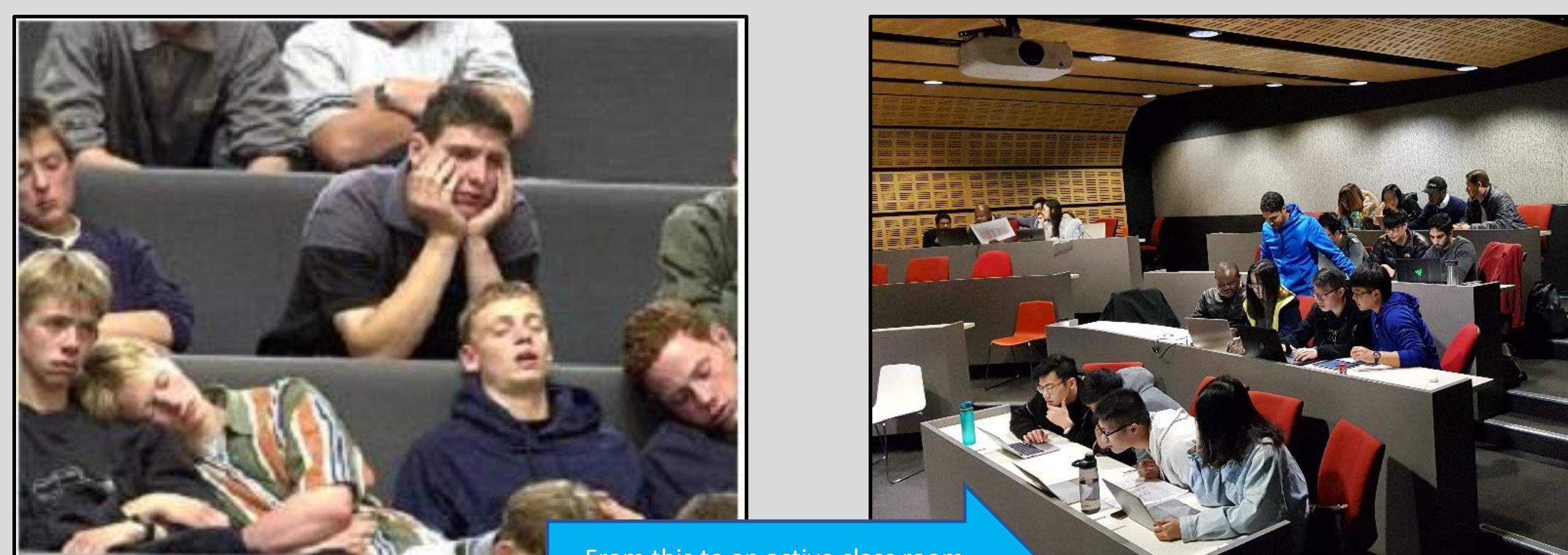


The geology class was suffering from low attendance and students were not gaining relevant industry knowledge

Student results and their learning experience are better with active learning styles compared with didactic lectures. Miller and colleagues found that exam results were 8.6% higher ($p < 0.05$) and the course had a higher retention rate by 22.9% ($p < 0.05$) with active learning styles [1].

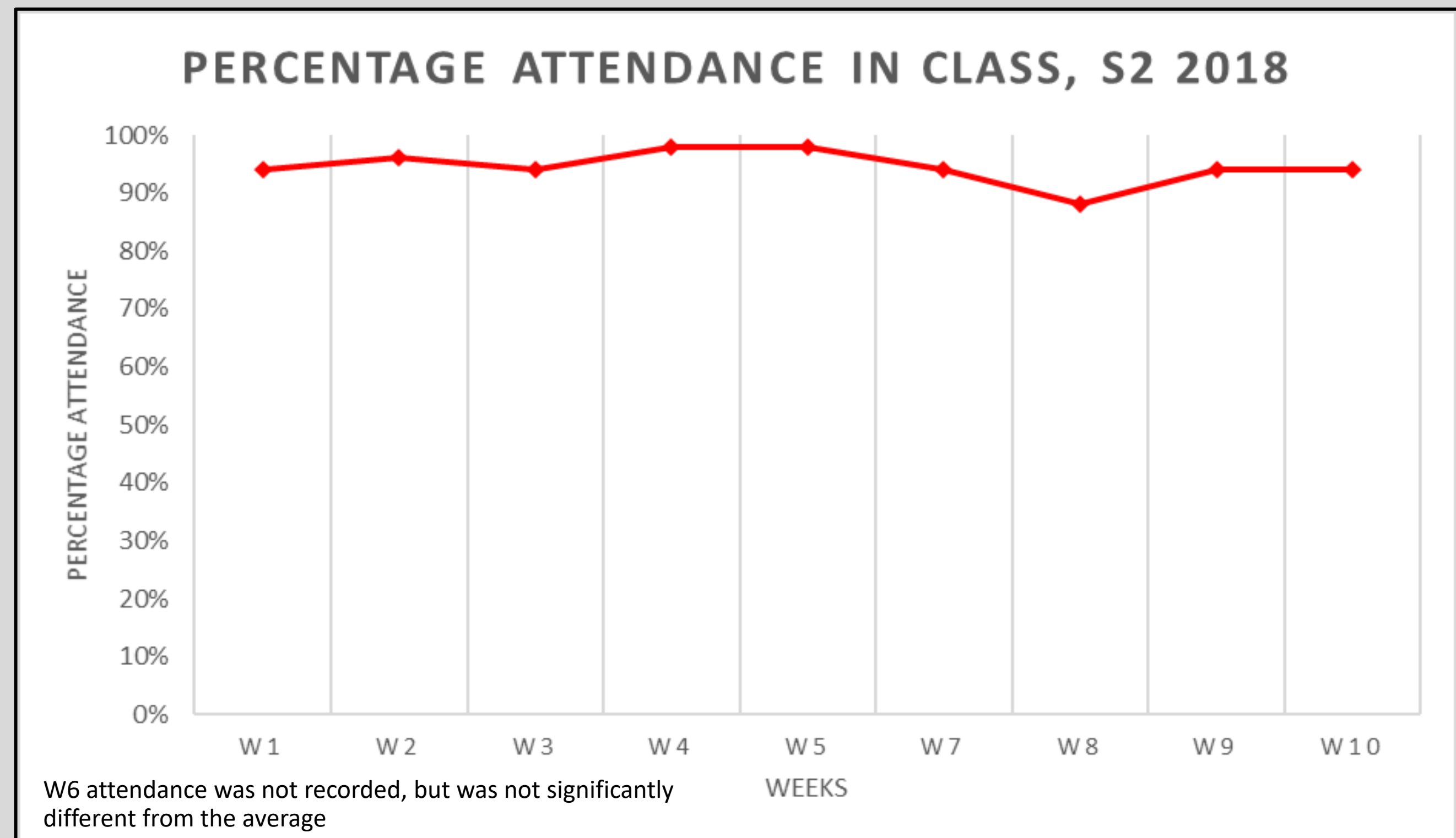
My hypothesis was that TBL would increase class participation and peer-to-peer learning

TBL encourages student participation with readiness testing of preparation material and student engagement through career relevant application exercises [2].

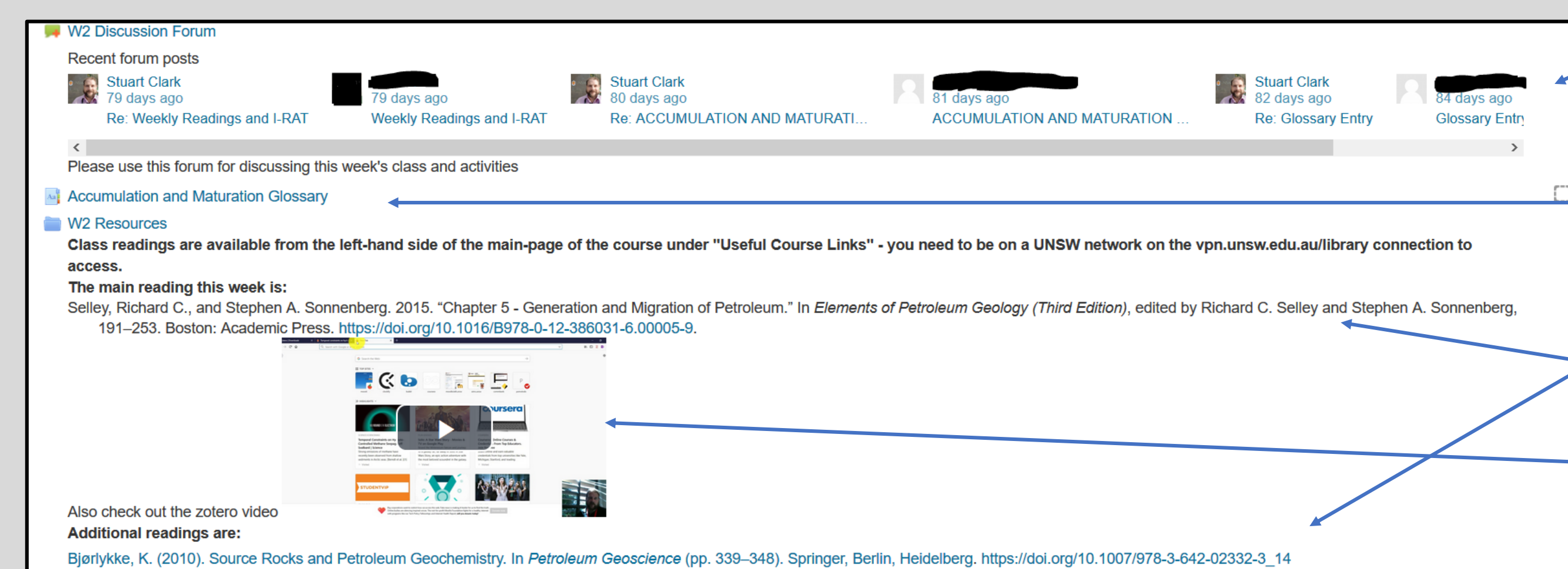


I measured attendance across 10 weeks and found that the average was 94%.

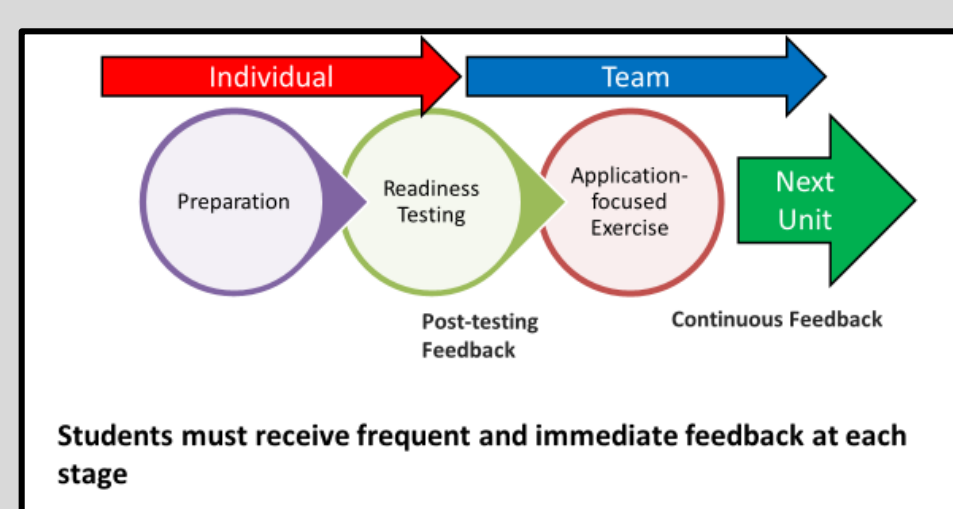
The average attendance across the 9 measured weeks was 94% and the attendance never dropped below 88% ($n = 50$).



I revamped the Moodle page (the LMS) to include all the preparatory materials, including student-created glossaries for each week.

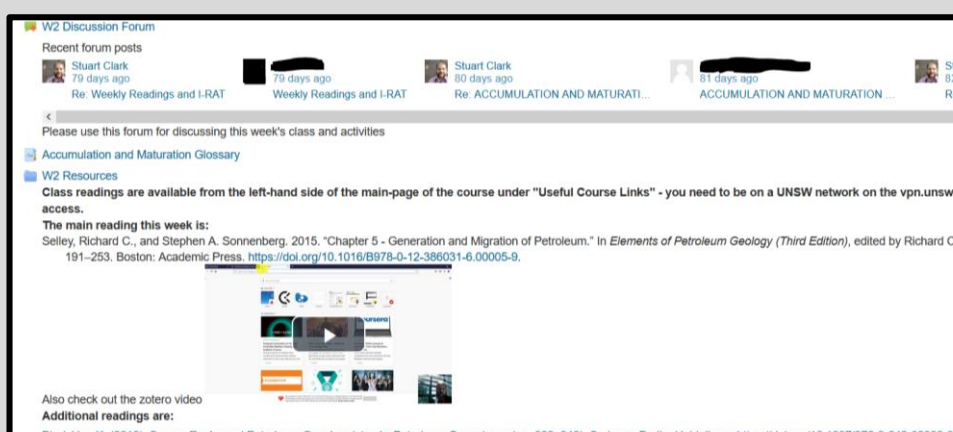


Team-Based Learning Flow



1. Preparation

Students undertake readings, watch videos, ask questions in forums and post a new definition in the glossary – all in Moodle, the learning management system online



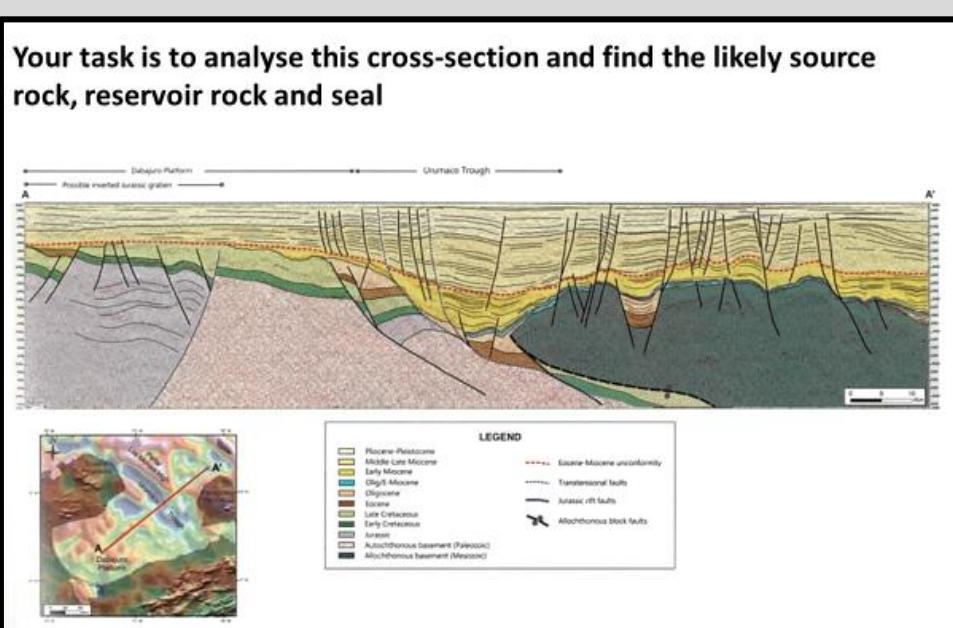
2. Individual and Team Readiness Testing

Teams perform significantly better than individuals

Question	Individual	Team
Q1	100%	100%
Q2	100%	100%
Q3	100%	100%
Q4	100%	100%
Q5	100%	100%
Q6	100%	100%
Q7	100%	100%
Q8	100%	100%
Q9	100%	100%
Q10	100%	100%

Multiple choice questions must be well-posed to prevent guessing!

3. Industry-Authentic Application Exercise

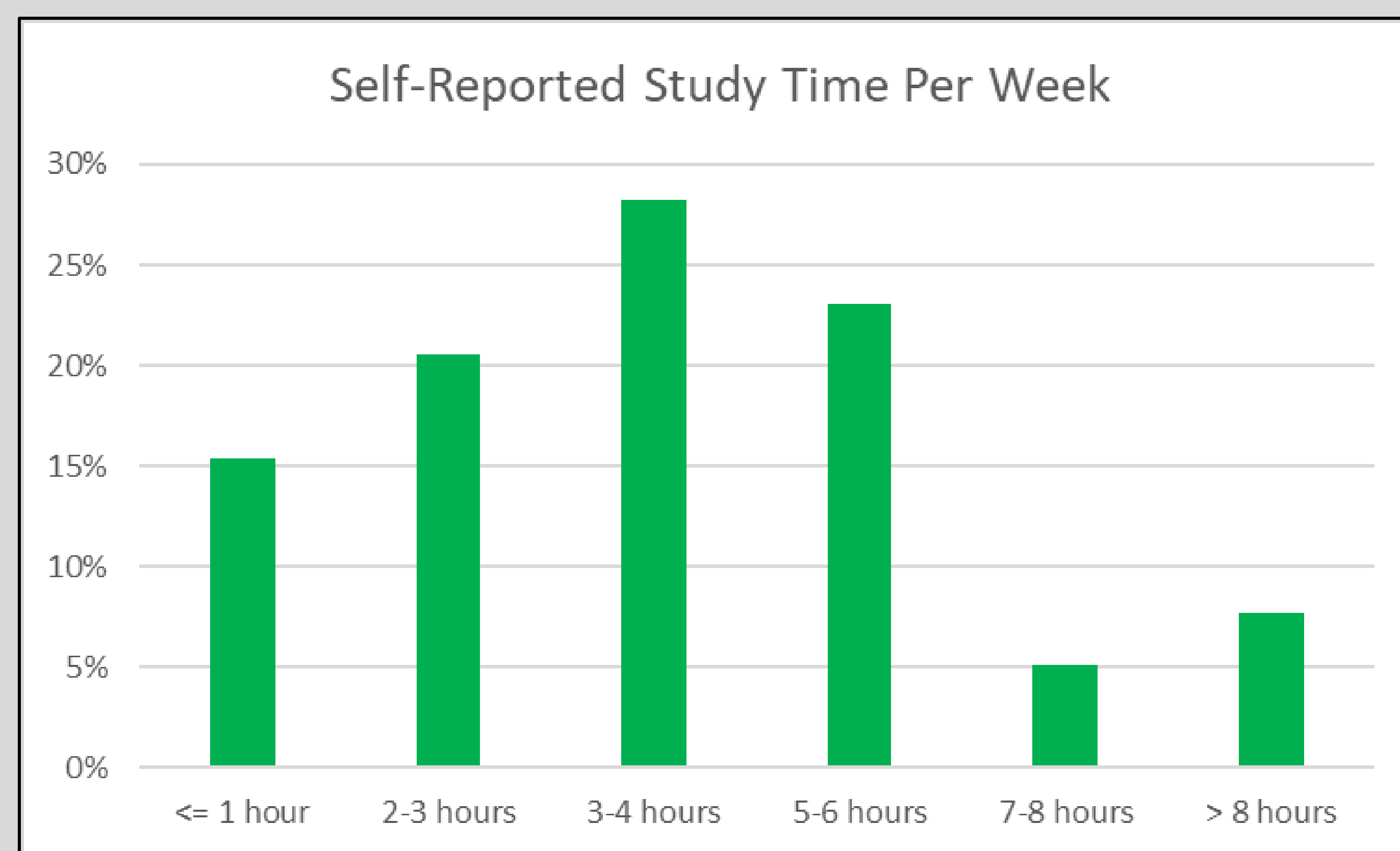


Question 1a. Which is the most likely source rock? (10 points)

A. Pliocene-Pleistocene	None
B. Middle-Late Miocene	None
C. Olig/Early Miocene	None
D. Oligocene	None
E. Eocene	None
F. L. Cretaceous	2 3 4 5 6 7 8 9 10
G. E. Cretaceous	4 5 6 7 8 9 10
H. Jurassic	7
I. Paleozoic Basement	None
J. Mesozoic Basement	None

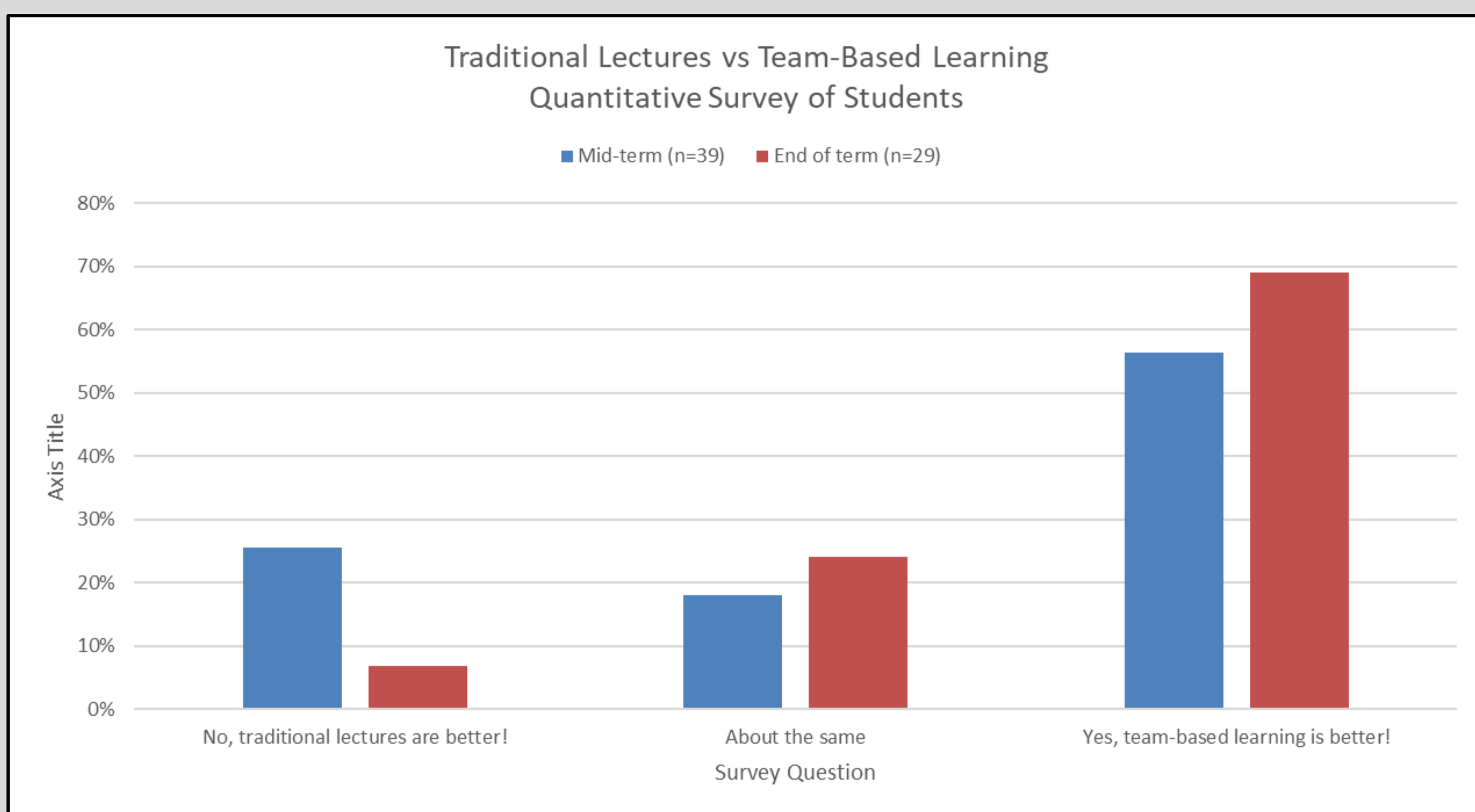
Students reported on average 3-4 hours of preparation time for each week's quiz (Readiness Assurance Test)

Class attendance is a better predictor of results than study time, but consistent study leads to better performance than cramming [3].



At the end of semester, nearly 70% of students (n=29) enjoyed TBL better than traditional lectures

After 5 weeks, students preferred TBL by 56% to 26% (18% about the same, n=39). However, by the end of term, TBL was preferred 69% to 7% (24% neutral, n=29).



41% of respondents indicated that TBL was the single best part of the course in the free response question.

Example responses:

“Team base [sic] learning because what I learn from team discussion becomes part of you”;

“The team discussions help improve knowledge”;

“The team-based learning is kinda fun because we get to engage and discuss with other people”.

About Stuart

Stuart is a Senior Lecturer at UNSW, joining UNSW after 10 years working in R&D in Norway. He has transformed a geology and a geophysics course with TBL as the teaching method for the 10 week courses at first using Moodle and Epstein Education scratchie cards and then Intedashboard. Stuart is a member of the TBLC, the Australia Association for Engineering Education and the Australasian Universities Geoscience Educators Network.

References

[1] Miller, C.J., McNear, J., Metz, M.J., 2013. A comparison of traditional and engaging lecture methods in a large, professional-level course. *Advances in Physiology Education* 37, 347–355. <https://doi.org/10.1152/advan.00050.2013>

[2] Michaelsen, L. K., Knight, A. B., & Fink, L. D. (Eds.). (2004). *Team-Based Learning: A Transformative Use of Small Groups in College Teaching* (1 edition). Sterling, Va: Stylus Publishing.

[3] Plant, E.A., Ericsson, K.A., Hill, L., Asberg, K., 2005. Why study time does not predict grade point average across college students: Implications of deliberate practice for academic performance. *Contemporary Educational Psychology* 30, 96–116. <https://doi.org/10.1016/j.cedpsych.2004.06.001>