Universität Zürich[UZH]

Weiterbildung

SoTL project: ‘Are students more motivated in a ‘flipped classroom’ setting in a biochemistry laboratory course?’

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1. Abstract

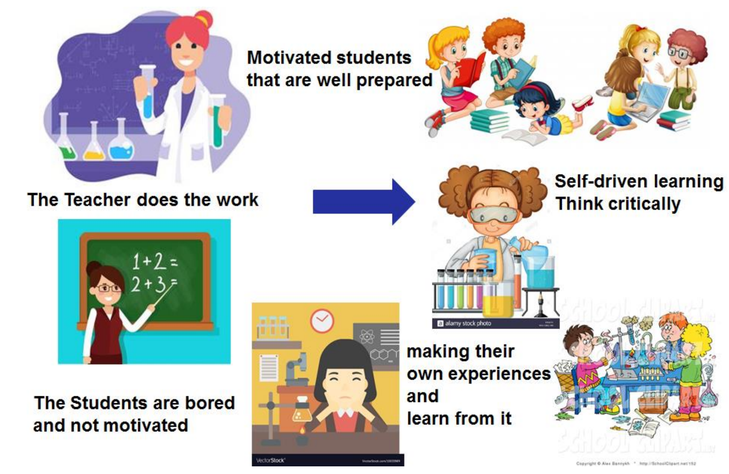
One of the major challenges in teaching is how to motivate students and ensure that they will have a positive learning outcome. How can this be achieved in a practical laboratory setting?

Students are in principle eager when it comes to ‘play time’ and not just sitting over books or listening to lectures. However, without the basic knowledge and skills they will have no chance on the job market.

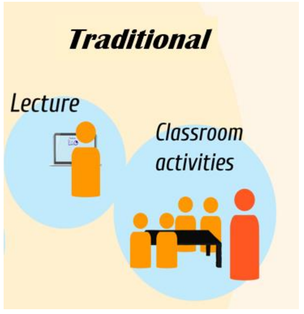
In the setting of my biochemistry laboratory class students failed to prepare themselves in previous years and they felt no motivation to do so, because there was no assessment or grading. Therefore, ‘play time’ was cut short, because basic knowledge had to be discussed in detail before the actual execution of the experimental parts. In order to stimulate their motivation the course format was changed to a ‘Flipped Classroom’ model (Ref. 1) with two days out-of class for preparations and assessment implemented by a quizz, short presentation and grading (Ref. 2). In order to evaluate the effectiveness regarding motivation and learning outcome, student’s expectations before class and experiences after class were assessed (Ref. 3, 4). In addition, student’s opinions from previous years and peer observations in class were collected.

2. What did I want to achieve?

Traditional ⟶ **Flipped**



3. The ‘traditional’ model and WHY I had to change it



2 days in-class

The ‘traditional’ BCH303 PCR format

Course information on OLAT (protocol)

Please look at the general concepts (PCR, RE etc.)

No assessment (e.g. quizz, presentation)

Not graded

⬇

Nobody did the preparations

⬇

Result: very packed, stressful ‘in-class’ days
Learning outcome: ?

4. New model: ‘flipped classroom’ (my vision)

2 days out-of class — 2 days in-class

Course information on OLAT (protocol, additional reading material to the topics, task sheet, instructions ‘how to’ for presentations)

Defined learning outcomes (Ref. 2, 5)

Assessment (Ref.2)
ALL: basic knowledge of general concepts (PCR, RE etc.) -> Quizz
Groups of 2: presentation (‘expert’ on one of the topics)

Grade
Quizz, presentation, in-class performance, Questionaire

⬇ Everybody does the preparations

⬇ Result: relaxed ‘in-class’ days with sufficient time to discuss and analyse experimental results

-> Improvement of student’s learning outcome

5. Student’s expectations

Pre-course evaluation

- **Personal opinion of a ‘Flipped classroom’**

interesting	not sure	Didactically not suited for topic	I do not understand the teaching principle
8	8		

- **What do you need to contribute?**

  Know and repeat basic principles (3)
  Prepare well in advance (11)

- **What competencies could be strengthend?**

  Self-motivation/initiative (5)
  Giving a presentation (4)
  Thinking independently (7)

- **Your current motivation level**

very high	high	moderate	low	very low
3	7	6		

- **Would you benefit more from a ‘traditional’ course concept?**

Yes	Not sure	No	both would encourage me to the same extend
1	7	7	1

6. Peer’s observations

In-class evaluation

- **Students were well prepared**
- **Students were motivated**

7. Student’s evaluation

- **How did you experience the ‘flipped classroom’?**

interesting	not sure	Didactically not suited for topic	I felt left alone
8	7		

- **Did you benefit from the ‘flipped classroom’ setting?**

competence	yes	Not sure	no
Time management	4	8	3
Self motivation/interest	9	6	
Presentation skills	11	2	2
Method knowledge	12	2	1
Work out an experimental set up	9	6	
Technical skills	6	4	4
Analysis of data	9	5	1
Team work	12	1	2
Discussion skills	11	3	1
Implementation of knowledge to a new setting (questionnaire)	3 (1)	8	

- **How do you rank your motivation in the course?**

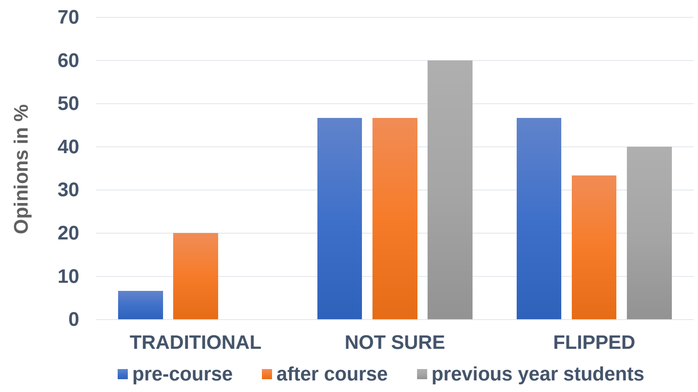
2 days ‘out-of class’

very high	high	moderate	low	very low
	5	9	1	

2 days ‘in-class’

very high	high	moderate	low	very low
3	10	2		

8. Comparison ‘traditional’ vs. ‘flipped’ course format



Evaluation of student’s opinions regarding the classroom setting: Students judged themselves from their expectations or experiencesopinions if they would have profited more from a traditional classroom setting. A difficult task since each student only experienced one teaching/learning setting. This explains the high of uncertainty of approximately 50%. Notably, students expectations towards a benefit of the flipped setting was more positive (>95%) than after the course (80%). (survey:15(1) students, 5 students of previous year)

9. The learning outcome within this project had two faces:

For the students:

- Good teaching/suitable classroom style
- Improve student’s learning outcome:
  - Knowlegde
  - Analysis
  - Implementation
- Better guidance for student’s personal career development

For the teacher:

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- Implement suitable new teaching methods
- Feedback from students
- Reflection of my teaching
- Improve my teaching
- Make teaching more interesting and valuable for students

Conclusion

The ‘flipped classroom’ seemed to be an interesting approach for students to explore a biochemistry practical course. I noted that students were very well prepared and were motivated to fullfill tasks pre-course. This included the preparation of a short presentation which they never did before, but all managed in an excellent way. My personal observation was unlined by the peer’s observations. Student’s agreed that they had gained experiences in method knowledge, presentation and discussion skills, as well as in team-oriented working. However, I was stunned that they had not reached their personal learning goals regarding experimental setup, improvement of technical and data analysis skills. Latter could be explained to the still limited time ‘in class’ and necessary improvements on the script for the practical work which currently might in part only be suited for higher level students.

Even though, success in student’s motivation and partly in improvement of learning outcomes could be observed, other aspects might need to be considered in the future (time, implement movies, script, curriculum, guidance).

References

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