New Perspectives in Science Education

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Stiftung Innovation in der Hochschullehre

Lean Management in a Student Engineering Laboratory: First Results

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Student Engineering Laboratory

"*Schluckspecht*"

https://schluckspecht.hs-offenburg.de/schluckspecht

Schluckspecht

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Shell Eco-Marathon

2024	3rd place Urban Concept (Combustion Engine)
2023	1st place Regional Drivers' Championship 2nd place Urban Concept (Internal Combustion Engine)
2022	2nd place Urban Concept (Combustion Engine)
2019	2nd place Autonomous Driving
2018	3rd place Autonomous Driving
2016	1st place Urban Concept (Combustion Engine)
2014	1st Place Urban Concept (Combustion Engine) Winner Shell Helix Tribology Award
…	…

Schluckspecht Lab

Photos: Marc Hug

A student's question

Why is our lab—where we design and build efficient, resource-saving vehicles—not efficient and resource-saving itself?

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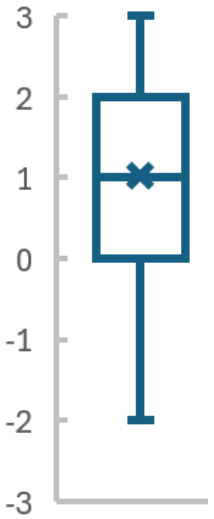
The problems:

Students evaluation of the order and cleanliness within the laboratory



Information from employees :

- **general disorder**
- **students to spend considerable time searching for items**
- **students distract employees with frequent questions**

The longer students had worked on the project, the lower they rated the lab's order and cleanliness.

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The goal:

to find a way to reorganize the laboratory, so that order and cleanliness remain at a sufficient, self-maintaining level, without burdening the employees and students with additional time-consuming tasks.

The idea of the solution:

Lean Management

Lean Management

a quality and process improvement method with emphasis on the customer's needs, employee involvement, and continuous improvement.

What does it mean in our case?

The changes should affect various areas:

the laboratory itself

student perceptions of working in the environment.

Key aspects of the implemented changes

physical

storage and accounting of materials and tools

affective

the emotional state of students, changes in their motivation and commitment

cognitive

students' knowledge about effective ways to organize their own work

Pull-System / Kanban-System

Consumable items:
- gloves,
- protective clothing,
- adhesive tapes,
- sprays,
- glues,
- oils,
- etc.

How an employee becomes information that it is time to order the next pack of gloves?

SCHLUCKSPECHT

Kanban-Karte

Bezeichnung	Schaumhandschuhe 7
Foto	
Menge	12 Paare
Lageort	Schrank 6
Preis	1,85 €/Paar

SCHLUCKSPECHT

Kanban-Karte

Bezeichnung	Schaumhandschuhe 7
Beschaffung	www.arbeitshandschuh24.de
Art. Nr.	L-1490-144-7
Lageort (intern)	Hochregal F___.___

First Results: Stability of the Pull-System

5S methodology
Kanban-System

First Results: Students' Engagement

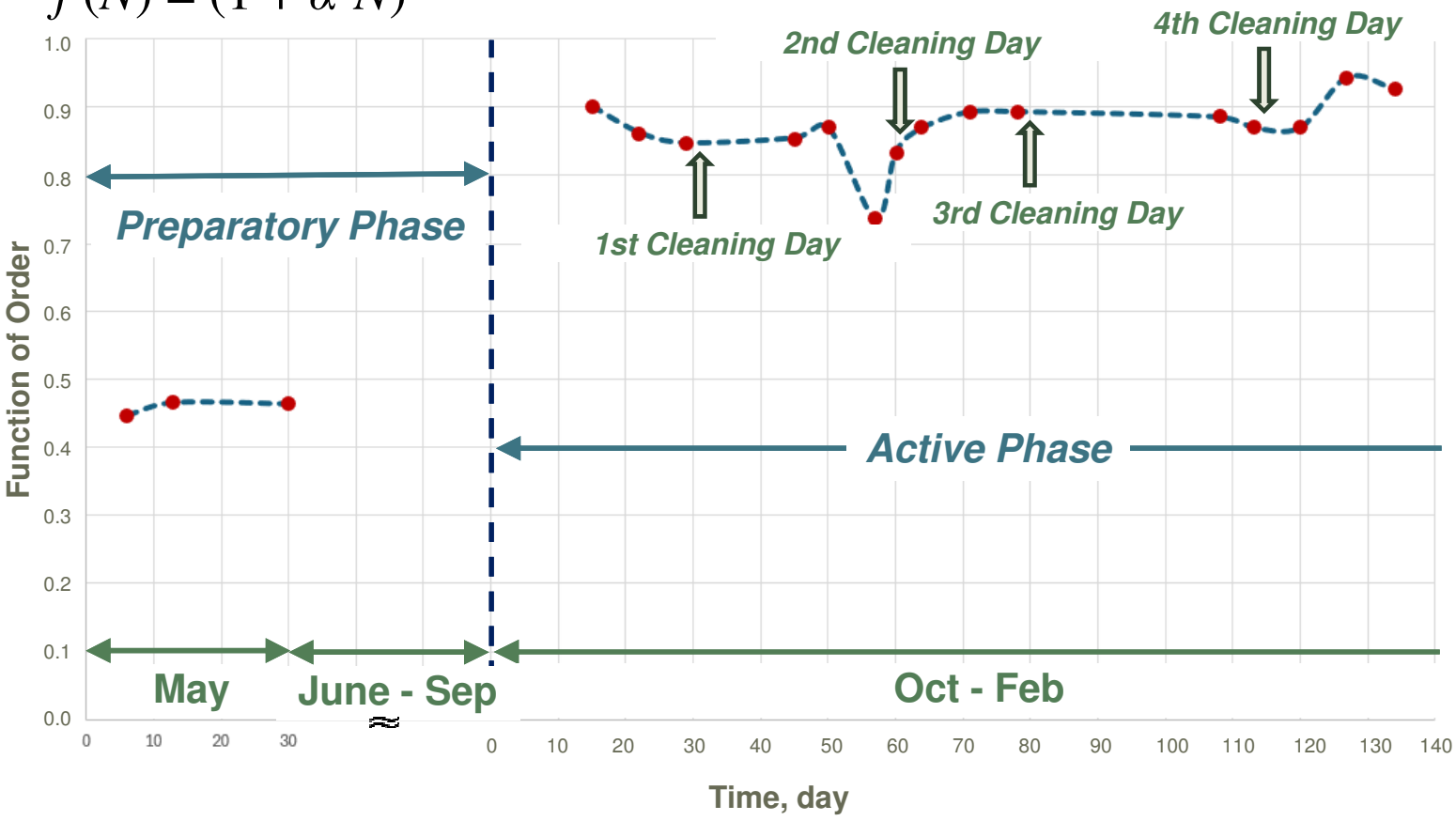
Appointment of the responsible student

SCHLUCKSPECHT

CUBICAL
In diesem Bereich ist für Ordnung und Sauberkeit
_____
verantwortlich

First results: Function of Order

$$f(N) = (1 + \alpha \cdot N)^{-1}$$



Participants

21 students from:

- **mechanical engineering (12)**
- **biomechanics (2)**
- **mechatronics (4)**
- **medical technology (2)**
- **energy systems (1)**

Conclusions

- The preliminary research revealed that both students and employees were dissatisfied with the state of the laboratory.
- By adopting Lean Management principles and involving students directly in the reorganization process, we achieved a noticeable improvement in the level of laboratory effectiveness.
- Measurements indicate that students were able to maintain the target laboratory state without significant additional efforts from either the staff or the students themselves.

Limitations

- it is unclear whether students will be able to maintain the sufficient level of order as work intensity increases,

- the students' subjective evaluation of the reorganized laboratory remains to be fully assessed.

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Thank you for attention!

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