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Innovative pedagogy

Implementation of the problem-based learning (PBL) approach

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Session overview

Topic	Speaker	Duration approx.
Introduction of innovative teaching methods and the problem-based learning approach	Yvonne Johannsen-LAK	10 min
Applying Problem-Based Learning in A&D training	Hannah Jones -MTC	20 min
Case examples from advanced manufacturing	Wim Verlinde-BIL	20 min
Interactive exercise	Hannah Jones -MTC Wim Verlinde-BIL Yvonne Johannsen-LAK	25 min

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History – 1821



1749 – 1831; Johann Wolfgang von Goethe;
German polymath and writer

Es ist nicht genug zu wissen – man muss auch anwenden. Es ist nicht genug zu wollen – man muss auch tun.

Johann Wolfgang von Goethe - Wilhelm Meisters Wanderjahre

Knowing is not enough; we must apply.
Willing is not enough; we must do.

Johann Wolfgang von Goethe - Wilhelm Meister's Journeyman Years

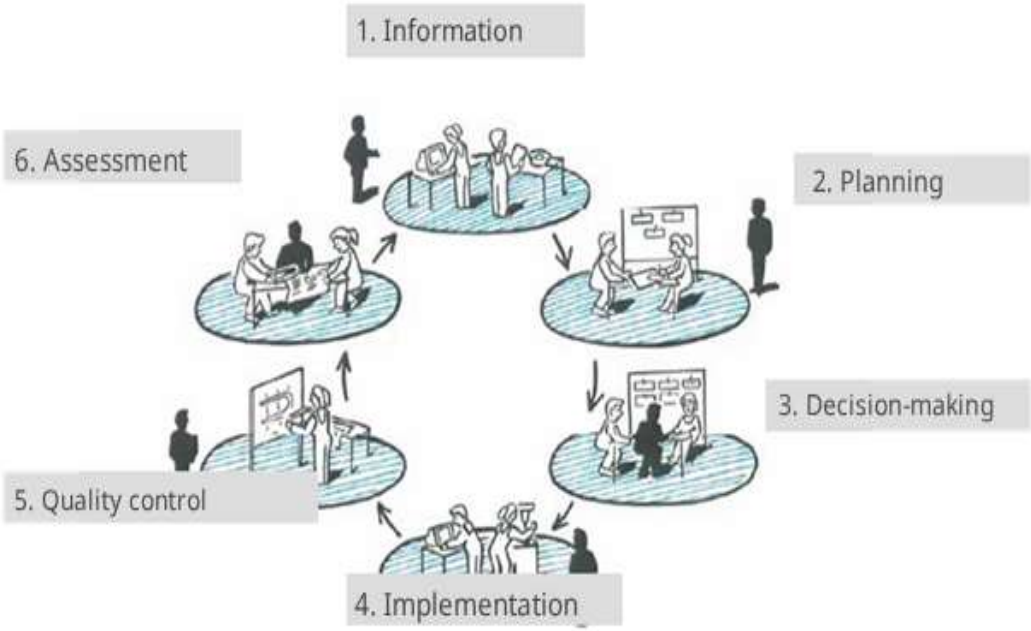
Goethe himself knew as far back as 1821:

People learn best when they apply and do as much as possible by themselves!

The complete action cycle

The model of the **complete action cycle** is used particularly in vocational training.

Advantages:
- a **holistic approach to learning**, achieved through the combination of theory and practice
- encourages **independent working** and **problem-solving skills** of the learners, through planning, implementation and evaluation

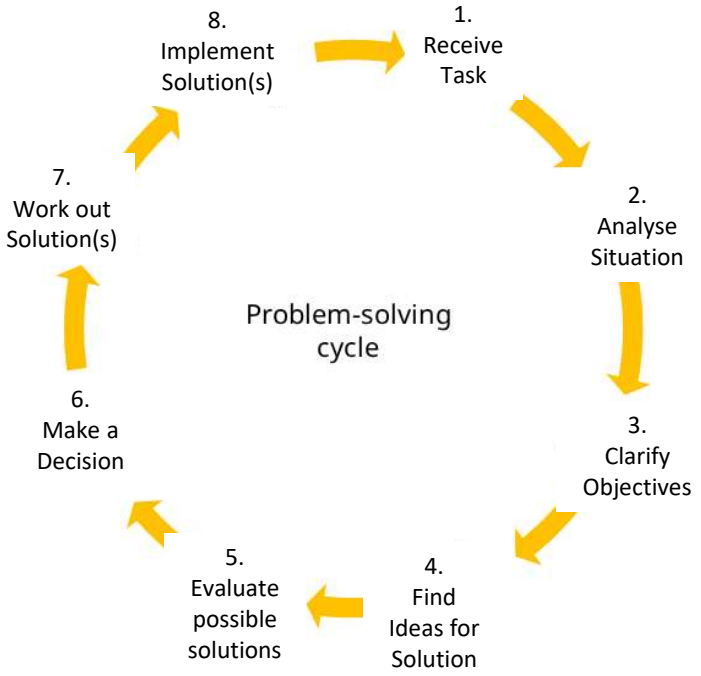


Problem-based learning

The problem-solving learning model emphasises working on a task (problem)

Advantages:

- prepares trainees for a real-life workplace situation
- encourages creativity and logical, independent thinking
- boosts motivation through practical tasks



What is a learning situation?

A learning situation corresponds to a practical task (problem) in which the learner acquires and applies new knowledge and skills.

The learning situation is based on a **real-life professional activity**. Learners tackle a specific task as independently as possible, applying theoretical knowledge to practical action in the process.



Learning situation with the aim
'The learner should be able to solder'

7 Steps of the PBL Process

1. **Clarification of terms and concepts**
   - Discuss the case and make sure everyone understands the problem, clarify unfamiliar terms
   - Is the task clear?

2. **Defining the problem statement**
   - Discuss the scenario and identify questions to be answered to outline the core problem that requires an explanation
   - What information is still required?

7 Steps of the PBL Process

3. Brainstorm using prior knowledge and common sense

- Brainstorm what the group already knows and identify potential solutions
- Use prior knowledge to pitch ideas, hypotheses, and initial explanations for the problem without filtering or debating prematurely
- What should the objective of the task?

7 Steps of the PBL Process

4. Structuring of the brainstorm through constructing a detailed and coherent „theory“

- analyse and structure the results of the brainstorming session
- What solution strategies are available?

5. Formulation of learning objectives for self-directed learning

- formulate learning objectives for the knowledge that is still lacking
- Agree on clear, focused learning goals
- What knowledge is still missing?

7 Steps of the PBL Process

6. Independent self-study to fill the gaps in knowledge

- do independent study, individually or in smaller groups: read articles or books, follow practicals or attend lectures to gain the required knowledge
- What information still needs to be gathered?

7 Steps of the PBL Process

7. Post-discussion to integrate acquired knowledge in a suitable explantation

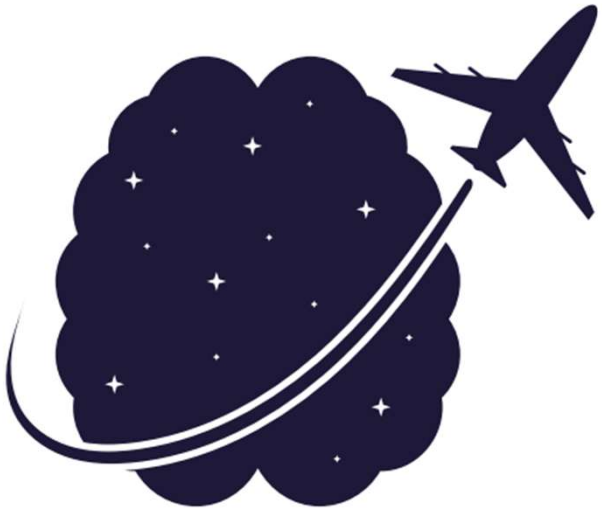
- Reconvene as a group to share findings, discuss what was learned, and synthesize a final, complete understanding of the original problem
- Exchange information and, if necessary, evaluate it
- Take quality assurance measures into account

Thank you for your attention

Hannah Jones

Wim Verlinde

Yvonne Johannsen



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