A free-form assignment instead of an exam to stimulate students' motivation and retention of botany knowledge

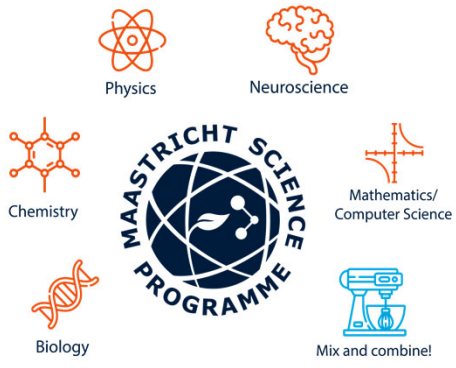
Roy H.J. Erkens
Associate Professor Plant evolutionary biology

Maastricht Science Programme, Maastricht University, The Netherlands

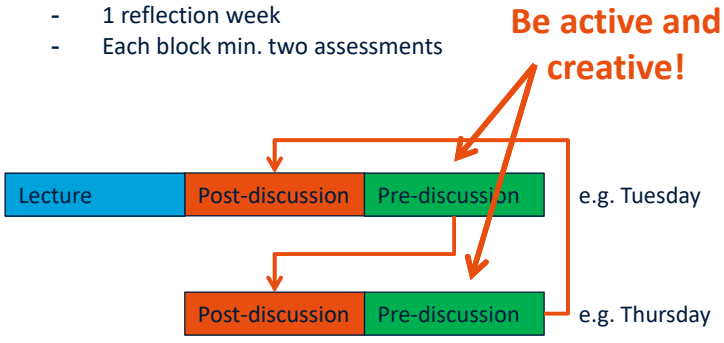
roy.erkens@maastrichtuniversity.nl

Maastricht University

LAS foundation, natural sciences and P/RBL



- 8 week modules
  - 6 weeks content
  - 1 exam week
  - 1 reflection week
  - Each block min. two assessments



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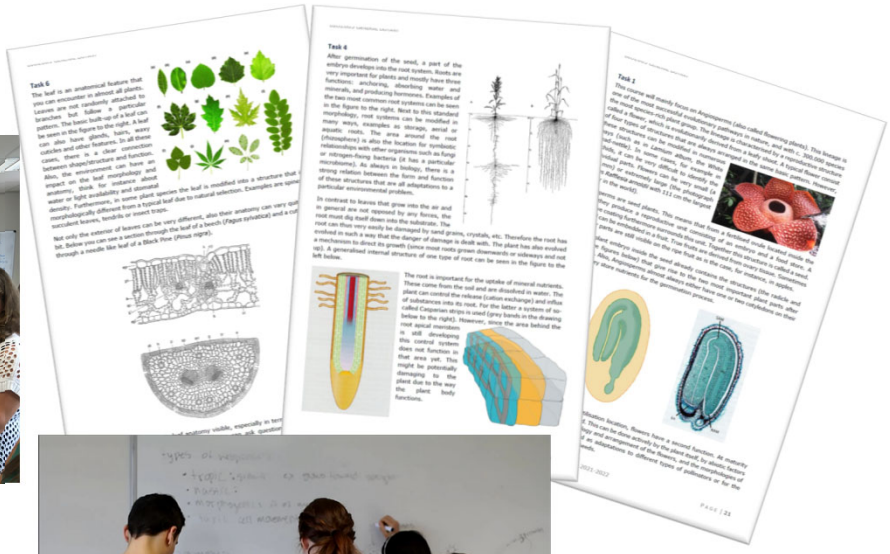
Dolmans et al. (2005). Problem-based learning: future challenges for educational practice and research. *Medical Education, 39(7), 732-741. https://doi.org/10.1111/j.1365-2929.2005.02205.x*

2

PBL sessions



Why keep mid-terms and exams traditional??

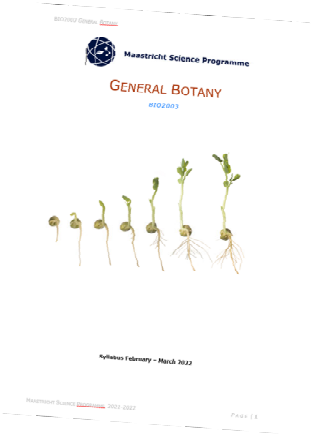
Sat exams are common

- Unwanted effects:
  - Cramming
  - Low retention
  - External driver
  - Not motivating
- Snap-shot test method

https://library.maastrichtuniversity.nl/study/digital-exams/

BIO2003 General botany

- Aims of redesign
  1) intrinsically motivate students to learn botany
  2) cover all topics of a traditional botany class
  3) reach high(er) level of understanding of these topics
- Design based on :
  - Adult Learning Theory (ALT; or “andragogy”)
  - Universal Design for Learning (UDL)
  - Contextual, Constructive, Collaborative, Self-directed (Uni Maas design principles)



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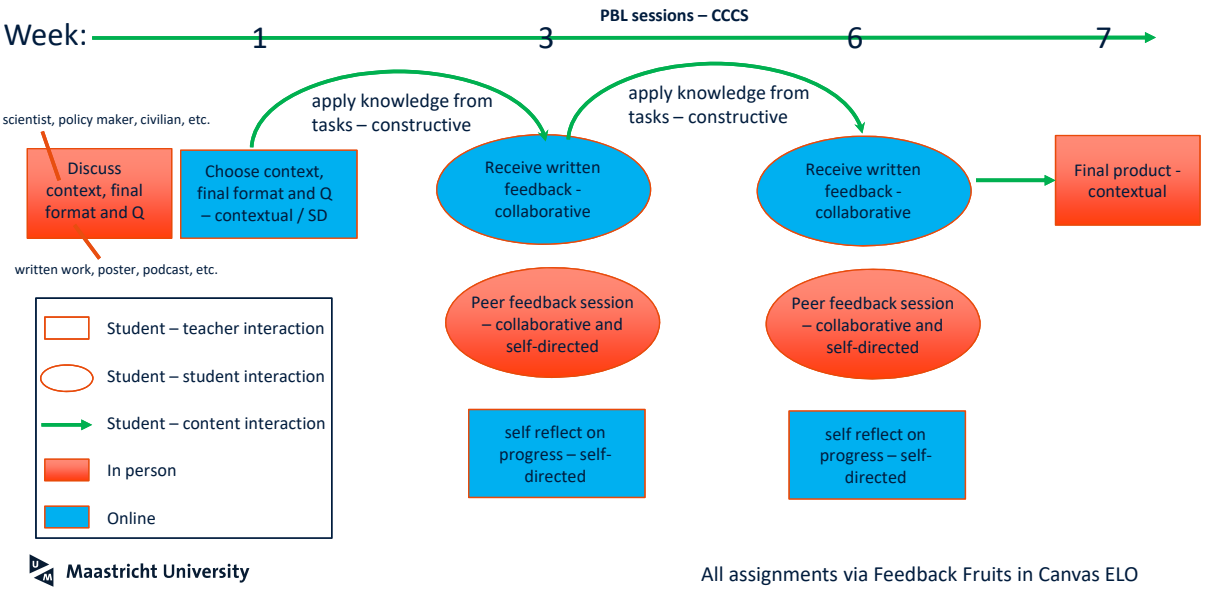
Kleinke, S., & Lin, Y. (2020). Application of Adult Learning Theory to STEM Education in Online Learning Environment. Paper presented at the 2020 IEEE Frontiers in Education Conference (FIE).

Burgstahler, S., & Cory, R. (2008). *Universal design in higher education: From principles to practice*. Cambridge, MA: Harvard Education Press.

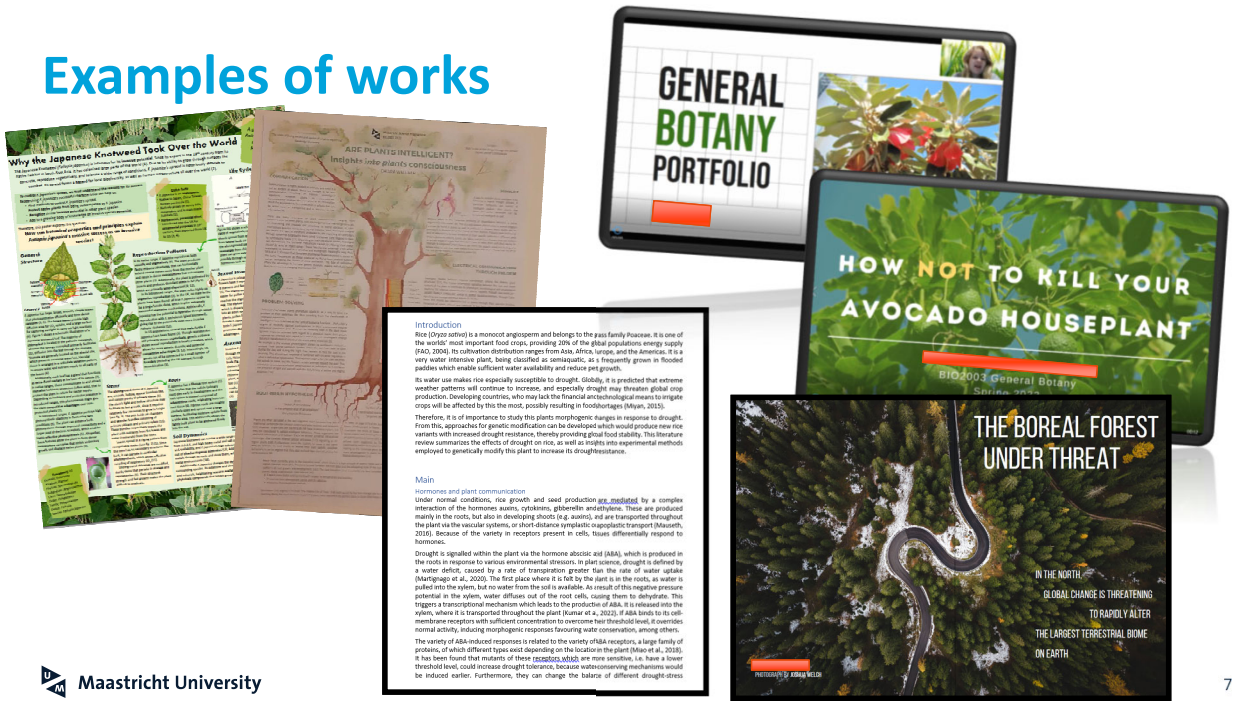
Rose, et al. (2006). Universal design for learning in postsecondary education: Reflections on principles and their applications. *Journal of Postsecondary Education and Disability, 19*(2), 135-151.

Assignment organization



All assignments via Feedback Fruits in Canvas ELO

Examples of works



Grade distribution

2013-2019: regular midterm and exam
2020: exam + review session (COVID)
2021-2022: free form assignment

	2013	2014	2015	2016-I	2016-II	2019	2020	2021	2022
Average*:	5.84	6.58	6.84	7.17	7.36	7.12	6.51	7.57	7.95
St. dev.:	1.80	1.28	0.86	0.62	1.28	0.83	0.75	1.11	0.89
Above 5.5:	12	8	17	14	13	12	28	39	51
Pass % :	60.00	72.73	100.00	100.00	92.86	100.00	93.33	97.50	100.00

*Grades are given between 1-10 in the Dutch system, 10 being excellent, < 5.5 is a failing grade

Student evaluation

N=29 out of 51

The assignments (self-assessments, peer review, final product) facilitated my learning	>70% agrees
The peer review sessions were valuable to me	>70% agrees
The free choice for the final assignment (context, case and format) was valuable to me	>80% agrees
In this course, I have been challenged to learn more than I expected	> 65% agrees
I was more prepared for tutorials than in other courses	> 70% agrees
I have put a great deal of effort into advancing my learning in this course	100% agrees
The course workload was higher than for a class with an exam at the end	True 45%, Neutral 38%, No 17%
I would like to have more classes with a free-form assignment	>65% agrees
This class has increased my interest in the field of botany	100% agrees
This course was challenging	59% yes
This course made me think	100% agrees
I believe that what I learned in this course is important and relevant for me	>95% agrees

How would you rate this class? 2021 (Response rate = 30%) 4.5/5.0 2022 (Response rate = 43%) 4.8/5.0

Pros and cons of free-form design

What parts of the course aided your learning the most?

What parts of the class were obstacles to your learning?

https://www.jasondavies.com/wordcloud/

Student self-evaluations

1. **Attitude towards studying**
   - "I should most definitely start on the self assessment quizzes to doublecheck that I actually understand the content of the course on my own and not just in a group" (week 3 SA)
   - "I also think I improved my way of working, I procrastinated less for the tasks work and instead worked more regularly" (week 6 SA)

2. **Performance in terms of content**
   - "After week 3 I feel I have learned more than ever, I can explain to my roommates about roots, life-cycles, secondary growth, etc.. Before I could not even understand the structure of a plant" (week 3 SA)
   - "I focused a lot in my tutorials and always made sure I responded to all the learning goals correctly and with enough depth" (week 6 SA)

3. **Overall progress**
   - "I would like to dedicate more time to this course because I'm really interested in the details of the subject, but I am enrolled in several extracurricular activities that take up a lot of time" (week 3 SA)
   - "I have noticed that when I am walking around outside I can relate a lot of the plants back to what we are learning in class which is really cool." (week 6 SA)

The self-assessments were valuable to me: True 38%, Neutral 35%, No 27%

Conclusions

- Were aims of redesign met?

  1) intrinsically motivate students to learn botany

     Hopefully yes, many positive responses in evaluation and SA

  2) cover all topics of a traditional botany class

     Definitely, no topics were take out of the class

  3) reach high(er) level of understanding of these topics

     Hopefully yes, good grades, students report outside of class application

Acknowledgements

Thanks to all students in my classes who work hard to get the most out of them and are happy to be my educational guinea pigs!

Answers to Q: "describe this 2022 botany class in one word"

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