Moodle quizzes with immediate feedback and unlimited attempts

28 June 2021

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Student feedback

"I think that the format of the quiz was nice since, because I found that repeating it to get a better grade actually made me study the questions and **better understand the material** in a more interactive way (I could see that I was actually improving.)"

"Quiz style was great as it allowed you to **learn from your mistakes**."

"Also the explanations at the end of a quiz question after completion were very helpful in letting me know where I was going wrong and **filling in gaps in knowledge**."

"The quiz feedback is useful in identifying weaknesses in understanding, and it is nice to be able to try them again for revision purposes and to **solidify understanding**."

"The Moodle quizzes were very well thought of. The questions are formative and the feedback is very insightful. I appreciate that they take a long time to make, but this is definitely something other modules should copy."

"The quizzes are very formative and force you to look back at the notes and **get a deeper understanding** of the material."

"I feel **I learn a lot from the quiz structure**, where we have an attempt and then receive feedback and can then have another go. It allows me to learn from my mistakes and see how many I can get right the next time.

"I think the possibility to attempt quiz multiple times really helped me learn. Every time after I have finished it, I felt like I knew what I should work on to get to 100%. When I would finally get to the 100% I felt like **I had a lot better understanding** of the material.

“Multiple True/False (MTF)” questions

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Quiz	Week 2 quiz
Question	
Attempts	1, 2, 3, 4, 5, 6
Completed on	Tuesday, 13 October 2020, 23:43

Question 2

Partially correct

Mark 3.00 out of 4.00

Flag question

These questions are all about F-linear combinations, so you should look again at the definition of “linear combination”. Determine which of the following statements are true.

A: In $\mathbb{R}^3$ the vector $(-1,0,0)$ is an $\mathbb{R}$-linear combination of $(3,0,0)$ and $(0,1,0)$.

True ✔

B: In $\mathbb{R}^3$, the vector $(0,0,0)$ is an $\mathbb{R}$-linear combination of $(1,0,1)$ and $(2,3,0)$.

True ✔

C: In $\mathbb{C}^2$, the vector $(1,2i)$ is an $\mathbb{R}$-linear combination of $(1,0),(0,1)$.

True ✖

D: The span of a collection of vectors is the set of all F-linear combinations of those vectors.

True ✔

Every vector in $\mathbb{R}^2$ is an $\mathbb{R}$-linear combination of $(1,0),(0,1)$, because if $(x,y)\in\mathbb{R}^2$ then we can write $(x,y)=x(1,0)+y(1,0)$, and $x,y\in\mathbb{R}$.

The zero vector is a linear combination of *any* sequence of vectors, because we can simply set all of the coefficients to be zero. If there are infinitely many elements in the field F, then any non-zero vector has infinitely many F-linear combinations.

The difference between $\mathbb{R}$-linear and $\mathbb{C}$-linear combinations is like this: $(1,i)$ is a $\mathbb{C}$-linear combination of $(1,0),(0,1)$ because $1(1,0)+i(0,1)$, so the coefficients we needed were $1,i\in\mathbb{C}$. But $(1,i)$ is not an $\mathbb{R}$-linear combination of $(1,0),(0,1)$, since there are no real numbers $x,y\in\mathbb{R}$ such that $(1,i)=x(1,0)+y(0,1)$.

The F-linear span of some vectors is defined to be the set of all F-linear combinations of those vectors. In $\mathbb{R}^2$, if you have two vectors which are not multiples of each others, then their $\mathbb{R}$-span is all of $\mathbb{R}^2$; but if they are multiples of each other (for example, $(1,1),(2,2)$), then their linear span is not all of $\mathbb{R}^2$.

Multi-attempt quiz design

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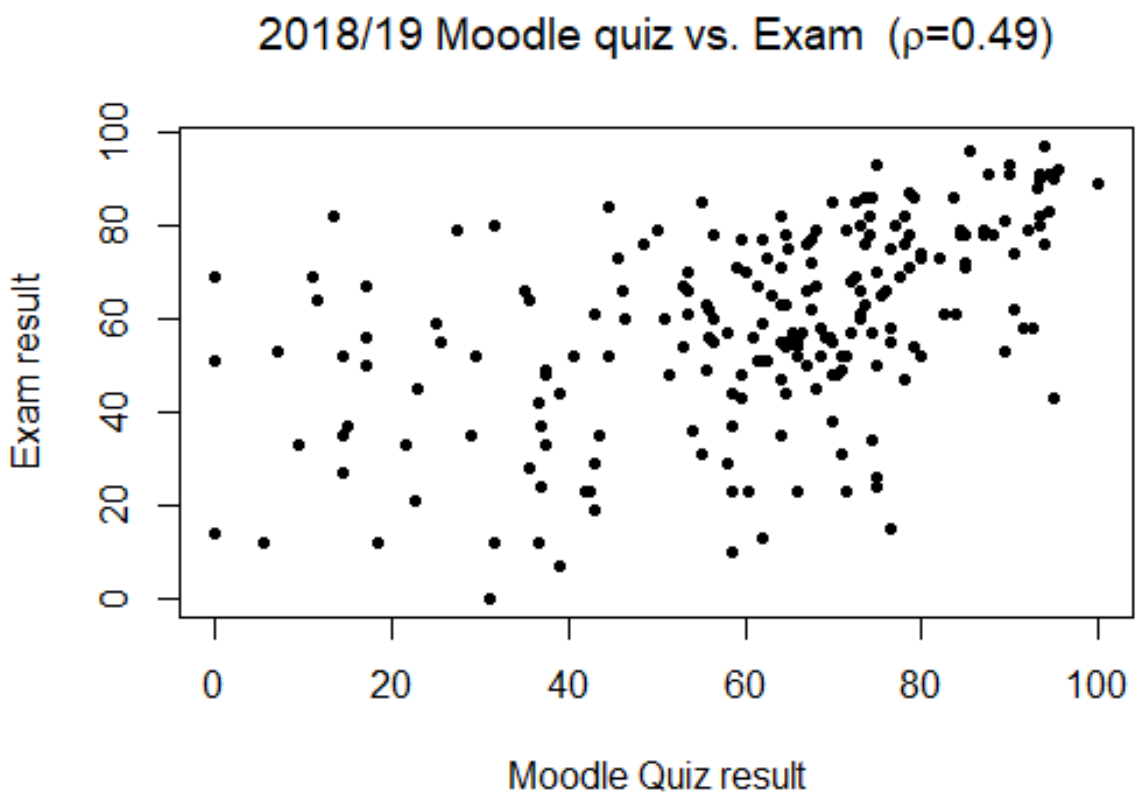
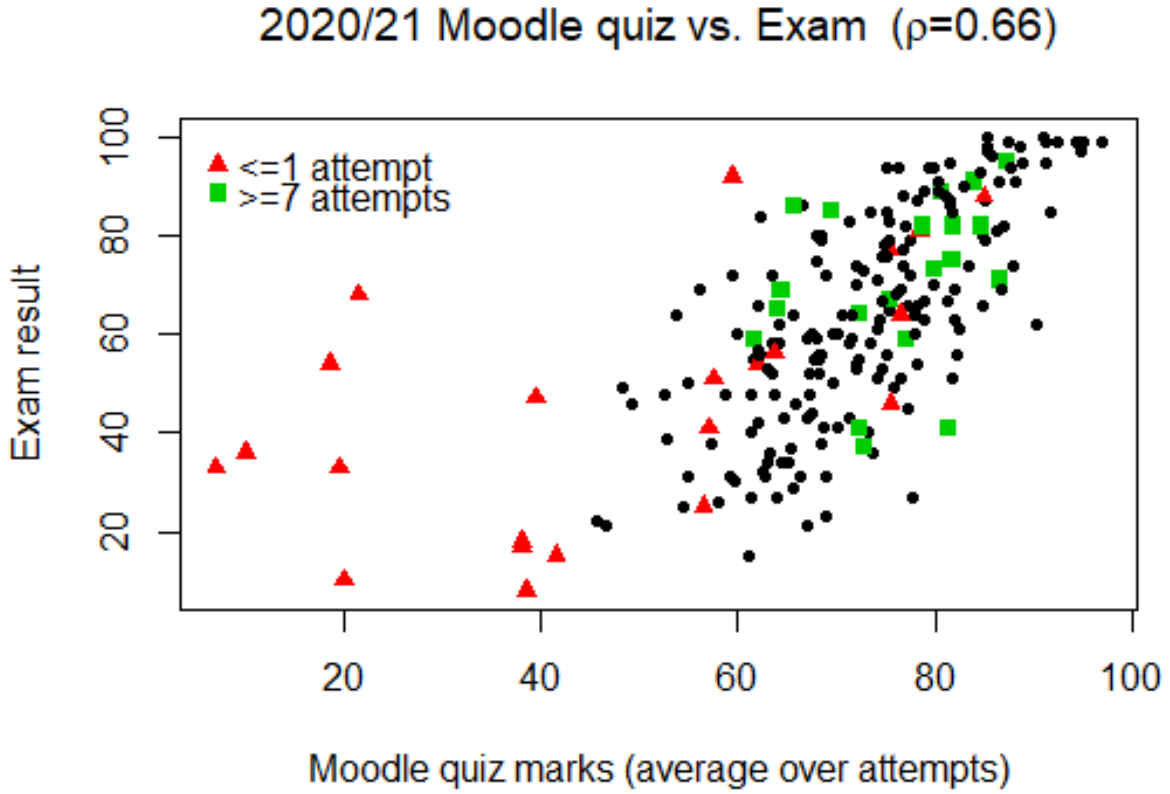
- Each weekly quiz counted as 1% of overall mark
- Unlimited attempts (no penalty, last attempt counts)
- Each question has 3-6 randomly chosen variants
- > 1 week to complete
- **10 min. delay between submissions**
- Upon submission they get:
  - General feedback
  - Marks out of 4

Results


2018/19 Moodle quiz vs. Exam (ρ=0.49)
Exam result
0
20
40
60
80
100
Moodle Quiz result


2020/21 Moodle quiz vs. Exam (ρ=0.66)
<=1 attempt
>=7 attempts
Exam result
20
40
60
80
100
Moodle quiz marks (average over attempts)

Thoughts for the future

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- Convert R/Exams -> STACK (easier for me to make changes)
- Last attempt -> Highest mark (encourage persistence)
  - + limit attempts (discourage brute force)
- Negative marking of incorrect answers (deflate grades)
- 2-hour time limit per attempt (encourage focus)

Ghabraie, Kazem. "Computer-marked assessments to enhance learning in engineering education." *International Journal on Innovations in Online Education* 4, no. 1 (2020).

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Thanks!