A lesson planned for the Erasmus+

Exchange of good practices

-

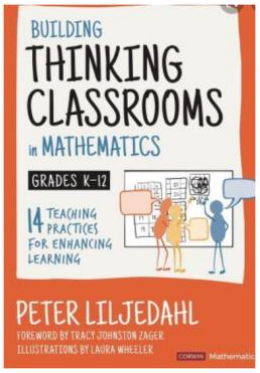
Travelling to New Teaching Adventures

Florø Ungdomsskule

Ørjan Andenæs May 5th 2022

Lesson based on ***Building thinking classrooms (BTC) in Mathematics***

By Peter Liljedahl



Why is BTC relevant for the exchange project?

- BTC consists of 14 teaching practices that enhance learning
- BTC helps developing communication skills, collaboration, problem solving and creativity
- BTC is an active, engaging, and different way of teaching mathematics.
- BTC prepares students to work and collaborate in the 21st century
- BTC enhances inclusion, participation and activity, and reduces the amount of students that are "passive passengers" in the classroom
- In BTC students do more other activities than they sit and listen
- Our school has explored BTC through MAMIS, a local project that lets teachers try out and reflect on innovative teaching practices

The 14 practices enhancing learning in mathematical classrooms

Need an explanation of each practice? Check out Peter Liljedahl and his website: https://buildingthinkingclassrooms.com/14-practices/

Toolkit #1

1. Give thinking tasks
2. Frequently form visibly random groups
3. Use vertical non-permanent surfaces

Toolkit #2

4. Defront the classroom
5. Answer only keep thinking questions
6. Give thinking tasks early, standing and verbally
7. Give check-your-understanding questions
8. Mobilize knowledge

Toolkit #3

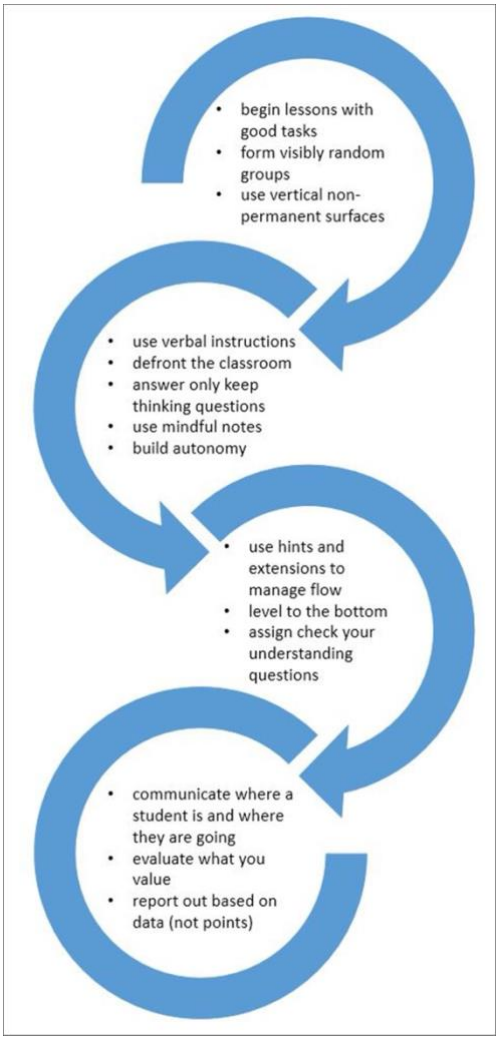
9. Asynchronously use hints and extensions to maintain flow
10. Consolidate from the bottom
11. Have students write meaningful notes

Toolkit #4

12. Evaluate what you value
13. Help students see where they are and where they are going
14. Grade based on data (not points)

How to implement the 14 teaching practices

Implementing the 14 teaching practices takes time. Both students and teachers need time to adapt to the changes. Introducing too much too soon might lead to participants giving up. On the other hand: not introducing enough changes from the established practice could cause the "system to defend itself", denying to accept the changes. The best times to introduce changes are at the beginning of a new school year and after holidays. Peter Liljedahl suggests implementing the 14 practices as four toolkits.



Toolkit #1

Practices 1-3 work best if they are all implemented at the same time.

Toolkit #2

Practices 4-8 can be implemented in any order, but must be introduced after toolkit #1 and before toolkit #3. Each new teaching practice in this toolkit should be well implemented before moving on to the next one.

Toolkit #3

The teaching practices 9-11 work best if they are implemented in the written order. It is also important that each practice is well implemented before moving on to the next one.

Toolkit #4

The practices 12-14 can be introduced in any order. This toolkit is all about assessment, and these lead to some of the biggest changes in student behaviour and performance. These practices focus on "transferring collective synergy into individual knowing and doing" (Liljedahl, 2020, p. 288).

Background – How the 14 teaching practices in BTC emerged

Peter Liljedahl was invited to Jane`s classroom to help her implementing problem solving in her teaching practice (since the new curriculum in 2003 emphasized it). Jane wanted help finding good math problems, but wanted no help whatsoever in changing her teaching practices.

Peter therefore observed Jane`s classroom, staying in a desk at the back of the classroom, not talking to her students (and certainly not talking to Jane!).

Peter observed Jane`s classroom, and a total of 40 classrooms, including every grade from kindergarten to Grade 12. He observed both low and high socioeconomic settings, public and private schools, both English-speaking and French-speaking. Peter observed a systematic problem: in all the 40 classrooms he observed, there are many students *not thinking*.

Only a small part of the activities students performed in the 40 classrooms (*studenting*), were also classified as *learning*. In too many situations, students did mimicking, faking, stalling and slacking, instead of actually trying to work mathematically the way the teachers want.

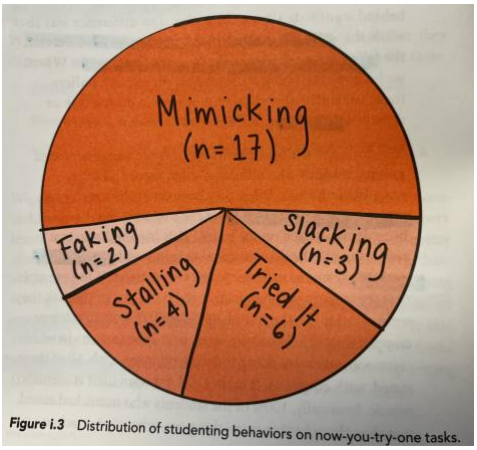
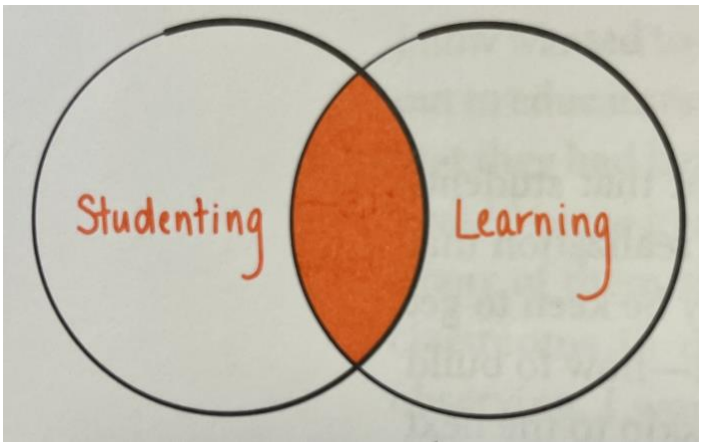


Figure i.3 Distribution of studenting behaviors on now-you-try-one tasks.



How have we explored BTC in our school?

During spring 2022 *Florø ungdomsskule* concluded a project called MAMIS (Master Ambitious Mathematics Teaching In School). The project lasted two years, and consisted of seven full days evenly spread thoughout the school year.

Each MAMIS gathering, the teachers explored new teaching practices. These included the practices in BTC, in addition to a few other. All of the seven days were organized as six *phases*, in what Lampert et al (2015) call a *Cycle of Enactment and Investigation* (p. 354).

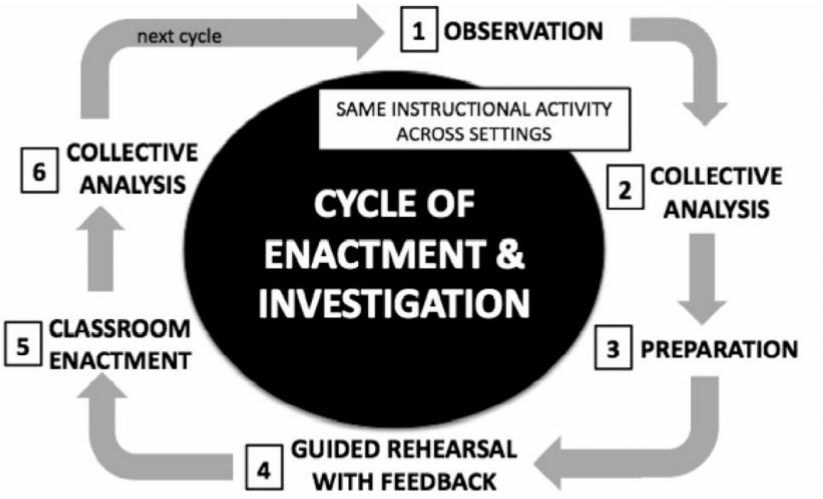


Figure 3. The Cycle of Enactment and Investigation.

In phase 1 the teachers were introduced to a small amount of theory, both written and practical. Three of the days started with observation of teaching. In phase 2 we discussed the theory, while phase 3 focused on lesson planning. Phase 4 gave the teachers an opportunity to test the lesson plan on other teachers, while phase 5 included trying out teaching in two different classes (the teachers were organized in different pairs each time). In phase 6 we met to share reflections on the days experiences.

The problem the lesson plan is based on

The lesson gets inspiration from the work of Alicia Burdess: http://aliciaburdess.weebly.com/uploads/2/4/7/6/24763920/3.0_teaching_through_problems_worth_solving_grade_8.pdf

The Painted Cube N1 PR2 SS3 SS4

**Credit to David Pimm*

Problem:

Picture a Rubik's Cube. Now drop it into paint so that it is completely covered. When the paint is dry, imagine smashing it on the floor and it breaking it apart into the smaller cubes.

How many of the cubes have one face covered in paint? How many cubes have two faces covered in paint? How many have three faces covered in paint? How many have zero faces covered in paint?

How could you predict the above for any size Rubik's cube?

What about a 4 x 4 x 4? 5 x 5 x 5? 6 x 6 x 6? N x N x N?

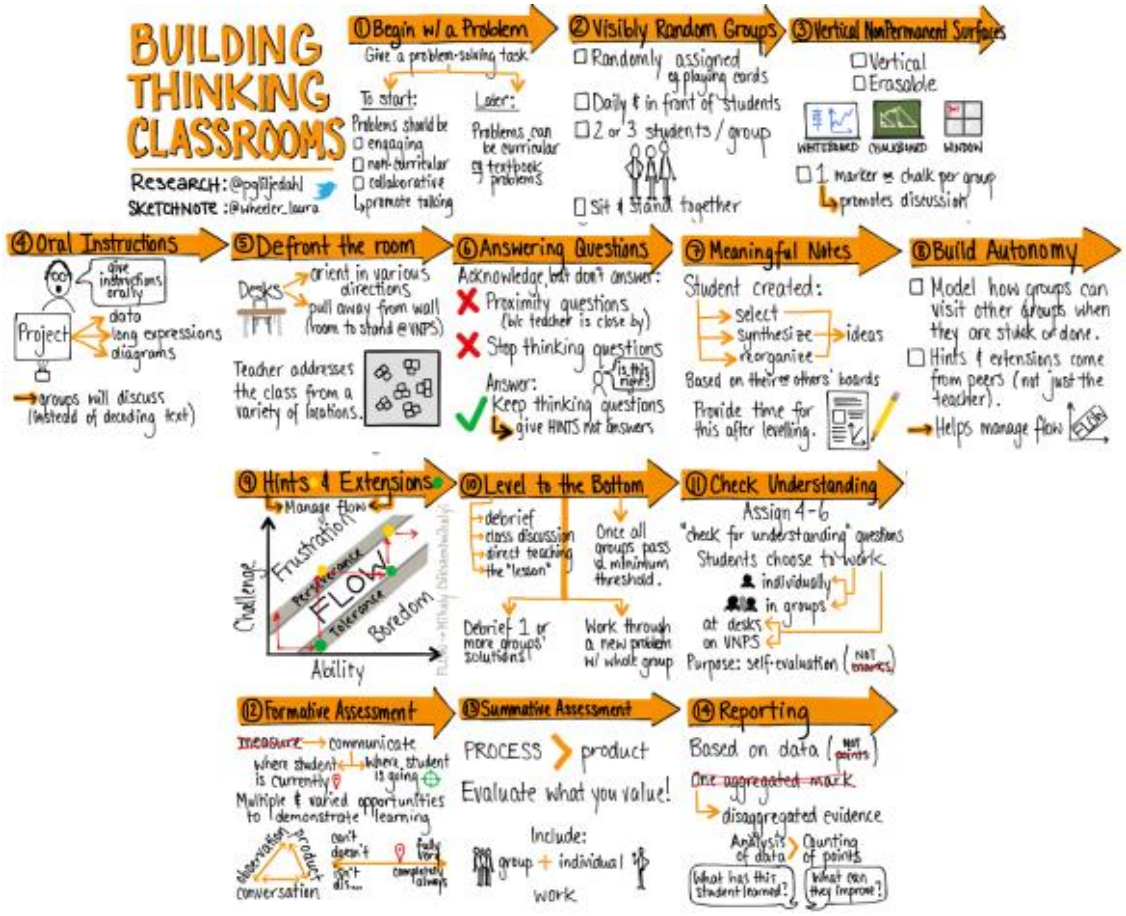
References

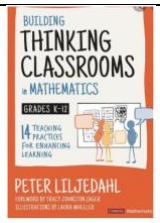
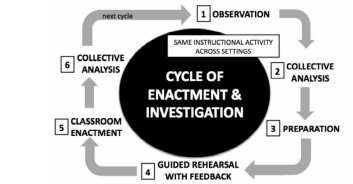
Fauskanger, J. (2020, 30. august). Analytisk observasjon av elevers matematiske tenkning. *Utdanningsnytt*. https://www.utdanningsnytt.no/didaktikk- etterutdanning-matematikk/analytisk-observasjon-av-elevers-matematiske- tenkning/251559

Lampert, M., Ghousseini, H., & Beasley, H. (2015). Positioning novice teachers as agents in learning teaching. I L. Resnick, C. Asterhan, & S. Clarke (Red.), *Socializing intelligence through academic talk and dialogue* (s. 363-374). Washington, DC: American Educational Research Association.

Liljedahl, P. (2020). *Building Thinking Classrooms in Mathematics, Grades K-12: 14 Teaching Practices for Enhancing Learning.* Corwin Press.

I also use **Laura Wheelers`sketchnotes** to remember and communicate the 14 practices: https://mslwheeler.wordpress.com/tag/thinking-classroom/



	**Erasmus+** **Observing BTC-teaching**	 Figure 3. The Cycle of Enactment and Investigation.

Which ones of the 14 teaching practices did you observe during the lesson?

#1: Give thinking tasks	
#2: Frequently form visibly random groups	
#3: Use vertical non-permanent surfaces	
#4: Defront the classroom	
#5: Answer only keep thinking questions	
#6: Give thinking tasks early, standing and verbally	
#7: Give check-your-understanding-questions	
#8: Mobilize knowledge	
#9: Asynchronously use hints and extensions to maintain flow	
#10: Consolidate from the bottom	
#11: Have students write meaningful notes	
#12: Evaluate what you value	
#13: Help students see where they are and where they are going	
#14: Grade based on data (not points)	