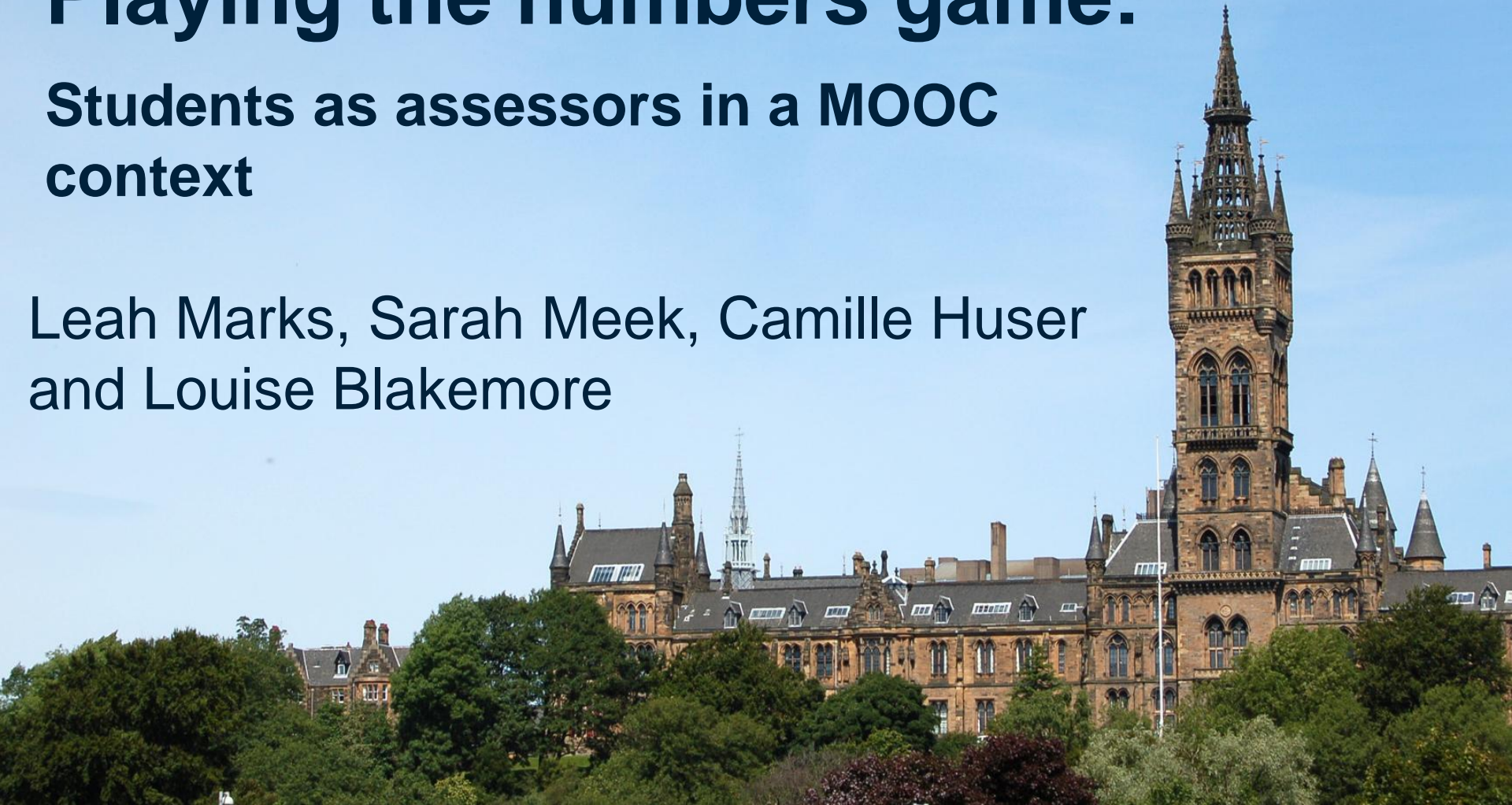


# Playing the numbers game:

## Students as assessors in a MOOC context

Leah Marks, Sarah Meek, Camille Huser  
and Louise Blakemore





Active student participation in marking assessments?

- Increasing emphasis on online learning
  - Distance delivery, and on large online classes including MOOCs
  - MOOCs for credit e.g. UCSF/Coursera
  - Large online classes: staff review time-consuming, peers more numerous than staff
  
- Peer review benefits (Morris 2001)
  - Transferable skills: reflection, self-assessment, communication skills
  - Ownership of learning
  - Learning through assessment, not just assessment of learning
  - Reviewing improves reviewer's performance (Cho & Cho 2011)

Aim: to evaluate the students' experience of a peer review task and the quality of peer feedback

Context: University of Glasgow / Futurelearn MOOC, "Cancer in the 21<sup>st</sup> Century – the Genomic Revolution"



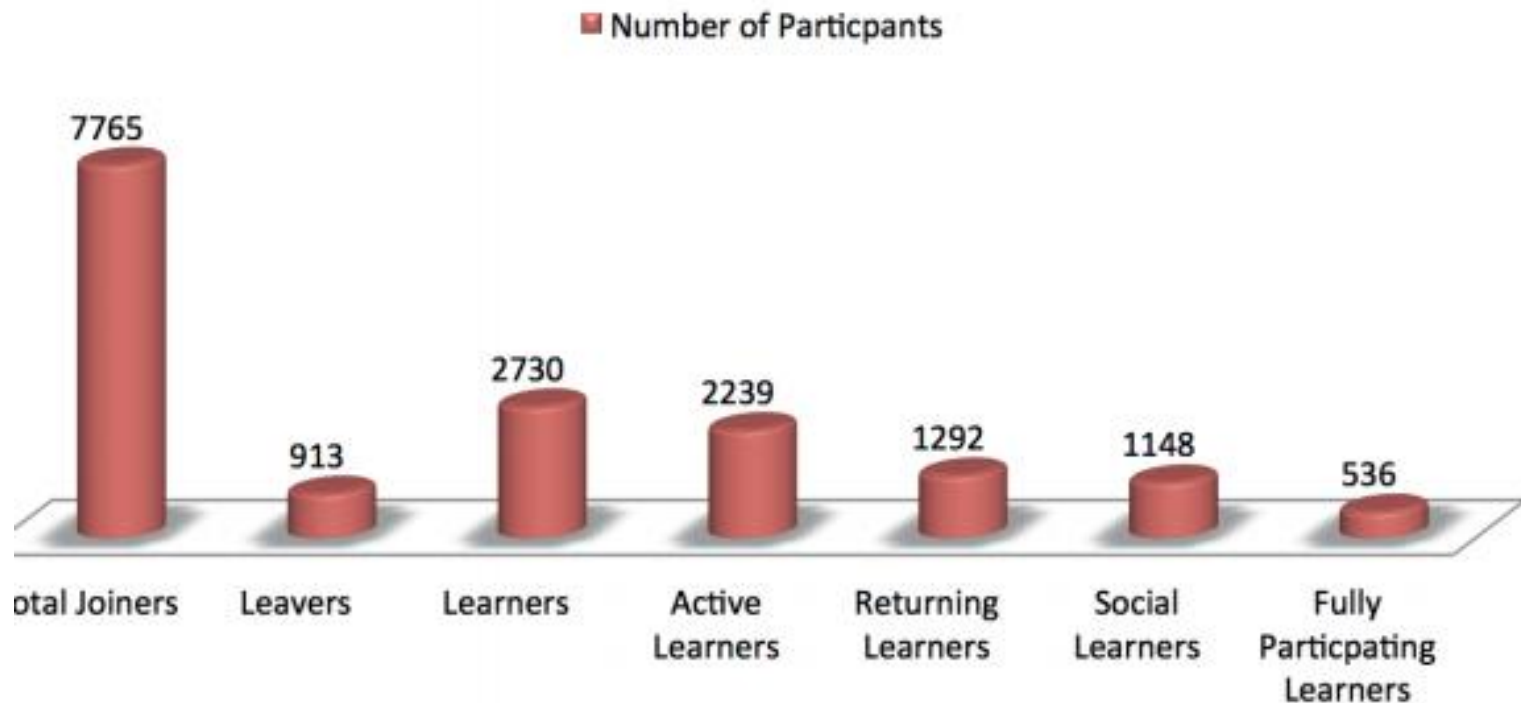
CANCER IN THE 21ST CENTURY: THE GENOMIC REVOLUTION  
UNIVERSITY OF GLASGOW

Discover how genetics is revolutionising the detection and treatment of cancer, with this free online course.

 17 Aug  6 weeks  4 hours pw  Certificates

[More](#)

## Genomics - Sign Up and Participation Figures





We hope you find it an informative and worthwhile exercise!

Here is the question:

What do we know about how epigenetic regulation goes wrong in cancer and what types of targeted treatment could arise from our knowledge of epigenetic de-regulation in cancer?

Links to the papers are below:

[The context and potential of epigenetics in oncology](#)

[Cancer epigenetics: above and beyond](#)

[A decade of exploring the cancer epigenome — biological and translational implications](#)

[Epigenomics in cancer management](#)

## Other Resources

[Targeting Epigenetics for Cancer Therapy](#)

[What is Epigenetics? The Cancer Epigenome](#)

- Peer review: provide qualitative feedback on 3 areas of other students' summaries:
  - What did you like about the author's work?
  - Had the author carried out research using reliable resources and did they make good use of these?
  - How might the author improve communication of their key ideas?



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Study ID text|

1 sorry don't have the time or inclination.

2 "Cancer epigenetics is the study of epigenetic modifications to the genome of cancer cells that do not involve a change in the nucleotide sequence. Epigenetic alterations are as important as genetic mutations in a cell's transformation to cancer. Mechanisms of epigenetic silencing of tumor suppressor genes and activation of oncogenes include: alteration in CpG island methylation patterns, histone modifications, and dysregulation of DNA binding proteins.

Silencing genes through epigenetic mechanisms is very common in cancer cells and include modifications to histone proteins and DNA that are associated with silenced genes. In cancer cells, the DNA in the promoter region of silenced genes is methylated on cytosine DNA residues in CpG islands, genomic regions that contain a high frequency of CpG sites, where a cytosine nucleotide occurs next to a guanine nucleotide. Histone proteins that surround that region lack the acetylation modification (the addition of an acetyl group) that is present when the genes are expressed in normal cells. This combination of DNA methylation and histone deacetylation (epigenetic modifications that lead to gene silencing) is commonly found in cancer. When these modifications occur, the gene present in that chromosomal region is silenced. Increasingly, scientists are understanding how these epigenetic changes are altered in cancer. Because these changes are temporary and can be reversed (for example, by preventing the action of the histone deacetylase protein that removes acetyl groups, or by DNA methyl transferase enzymes that add methyl groups to cytosines in DNA) it is possible to design new drugs and new therapies to take advantage of the reversible nature of these processes. Indeed, many researchers are testing how a silenced gene can be switched back on in a cancer cell to help re-establish normal growth patterns.

Genes involved in the development of many other illnesses, ranging from allergies to inflammation to autism, are also thought to be regulated by epigenetic mechanisms. As our



- 201 written summaries submitted (c.f. 550 fully participating)
- 192 participants took part in peer review process
- Staff assessed each summary (grades A-E, specific criteria)
- Staff assessed each peer review:

Grade	Assessment Criteria
3	Excellent attempt to give constructive and fair feedback. Generally at least two points of constructive feedback given to the student who has submitted the peer review.
2	Reasonable attempt to give constructive and fair feedback.
1	Minimal attempt to give constructive and fair feedback
0	Blank content of no attempt to complete the peer review task.
SNS	Summary non-submission. Students were not provided with a genuine attempt at the summary task to review and therefore could not provide feedback.

- Qualitative thematic analysis of student comments (NVivo)

# Which students took part in the PR exercise?

	Start of course %	Peer review %
Male	27	42
Female	69	57

	Start of course %	Peer review %
No University	24	13
Degree	42	46
Masters	26	29
Doctorate	8	10

	Start of course %	Peer review %
UK	79	76
USA	7	3
India	3	4
Spain	3	1
Australia	2	4
Greece	2	3
NZ	1	1
Canada	1	3
Nigeria	1	1
Germany	1	1

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# Which students took part in the PR exercise?

age	Start of course %	Peer review %
<18	4	0
18-25	22	11
26-35	16	18
36-45	12	14
46-55	15	18
56-65	16	23
>66	9	15

	Start of course %	Peer review %
FT employed	35	34
PT employed	17	15
FT education	20	10
Unemployed	7	5
Retired	17	27
Not available to work	3	9

- Time pressure and university education as factors that alter engagement with PR?

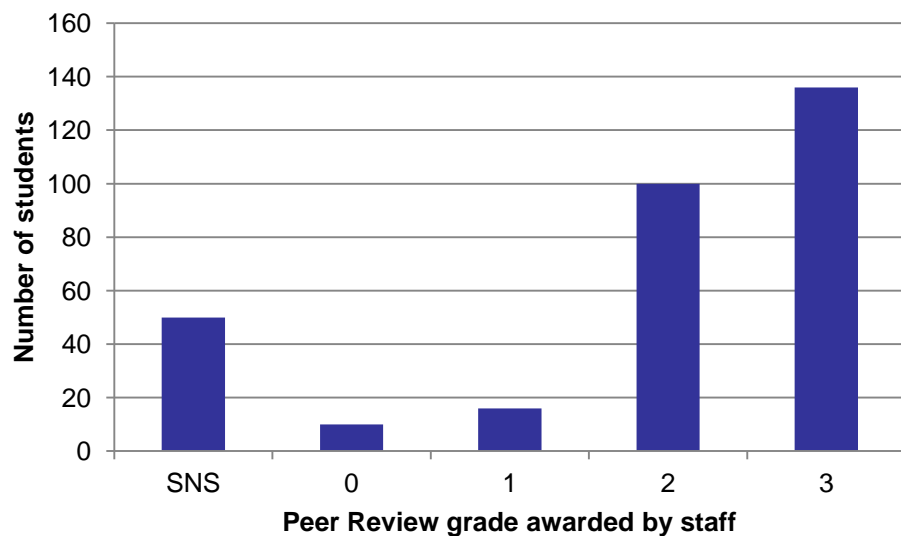
# Written summary grades

Demographic Category		Passed (A-C)	Failed (D/E)	Significance (Chi-squared analysis)
<b>Age</b>	Under 45	13 (38%)	21 (62%)	NS
	Over 45	25 (46%)	29 (54%)	
<b>Gender</b>	Male	22 (49%)	23 (51%)	NS
	Female	15 (45%)	18 (55%)	
<b>Working?</b>	In full time work	8 (30%)	19 (70%)	p = 0.018*
	Not in full time work	30 (58%)	22 (42%)	
<b>Education</b>	Doctorate	7 (88%)	1 (12%)	p = 0.017*
	No doctorate	29 (43%)	39 (57%)	
<b>National language</b>	English	33 (34%)	63 (66%)	NS
	Non English	5 (21%)	19 (79%)	

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- Students in full-time employment less likely to pass ( $p=0.018$ )  
– *time constraints?*
- Students with doctorate more likely to pass ( $p=0.015$ ),  
otherwise no correlation with education level - *more  
experience?*

# Quality of Peer Reviews



- Overall review quality was high

- SNS – students not clear that task was optional?

Grade	Assessment Criteria
3	Excellent attempt to give constructive and fair feedback. Generally at least two points of constructive feedback given to the student who has submitted the peer review.
2	Reasonable attempt to give constructive and fair feedback.
1	Minimal attempt to give constructive and fair feedback
0	Blank content of no attempt to complete the peer review task.
SNS	Summary non-submission. Students were not provided with a genuine attempt at the summary task to review and therefore could not provide feedback.

- **Students who did well in the written summary task give higher quality peer reviews**

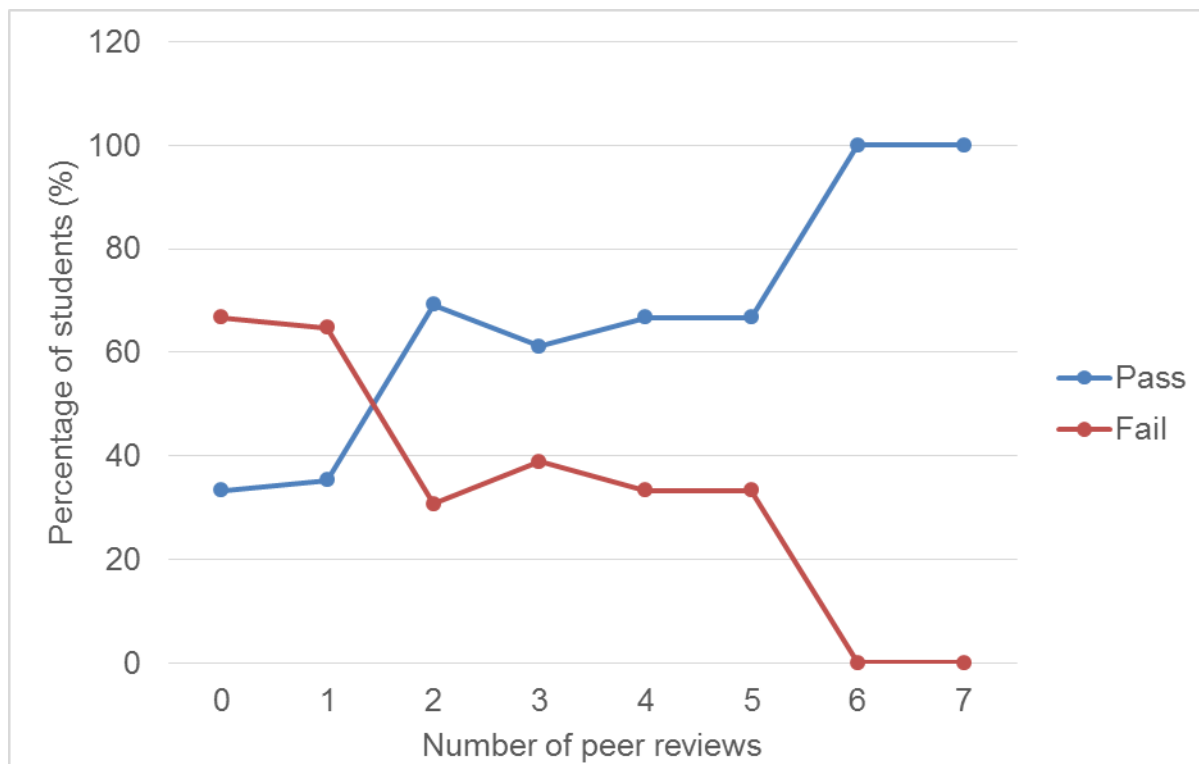
Written Summary Grade	Average peer review grade (0-3)
Pass (A-C)	2.7
Fail (D-E)	2.2

T test  $p = 0.0019$

No correlation of review quality with: full-time or part-time employment status or retirement, male/female, full-time education status

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**Students who did well in the written summary task were more likely to submit multiple peer reviews**





## Students in Countries Where English is a National Language Give Higher Quality Peer Reviews

English as national language	Average peer review grade (0-3)
Yes (1)	2.5
No (2)	2.2

T test  $p = 0.0229$

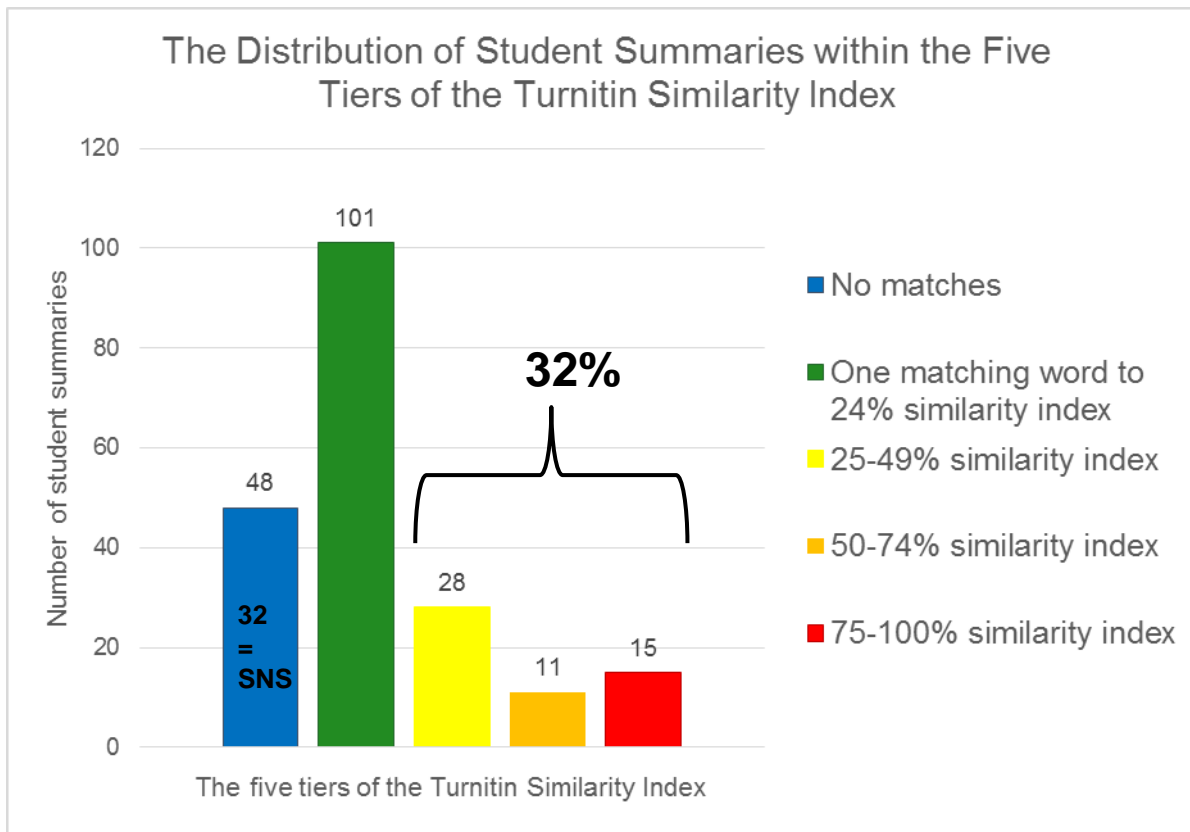
- (1) Australia, Canada, New Zealand, Nigeria, UK, USA
- (2) Columbia, Cyprus, Germany, Greece, India, Nepal, Pakistan, Portugal, Russia, Saudi Arabia, Serbia, Spain

# Written Summary vs MCQ

Written Summary Grade	Average MCQ grade (in %)	Average number of MCQ (attempts to achieve answer)	Average number of MCQs completed (total 65)	Number of students achieving summary grades
A-C (Pass)	84	12	63	38
D and E (Fail)	75 <sub>†</sub>	20 <sub>‡</sub>	60	41

# Peer Review vs MCQ

Average PR quality	Average MCQ grade (in %)	Average number of MCQ retries	Average number of completed MCQs (total 65)	Number of students achieving PR grade
3	82	13	61	41
2	79	17	62	25
0 and 1	72 <sub>†</sub>	25 <sub>‡</sub>	62	5



- Only 2 peer reviewers commented on plagiarism
- We did not provide plagiarism training
- Students in full-time employment more likely to plagiarise ( $p=0.018$ )



# Did students value PR?

- Student opinion is split
  - 105 positive comments; 96 negative
- Commonest negative comments
  - Too time-consuming (26)
  - Word limit too low (18)
  - Disliked writing task (15) | – *better communicate rationale, optional*
  - Too difficult (14) – *less than proportion who felt course too difficult overall (27%)*
  - Disliked peer review *per se* (13) – *unexpectedly small proportion, given literature*
    - **Poor quality reviews received (6)**
    - **Considered peers not qualified to review (6)**

\*A small proportion of students may not engage with PR

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## Commonest positive comments:

- Having work reviewed
  - Reviews were encouraging or useful (7)
  - Feedback on understanding and appropriateness of depth (5)
  - Thank reviewer (7)
  - Writing for others is a good challenge (2)
  - Reviewers with different background valued (2)
- Being a reviewer
  - Opportunity to get others' viewpoints, insights, and see how they approached task (8)
  - Reviewing improves reviewer's understanding of topic (3)
- PR exercise overall
  - Helped focus, think or remember more, consolidate learning (9) - *deeper learning?*
  - Skills practice (13) – research, critical thinking, synthesis, writing

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# Conclusions & Discussion

- Peers can produce high quality feedback, even with wide variety of student backgrounds
- Student opinion split on usefulness, but only a small proportion disagree with PR in principle, and many think PR helped their learning
- Factors that affect participation / engagement
  - Student circumstances: time = major reason for non-participation
  - Performance: proficient students do better, take part more
  - Task design: use clear instructions including rationale
  - May need strong sense of learning community and interaction with peers for PR to work well (c.f. literature on engagement e.g. Dixson 2010) – better in cMOOCs?

Contact: [leah.marks@glasgow.ac.uk](mailto:leah.marks@glasgow.ac.uk)

**Kerr *et al* (2015) Building and Executing MOOCS – a practical review of Glasgow’s first two MOOCs**  
[\*\*http://www.gla.ac.uk/media/media\\_395337\\_en.pdf\*\*](http://www.gla.ac.uk/media/media_395337_en.pdf)

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- Methods needed to filter out non-genuine attempts at task and review - a bad experience can deter students from future PR
- Integrate plagiarism detection if assignment for credit (in tandem with instruction on good academic writing)
- Multiple reviewers per assignment? (cf EdX, Coursera)
  - Inter-rater reliability poor (Luo et al 2014, Admiraal et al, 2014); CPR systems may help (Suen et al 2014)
- Qualitative feedback comments –short customisable feedback phrases? (Kulkarni et al 2013)
- Support learning analytics e.g. of ~200 PR participants, we could only match to demographic data for 79
- Reviewee/reviewer matching versus anonymity (Lu and Bol 2007)