-	5.1	23

Student engagement

There was a statistically significant positive correlation between students' PeerWise contributions and their performance in the end-of-course exam, even after taking prior ability into account (as measured by their mark in the FCI pre-test):

PeerWise activity	Effect size ^a
Number of questions authored	0.24***
Number of questions answered	0.24***
Average comment length (chars)	0.22**
Days of activity	0.33***

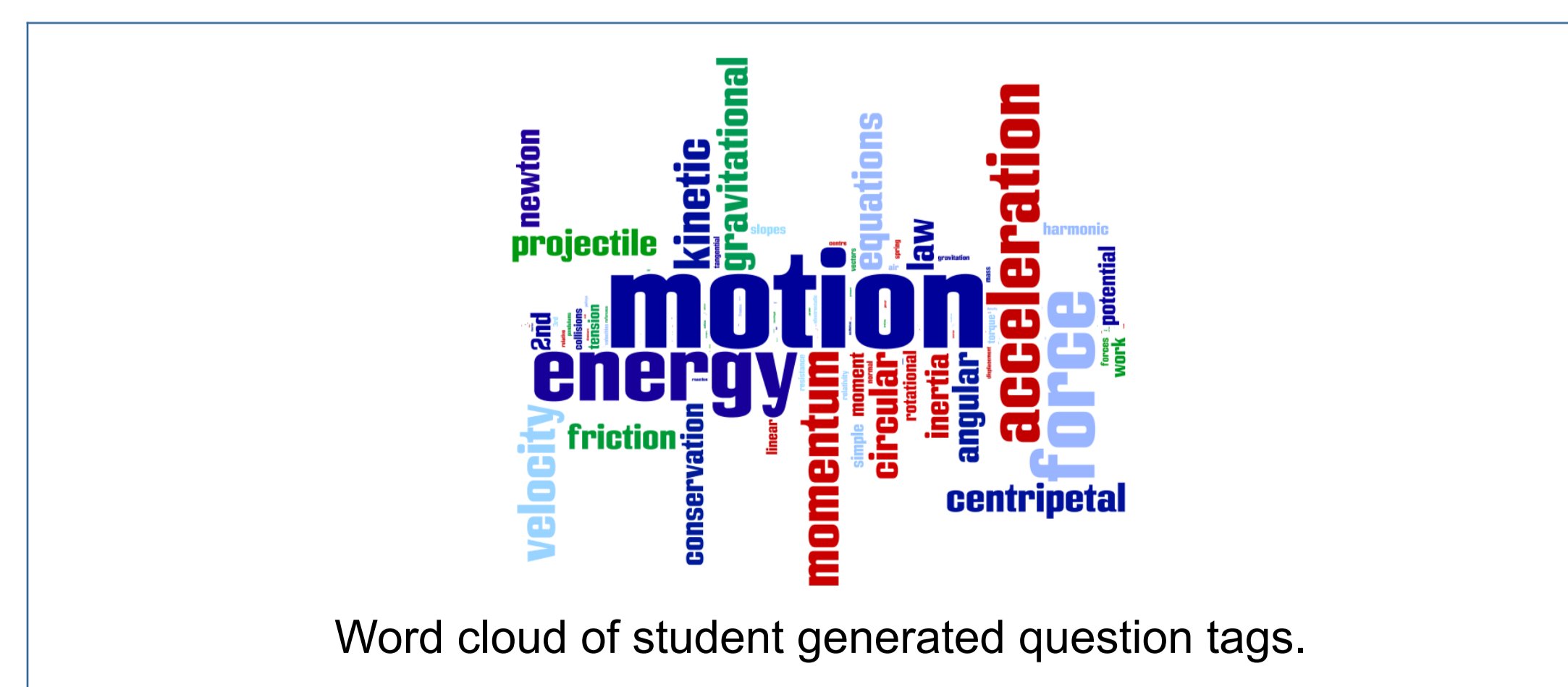
^aSpearman's partial correlation coefficient between PeerWise activity and end-of-course exam mark, controlling for pre-course FCI mark

p<0.01 *p<0.001

Student interactions

PeerWise enables students to interact with any other students in the class. It is completely anonymous and students may interact with peers who they perhaps have never met in 'real life', especially in large classes.

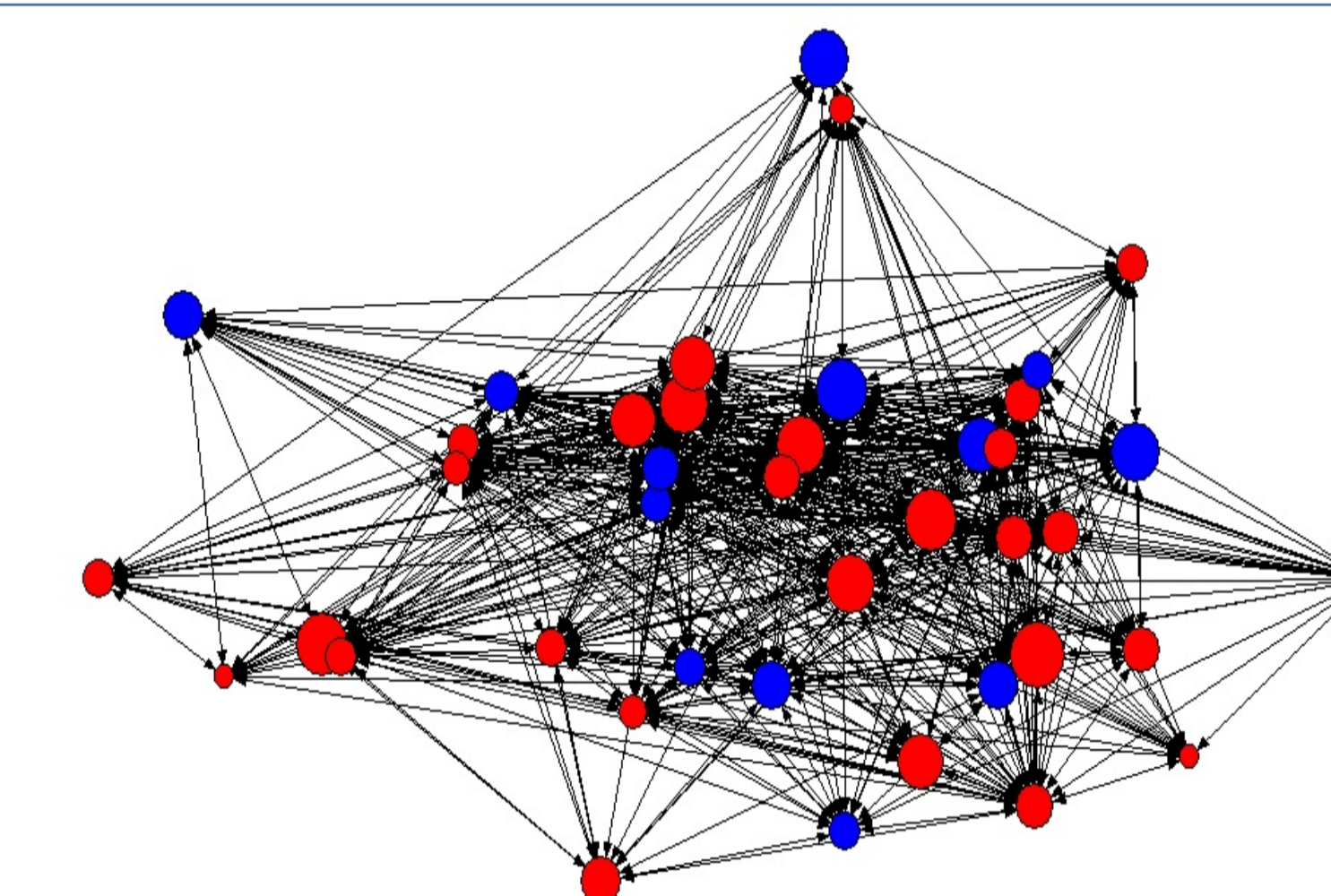
This opens up the possibility of an extended student network with a common aim of creating, sharing, answering, explaining and discussing MQCs.



Student networks

Networks were constructed of students who had:

- Answered the same question(s)
- Commented on the same question(s)



Comment network for medium-performing student. Nodes (students) are sized by attainment on end-of-course exam. Colours represent physics majors (blue) and non-majors (red).

A partial correlation between normalised degree centrality¹ and exam mark, controlling for the pre-test FCI mark, gave a statistically significant positive effect:

Network type	Effect size ^a
Answering questions	0.12*
Commenting on questions	0.11*

^aBootstrapped partial correlation (1,000 samples) between PeerWise activity and end-of-course exam mark, controlling for pre-course FCI mark

*p<0.05

These results suggest that students may benefit from engaging with their peers, not only by writing or answering many questions, but perhaps also by being exposed to a wide range of question styles, levels and topics posed by their peers.

¹In social network analysis, normalised degree centrality is the number of connections to a node (student) divided by the number of possible connections. It gives a measure of the relative influence in a network: Here, it can be interpreted as the extent of collaboration between students.