Unit 3_2


SOLUTION
PROBLEM

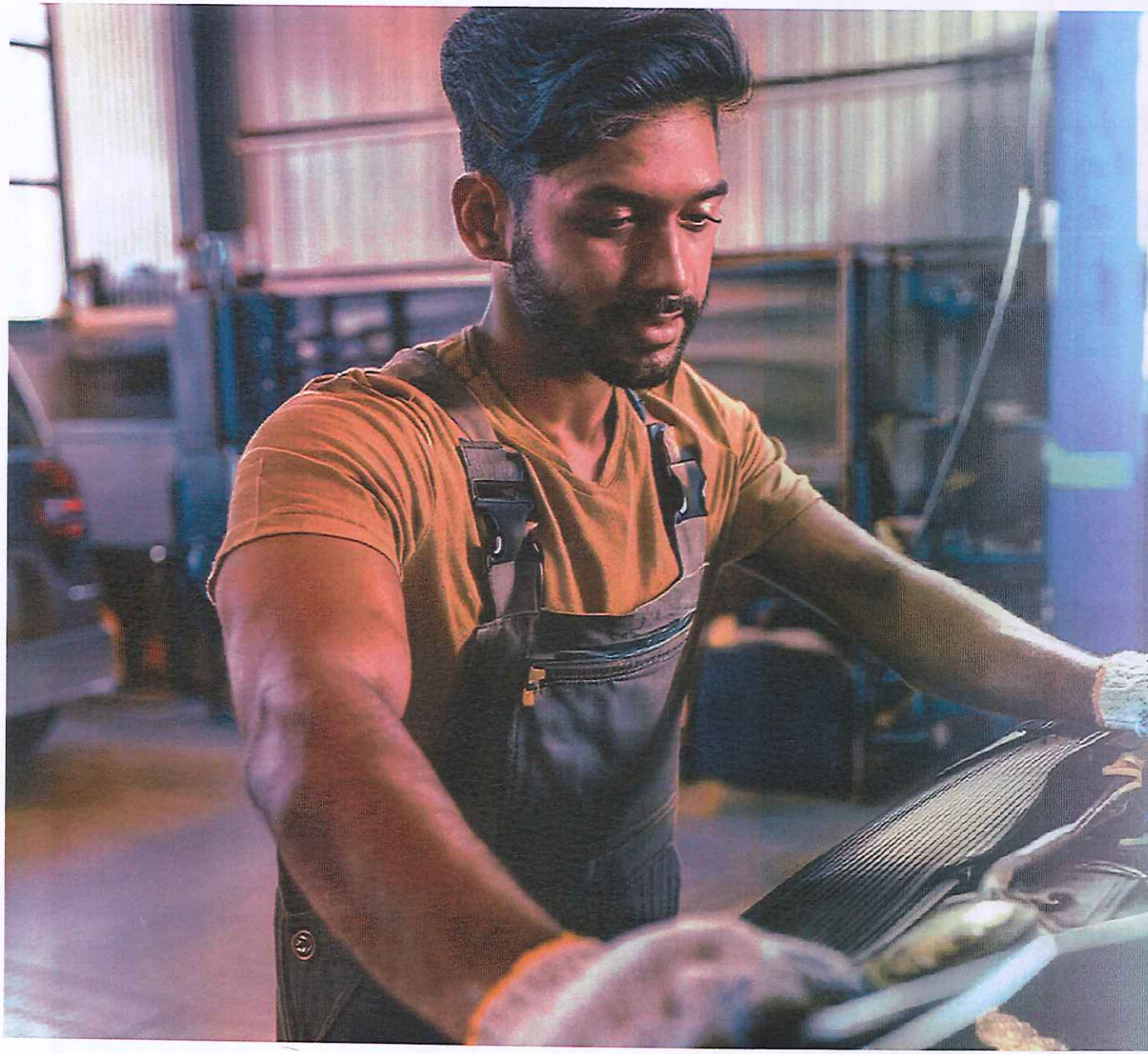
Today's goals

- **Name** situational pedagogy
- **Apply** 4Cs in problem-based learning
- **Analyse** Ishikawa diagram

Steps of today's lesson

- Situational pedagogy
- 4Cs
- Problem-based learning
- Ishikawa diagram
- Evaluation

Situational pedagogy



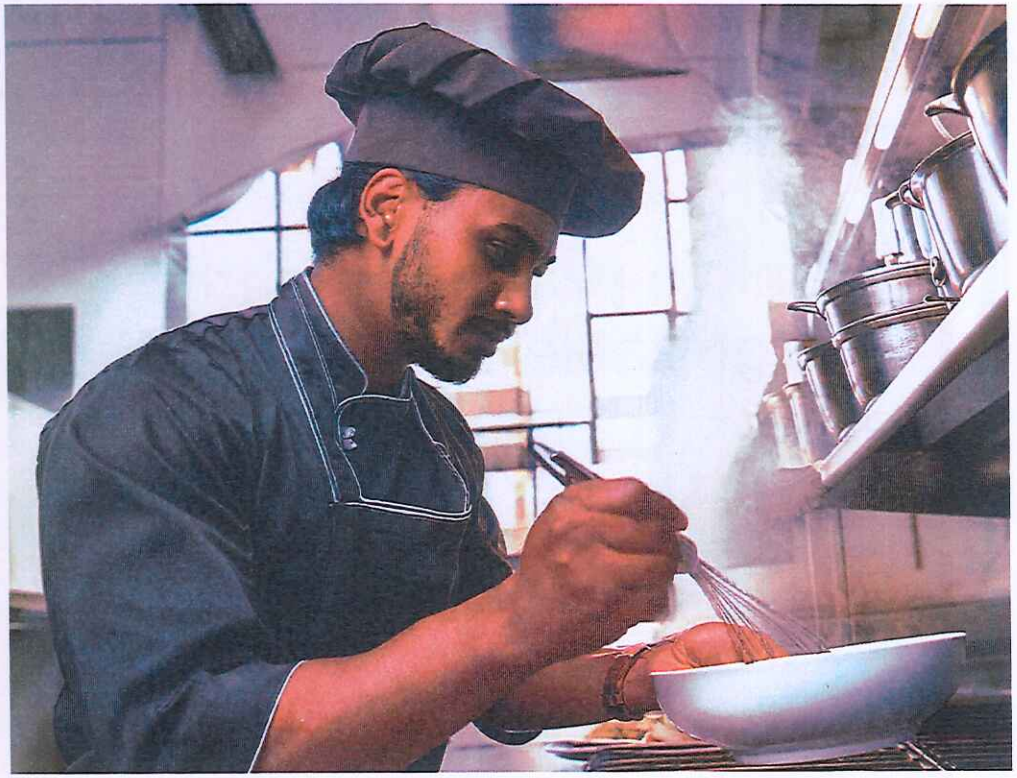
Situational pedagogy

- preparing learners for professional requirements through practical, **real-life** and **work-related situations**
- training learners to become **independent, competent** specialists who are able to adapt to the dynamics of the world of work

Situational pedagogy

Application in vocational training:

> Action-oriented learning:
learners work on real or
realistic professional tasks
(projects, case studies, simulations)

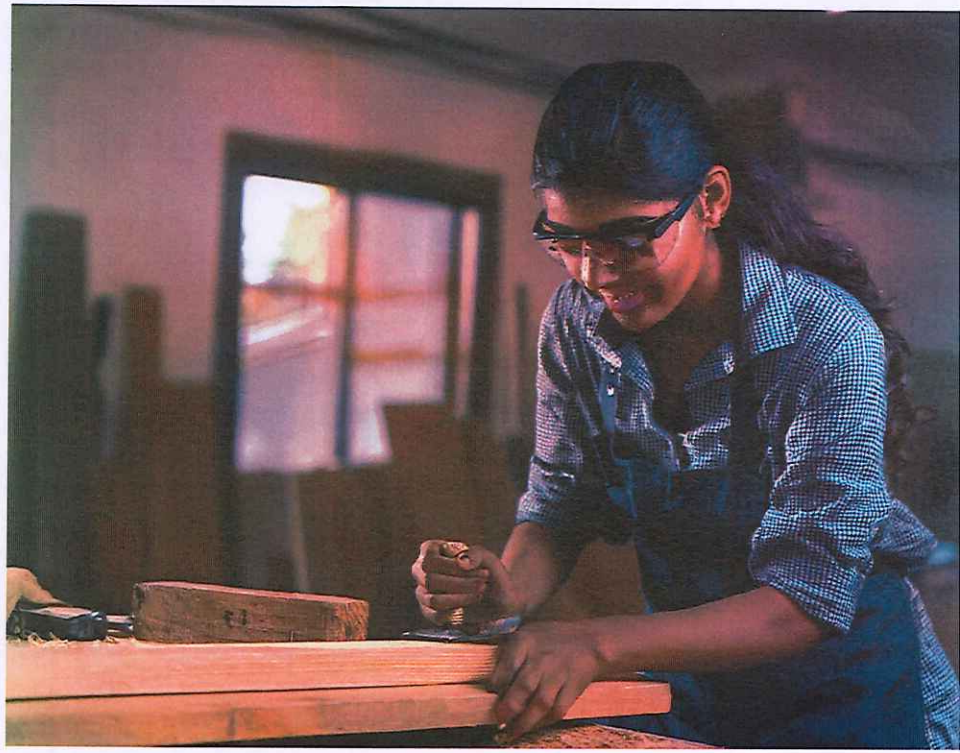


Situational pedagogy

Application in vocational training:

> **Work process orientation**:
Learning content from typical work situations

> Link to **practice** clearly recognizable



Situational pedagogy

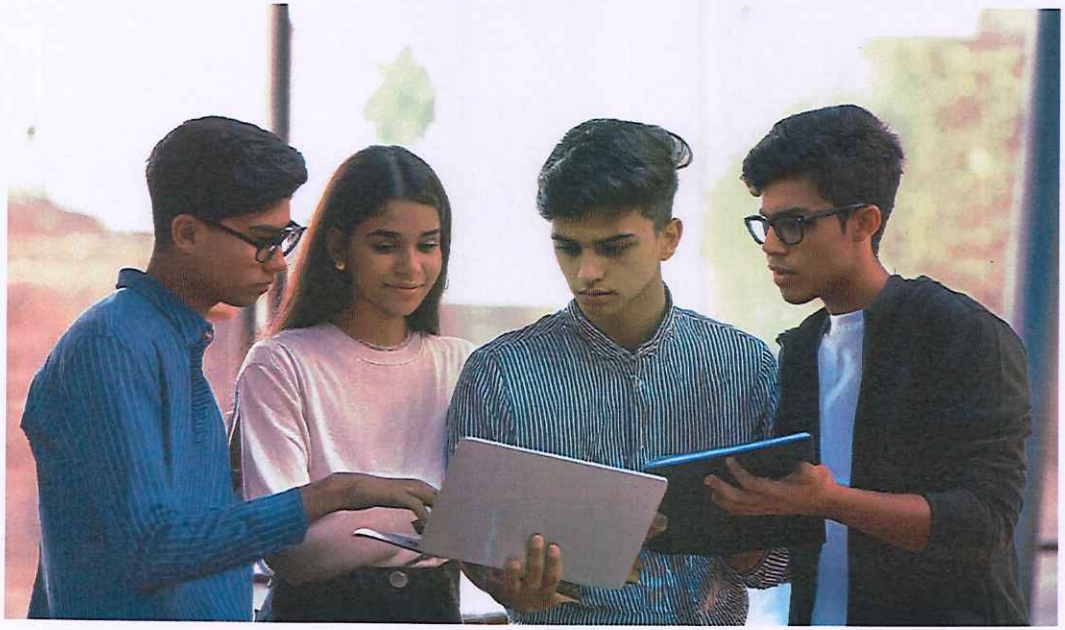
Application in vocational training:

> **Independence and responsibility**: Learners take responsibility for the learning process by being actively involved in the planning and execution of tasks.

Situational pedagogy

Application in vocational training:

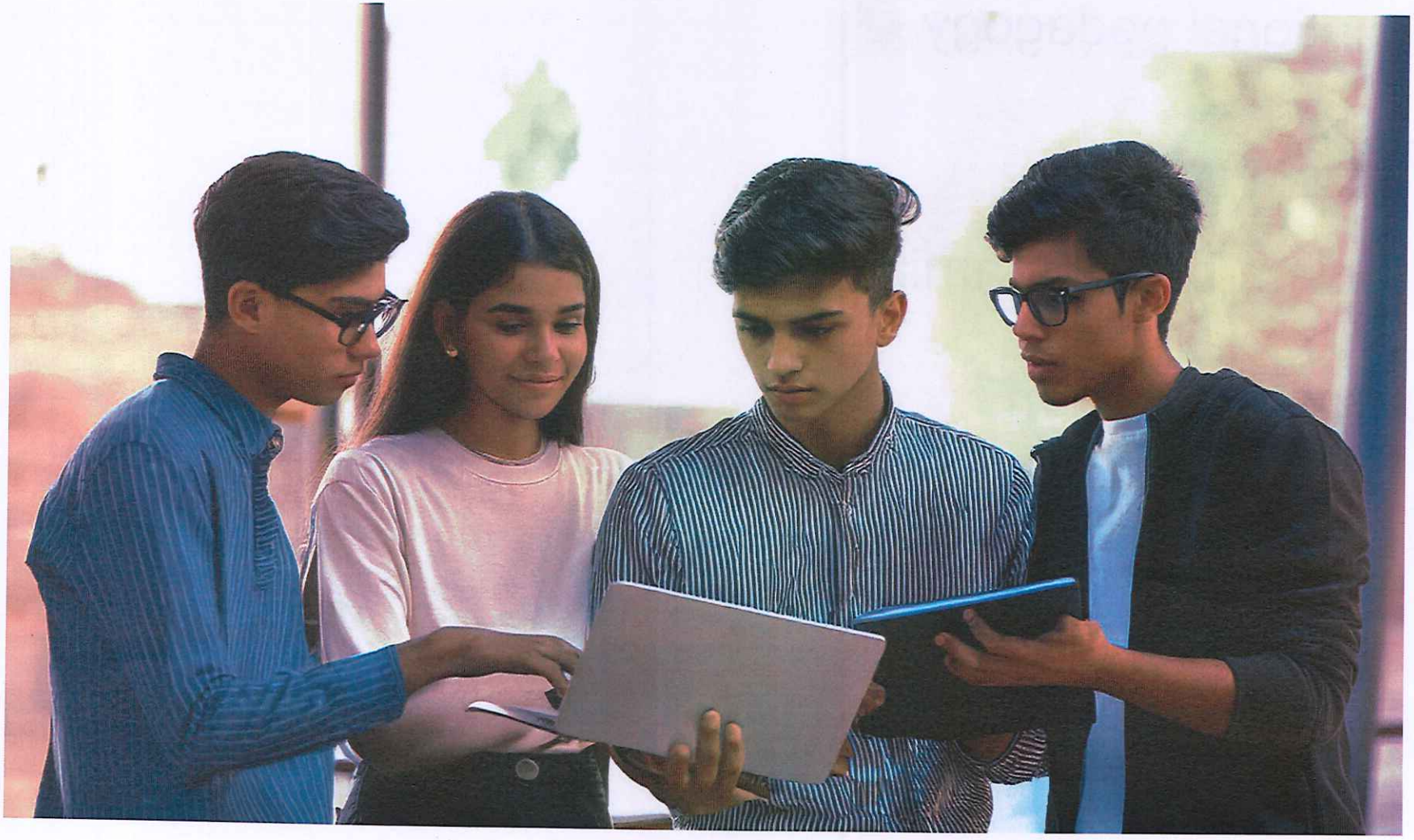
> **Promoting problem-solving skills:** Learners learn to analyze and deal with complex and unforeseen situations independently.



Steps of today's lesson

- Situational pedagogy ✓
- 4Cs
- Problem-based learning
- Ishikawa diagram
- Evaluation

Promoting problem-solving skills



4 Cs

4Cs

Meta Level

- highlighted by the **North Central Regional Educational Laboratory (NCREL), USA,** in the early 2000s
- for preparing for the modern challenges of work and life
- a concept that is widely used in the world of education and work, especially in relation to the development of skills

4Cs

- Critical Thinking
- Creativity
- Collaboration
- Communication

Meta Level

4Cs

Meta Level

- **Critical Thinking** - The ability to analyze and evaluate information and make informed decisions. Critical thinking requires an open, objective mindset and the ability to solve complex problems.

- **Creativity** - The ability to develop new ideas, find original solutions and challenge existing concepts in innovative ways. Creativity is important in the problem-solving process.

4Cs

Meta Level

- **Collaboration** - The ability to work effectively with others, especially in teams. Collaboration requires communication and empathy.

- **Communication** - The ability to convey thoughts, ideas and information clearly and concisely, both orally and in writing. Good communication skills are crucial.

Task 1

Task: Please find in the script U3_2 on page 3-6 your faculty. Read the example for a task, which focuses on the 4Cs. Try to formulate a task for a group work, which includes the 4Cs.

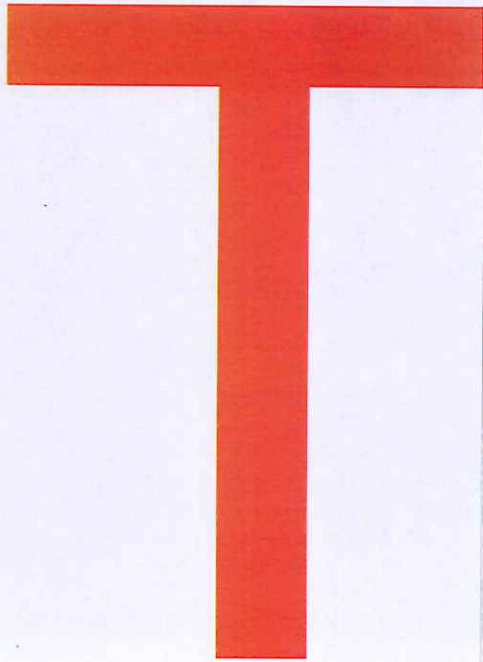
Interaction pattern: Individual/partner work

Location: Classroom

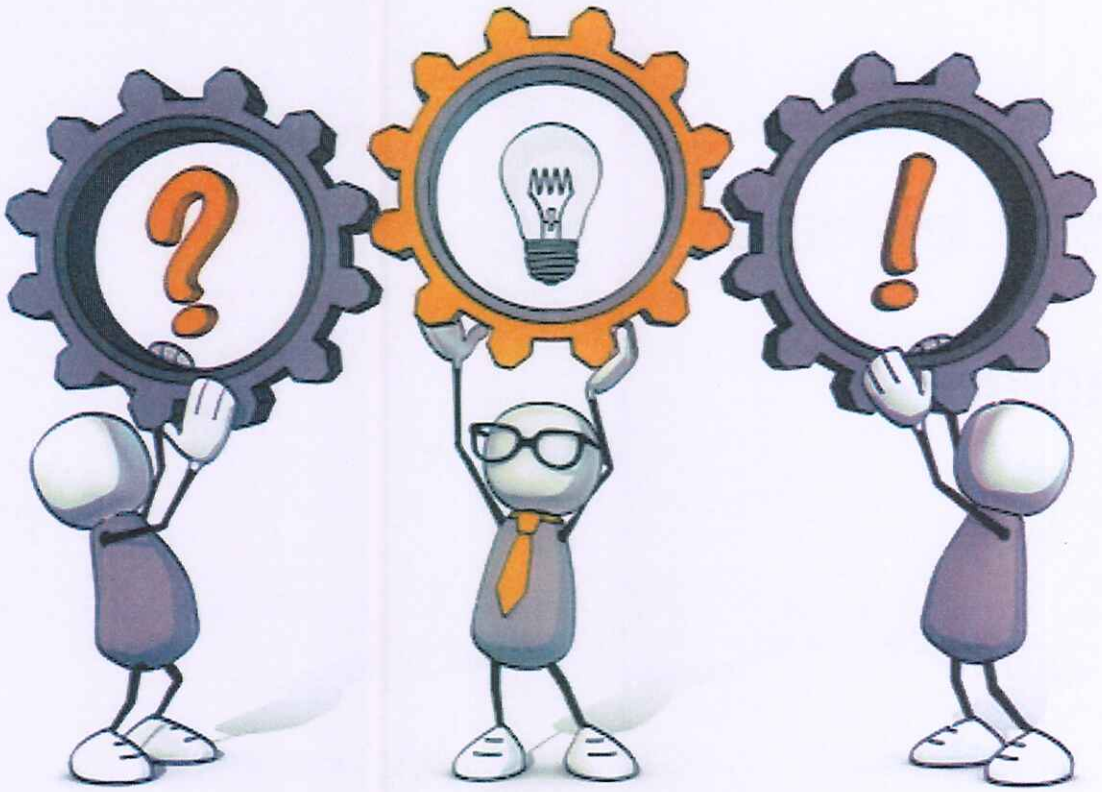
Resources: Script, laptop

Product: Short presentation

Time: 20 min.



Time for statements, reflections, questions



Steps of today's lesson

- Situational pedagogy ✓
- 4Cs ✓
- Problem-based learning
- Ishikawa diagram
- Evaluation

Problem-Based Learning - PBL

Problem-Based Learning

- higher level of Bloom's taxonomy
- focus is on analytical, creative, linking and evaluative thinking
- needs block sessions, longer sequences
- PBL promotes goal-oriented and evaluative thinking
- problems must be authentic and complex enough
- teacher acts only as a moderator
- learners remain active

4 Phases in PBL

Problem-Based Learning

1. **Problem definition phase (understanding the problem)**

   In the problem understanding phase, learners analyze the problem **independently**, develop a deep understanding and ask questions to identify knowledge gaps. *This is a **central** component of PBL as it allows learners to take active responsibility for their learning process*

Problem-Based Learning

2. Problem analysis (structuring the problem)

Problem analysis promotes structured and goal-oriented thinking as learners establish cause-and-effect relationships and prioritize information. Tools such as the **Ishikawa diagram** support the organization of thoughts and promote critical thinking - a key objective of problem-based teaching.

Problem-Based Learning

3. Production of ideas (hypothesis formulation)

The formulation of hypotheses stimulates divergent thinking by developing and evaluating different solutions.

Problem-Based Learning

4. Evaluation of results (assessment and reflection)

Evaluative thinking is a central component of PBL as it enables learners to assess the success of their solutions, critically question the process and gain insights for future situations.

Problem-Based Learning

1. Problem definition phase
   (understanding the problem)

2. Problem analysis
   (structuring the problem) > Ishikawa diagram

3. Production of ideas
   (hypothesis formulation)

4. Evaluation of results
   (assessment and reflection)

Task 3

Task: Please find in the script U3_2 on page 8 the 'Principles of problem-oriented learning. Read them. On the same page you find a problem-solving task for students at BSDU (using the example of the Computing Faculty). Formulate a task for your students according to the principles on page 7 and 8.

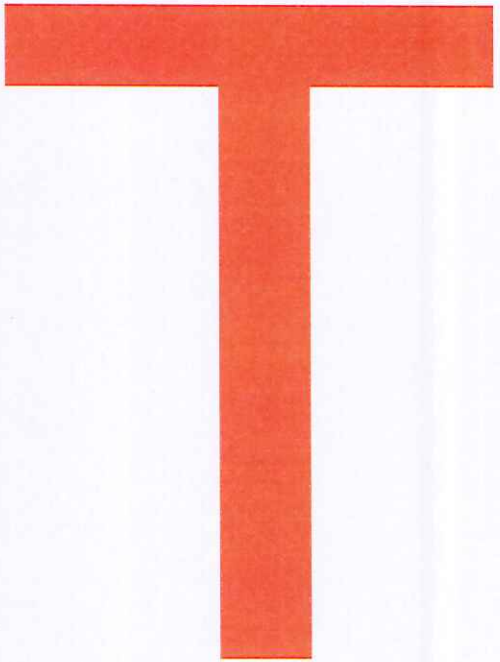
Interaction pattern: Partner or group work

Location: Classroom

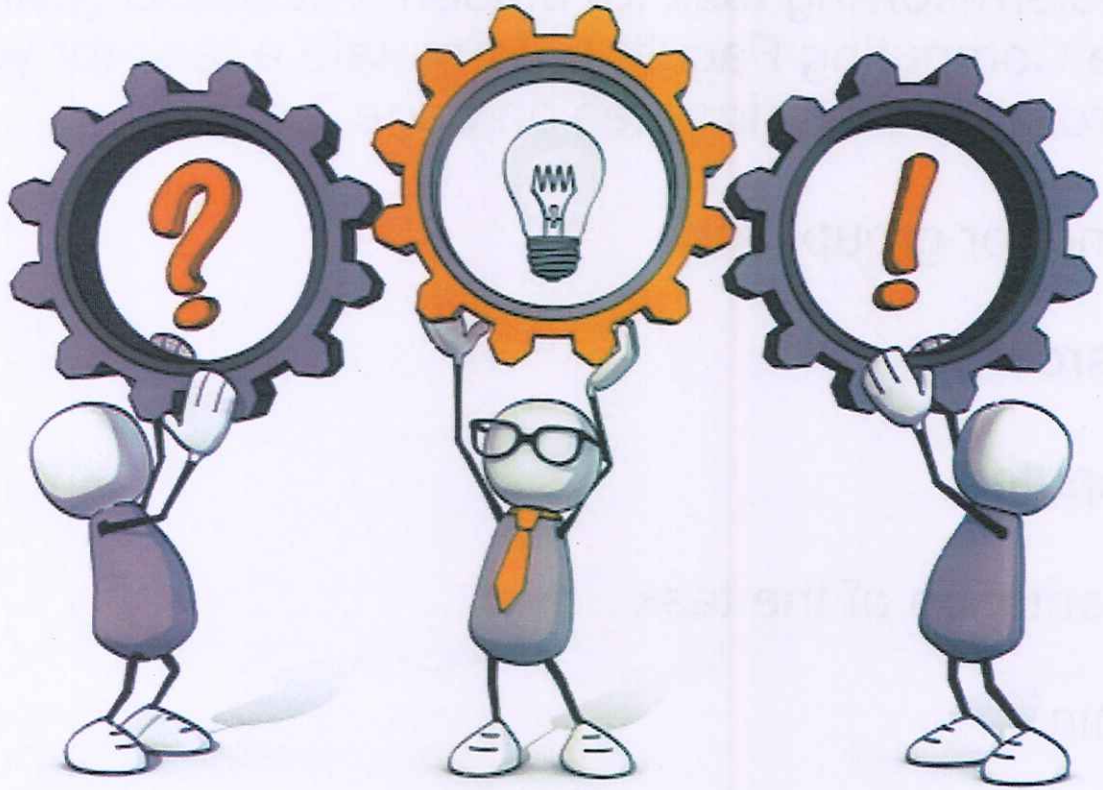
Resources: Computer

Product: Presentation of the task

Time: 30 min.



Time for statements, reflections, questions



Steps of today's lesson

- Situational pedagogy ✓
- 4Cs ✓
- Problem-based learning ✓
- Ishikawa diagram
- Evaluation

Ishikawa diagram

Problem-Based Learning

1. Problem definition phase
   (understanding the problem)

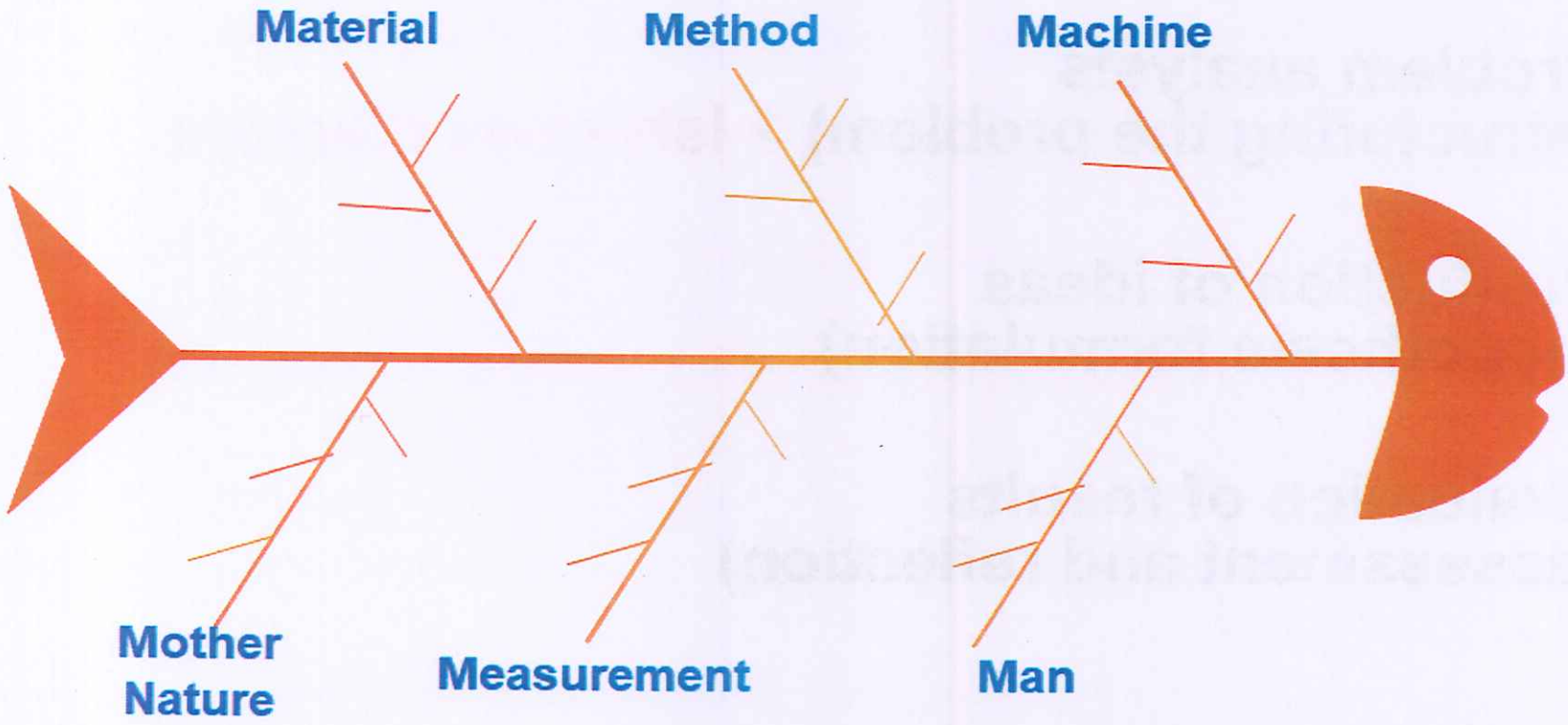
2. Problem analysis
   (structuring the problem) > Ishikawa diagram

3. Production of ideas
   (hypothesis formulation)

4. Evaluation of results
   (assessment and reflection)

Ishikawa diagram

> also known as **a fishbone diagram – 6M categories**



How is the diagram used in teaching?

- **Group work:**
  Each group is given the topic "Irregular braking effect" and collects possible causes in the six categories.

- **Categorization:**
  The groups create their own Ishikawa diagram by structuring their causes according to categories.

How is the diagram used in teaching?

- **Presentation:**
  Each group presents its analysis, including the main causes.
  - Example results: "The most common cause could be low-quality brake fluid that fails at high temperatures."

- **Discussion and evaluation:**
  - The groups compare their results.
  - The teacher presents other possible causes and gives feedback.

- **Solution approaches:**
  Each group develops practical proposals to eliminate the identified causes.

Task 4

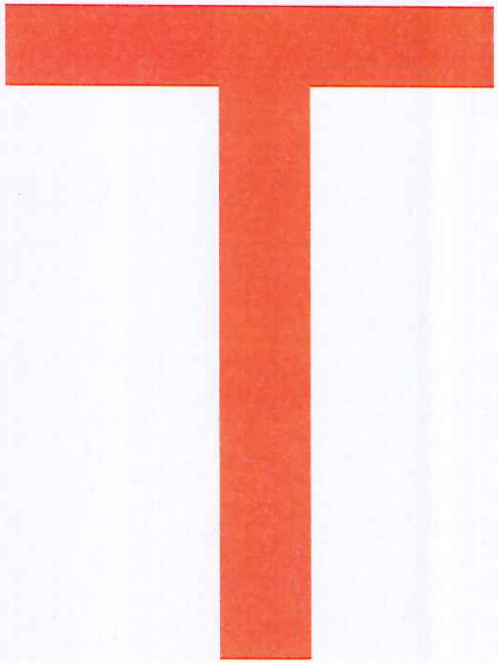
Task: Please find in the script U3_2 on page 11 the example. Than, on page 12-13 you will find an example for the Automotive faculty. Analyse it. Try to adapt it into a topic of your faculty. Formulate a central problem (fish head). Formulate the details for 6M.

Interaction pattern: Group or partner work

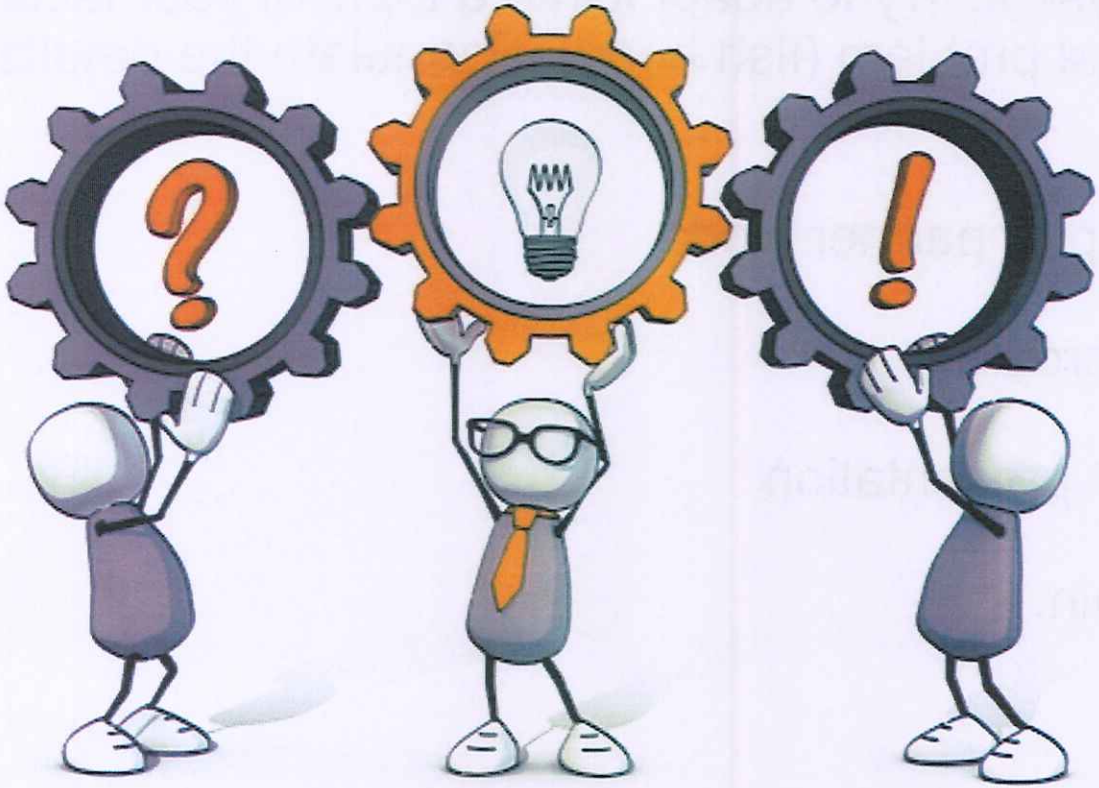
Location: Classroom

Product: Short presentation

Time: 40 min.



Time for statements, reflections, questions



Situational pedagogy

> **Action-oriented learning**

> **Work process orientation**

> Link to **practice**

> **Independence and responsibility (4 Cs)**

> **Promoting problem-solving skills (Ishikawa diagram)**

Steps of today's lesson

- Situational pedagogy ✓
- 4Cs ✓
- Problem-based learning ✓
- Ishikawa diagram ✓
- Evaluation

Reflection instead of Evaluation

Why it (situational pedagogy) can work very well at BSDU?

> Script U3_2, Page 14

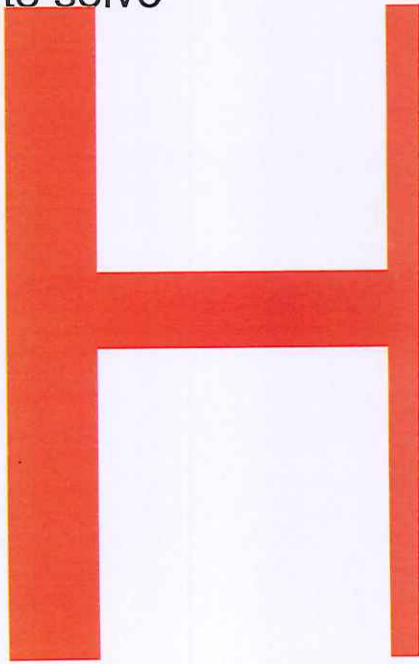
Homework

Develop a teaching concept for a 200-minute lesson based on the principles of **situational pedagogy**. The focus is on giving learners the opportunity to apply their knowledge directly and develop their skills through **authentic and practical tasks**. When developing the concept, make sure that all planned activities are clearly structured and offer sufficient space for individual initiative and reflection.

Integrate the following elements:
Action-oriented learning: plan practical tasks (e.g. projects, case studies, simulations).
Problem-solving skills: Incorporate unexpected challenges that learners have to solve actively and independently.
Work process orientation: Design the course in such a way that typical work processes are depicted and the practical relevance is clearly recognizable.
Promote independence and assumption of responsibility: Allow learners to plan, carry out and reflect on the tasks themselves.

Presentation of the concepts (5 minutes)

Reflection and conclusion (20 minutes)



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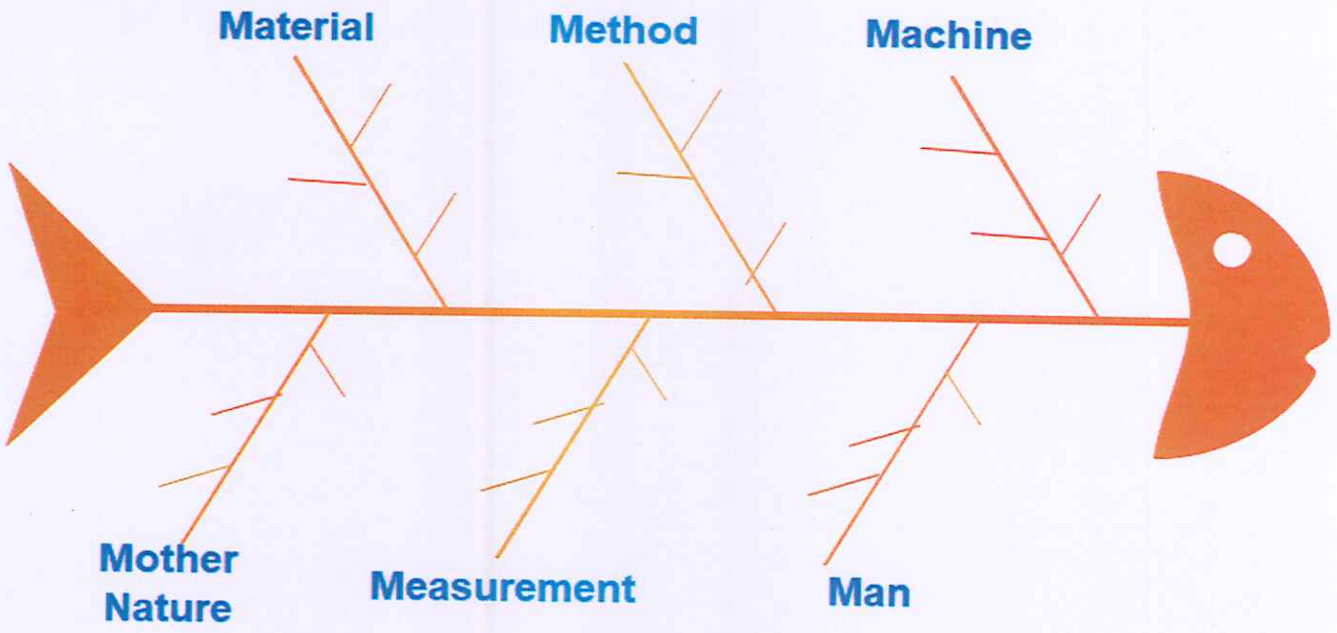
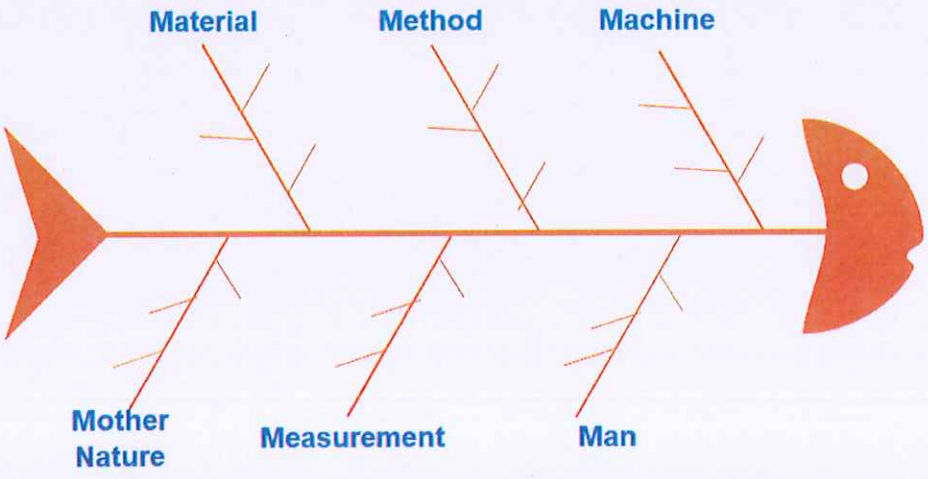


Didactics at the BSDU
Unit 3_2

A - Situational pedagogy
B - Critical thinking: 4Cs
C_a - Problem-Based Learning - PBL
C_b - Ishikawa Diagram



A - Situational pedagogy

In vocational education and training, **situational pedagogy** refers to preparing learners for professional requirements through practical, real-life and work-related situations. The approach makes it possible to develop technical, methodological and social skills directly in the context of their application. Situational pedagogy thus supports the aim of vocational education and training to train learners to become independent, competent specialists who are able to adapt to the dynamics of the world of work.

Objectives in vocational training:

- Development of **job-related skills**.
- Promotion of **transfer skills** in order to apply what has been learned flexibly in different professional contexts.
- Improve **teamwork and communication skills** through collaborative tasks.
- Strengthening **personal development**, such as initiative and the ability to reflect.

Application in vocational training:

1. **Action-oriented learning**: learners work on real or realistic professional tasks (e.g. projects, case studies, simulations).
2. **Promoting problem-solving skills**: Learners learn to analyze and deal with complex and unforeseen situations independently.
3. **Work process orientation**: Learning content is derived from typical work situations so that the link to practice is clearly recognizable.
4. **Independence and responsibility**: Learners take responsibility for the learning process by being actively involved in the planning and execution of tasks.

B - Critical thinking: 4Cs

The 4Cs stand for **C**ritical Thinking, **C**reativity, **C**ollaboration and **C**ommunication. These fou petencies are often emphasized in educational and professional settings to promote key skil the 21st century. The 4Cs are particularly relevant for **problem-based learning** as they help ers to solve problems independently, think creatively, collaborate effectively in groups and p results clearly.

The 4Cs:

1. **Critical Thinking:**
   - The ability to analyze information, question problems and make well-founded sions.
2. **Creativity:**
   - The ability to develop innovative ideas and solutions and to find creative approaches to problems.
3. **Collaboration:**
   - The ability to work effectively in teams, pursue common goals and utilize syne
4. **Communication:**
   - The ability to convey thoughts and information clearly, precisely and convincir both orally and in writing.

Examples or activities to promote the 4Cs

Here are some **problem-solving tasks** for the faculties of **Manufacturing, Computing, Healthcare, Automotive, Food production, Woodworking, RAC** at BSDU that are tailore **situational pedagogical method**. Each task promotes the **4Cs** (Critical Thinking, Creativity laboration, Communication). These assignments are **practical, interdisciplinary, commerc relevant and** focused **on real-world challenges**, forcing students to actively apply the 4Cs.

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1. Manufacturing - Solve production downtime

Situation:
A mechanical engineering company has an unexpected loss of production because a key m is not working. The students receive machine and maintenance data and have to work out a **mediate solution** in teams.

Goals & 4Cs:
Critical Thinking: Root cause analysis, troubleshooting
Creativity: Developing unconventional solutions
Collaboration: Teamwork for decision-making
Communication: Presenting the solution to management

Outcome/Product: An action plan to minimize production downtime

2. Computing - AI-supported patient management

Situation:
A hospital wants to improve patient management with an **AI-supported solution** to reduce \
times. The students have to work in teams to design a digital solution (mockup or prototype)

Goals & 4Cs:
- **Critical Thinking:** Identification of bottlenecks in existing processes
- **Creativity:** Development of innovative IT-supported solutions
- **Collaboration**: Interdisciplinary work with healthcare and IT teams
- **Communication:** Pitching the solution to a panel of experts

Outcome/Product: Mockup or prototype of a digital patient administration system

3. Automotive - Sustainable mobility solution for Jaipur

Situation:
The city of Jaipur wants more environmentally friendly transportation solutions for city traffic. students have to develop a **practicable mobility concept** for Jaipur (e.g. electric vehicles, (sharing, alternative fuels).

Goals & 4Cs:
- **Critical Thinking:** Analysis of the current traffic and environmental problem
- **Creativity:** Development of sustainable vehicle solutions
- **Collaboration:** Teamwork with experts from urban planning & technology
- **Communication:** Convincing presentation to city representatives

Outcome/Product: Concept for sustainable mobility in Jaipur

4. Food production - Emergency management in the restaurant

Situation:
A fire breaks out in the kitchen of a 5-star hotel. The students have to draw up a **detailed gency strategy** and implement it in a simulated exercise.

Goals & 4Cs:
- **Critical Thinking:** Development of an emergency plan
- **Creativity:** Developing innovative solutions for safety measures
- **Collaboration:** Working together with the fire department, management and staff
- **Communication:** Clear communication under stressful conditions

Outcome/Product: A complete emergency protocol for hotel kitchens

5. Woodworking - Smart multifunctional furniture for small spaces

Situation:
In modern cities like Jaipur, there is a growing need for **space-saving furniture** for small ap ments. The students should develop a **multifunctional piece of furniture (e.g. fold-out de bed with storage space)** and create a **functional prototype**.

Goals & 4Cs:
Critical Thinking: Identification of space problems in small apartments
Creativity: Development of an innovative, foldable or modular design
Collaboration: Collaboration with interior designers & end customers
Communication: Pitch and market launch concept

Outcome/Product: Technical drawing + functional mini-prototype

6. Refrigeration & Air Conditioning - Emergency repair of a cold chain

Situation:
A **cold room in a hospital** suddenly breaks down, threatening to spoil medicines. The stud have to find the cause in **a simulated emergency setting** and implement a **quick but effec solution**.

Goals & 4Cs:
Critical Thinking: Error analysis and determination of causes
Creativity: Developing immediate measures for cooling
Collaboration: Working under time pressure in a team
Communication: Clear and fast reporting to management

Outcome/Product: An emergency repair protocol + alternative solutions for future cases

7. Healthcare - Dealing with anxious patients

Situation:
An elderly patient is very anxious before a blood sample is taken. The students need to **dev calm, trusting, empathic communication in** order to reassure the patient.

Goals & 4Cs:
Critical Thinking: What fears does the patient have? How can they be reduced?
Creativity: Development of a **friendly, empathic conversation guide**
Collaboration: Role play in groups of two as patient & nurse
Communication: Application of communication techniques in role play

Outcome/Product: A mock conversation and feedback on communication

8. General Education – Cultural understanding

Situation:
In Indian companies, people from different cultures and religions work together. The student to design **a training course for respectful intercultural cooperation**.

Goals & 4Cs:
Critical Thinking: What cultural misunderstandings exist?
Creativity: Develop an interactive training (e.g. role plays, case studies)
Collaboration: Work in groups to collect examples
Communication: Conduct a short intercultural training

Outcome/Product: A concept for intercultural training in the workplace

9. Facility Management - Water damage in a hotel

Situation:
There is water **damage in a luxury hotel in Jaipur due to a burst pipe**. The students have quickly to **minimize consequential damage and costs**.

Goals & 4Cs:
Critical Thinking: What damage has occurred? What is the best immediate solution?
Creativity: Develop a **fast & cost-effective solution**
Collaboration: Teamwork to coordinate the repair
Communication: Clear reporting to the hotel manager

Outcome/Product: An emergency plan for water damage + a practical simulation

10. Electrical - Detecting faults in a domestic electrical installation

Situation:
A resident reports that his **sockets sometimes do not work** and **fuses often blow**. The stu have to find the source **of the problem and propose a safe solution**.

Goals & 4Cs:
Critical Thinking: Root cause analysis – Is it an overload, a loose contact or a wiring err
Creativity: Develop a plan for **professional repair**
Collaboration: Teamwork for inspection and discussion of the best solution
Communication: Explain the problem and possible solutions to a "customer"

Outcome/Product: An inspection protocol + troubleshooting suggestions

C_a - Problem-Based Learning - PBL

Problem-based learning place at higher levels of Bloom's taxonomy. The focus is on **analytical, creative, linking and evaluative thinking**. You need block lessons, longer sequences. Once or twice a week would be ideal. It can be difficult with low-achieving students. PBL promotes divergent, goal-oriented and evaluative thinking.

It is important that the learners remain active, that the teacher **only** acts as a moderator, and that the problems are authentic **and** complex enough to challenge the learners' skills.

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1. Problem definition phase (understanding the problem)

In the problem understanding phase, learners analyze the problem **independently**, develop a deep understanding and ask questions to identify knowledge gaps. *This is a central component of PBL as it allows learners to take active responsibility for their learning process.*

---

2. Problem analysis (structuring the problem)

Problem analysis promotes structured and goal-oriented thinking as learners establish cause-and-effect relationships and prioritize information. Tools such as the **Ishikawa diagram** **support the organization** of thoughts and promote critical thinking - a key objective of problem-based teaching.

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3. Production of ideas (hypothesis formation)

The formulation of hypotheses stimulates divergent thinking by developing and evaluating different solutions. At the same time, the process remains goal-oriented, as the hypotheses are focused on the problem to be solved. This corresponds to the idea of PBL to combine creative approaches with practical application.

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4. Evaluation of results (assessment and reflection)

Evaluative thinking is a central component of PBL as it enables learners to assess the success of their solutions, critically question the process and gain insights for future situations. This step strengthens the ability to reflect and the connection between theory and practice.

Principles of problem-oriented learning:

1. **Learning in real contexts:**
   The problems are practical and tailored to professional situations.
2. **Self-directed learning:**
   Learners work independently in groups and develop solutions through discussion, analysis and planning.
3. **Collaboration:**
   Group work promotes teamwork, communication and the sharing of different perspectives.
4. **Reflection:**
   Through the evaluation and the final presentation, the learners reflect on their process and their results.
5. **Promotion of key skills:**
   The focus is on skills such as problem-solving, critical thinking, decision-making and finding creative solutions.

Problem-solving task for students at BSDU

Students should learn to approach problems systematically and find creative and effective solutions. Here are concrete examples and detailed assignments for the problem definition phase, problem analysis and hypothesis formation in the teaching unit:

Task: (Using the example of the Computing Faculty)

Scenario:
Imagine you are part of a team working on the development of a new software application. During the development process, you receive feedback from test users who point out several problems:

1. slow loading times: The application takes too much time to load data.
2. user interface: users do not find the user interface intuitive and have difficulty finding certain functions.
3. compatibility: The application does not work properly on older operating systems.

Task:
Develop a detailed plan to solve these problems. Consider the following steps:

1. Problem definition and analysis phase (understanding the problem)
- Identify the causes of the problems mentioned.
- Use suitable analysis tools or methods (e.g. Ishikawa diagram).

2. Production of ideas (hypothesis formation):
- Develop at least two possible solutions for each problem.
- Consider technical feasibility, costs and time frame.
- Create an implementation plan with clear milestones and responsibilities.

3. Evaluation of the results (assessment and reflection):
- Describe how you will measure the success of your solutions.
- Discuss possible challenges during implementation and how these can be overcome.

4. Presentation of the problem solution (20-30 minutes):
- Present your proposed solution, your solution approaches.

Each group presents
- the final result of their solution.
- the evaluation of the solution process.
- the most important learning experiences.

Questions to the groups at the end of the problem-solving:

Evaluate the solution process and reflect on your learning progress:

- Which steps in the problem-solving process worked well?
- Where could you have been more efficient?
- Did the group dynamic contribute to the success, or were there obstacles?
- What did this exercise teach you about problem solving, teamwork and the application of professional skills?
- What skills have you developed further?
- Which areas would you like to improve in the future?

Key questions:

- Were all perspectives considered in the group?
- Was there enough time for problem solving and implementation?
- How could you optimize the process in future projects?
- How has your knowledge of professional problems changed?
- What new approaches or tools have you learned about?
- What was the most important learning from this task?

Evaluation criteria:

- **Accuracy of the fault analysis**: Were the faulty parts correctly identified?
- **Practical root cause analysis**: Have the most important sources of error been identified?
- **Action-oriented solution proposals**: Are the proposed measures simple and feasible?
- **Clear documentation**: Are the observations and solutions clearly described?
- **Good presentation**: Were the solutions presented in an understandable way?

Conclusion and feedback (30 minutes):

- The teacher summarizes the results, gives constructive feedback and highlights good approaches.
- Groups discuss together which solutions from the presentations would be most suitable for responding to future challenges.

Through this evaluation process, learners develop evaluative thinking, recognize the strengths and weaknesses of their approach and draw lessons for future problems. This promotes holistic skills development.

C_b - Ishikawa diagram (also known as a fishbone diagram or cause-and-effect diagram)

The **Ishikawa diagram**, also known as **a fishbone or cause-and-effect diagram**, categorizes the causes of a problem into different main categories. These categories are often the "6M" in the manufacturing industry but can be adapted depending on the context.

It is a tool that is used to systematically analyze causes for a specific problem. The Ishikawa diagram is an ideal tool for finding the causes of a problem in a systematic and structured way during **problem-oriented learning**.

What is the Ishikawa diagram used for?

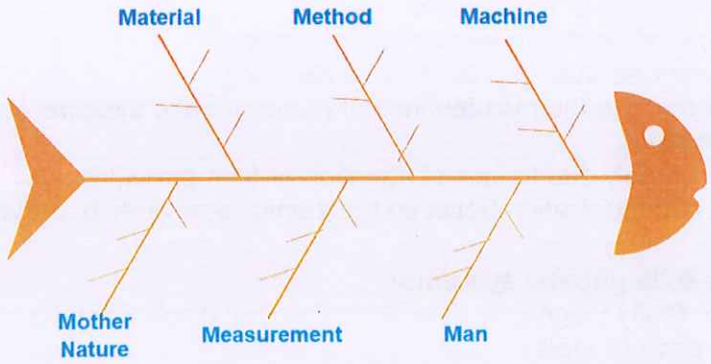
- **Root cause analysis**: It helps to identify the different factors and categories that could be causing a problem.
- For **problem solving**: The diagram helps teams to prioritize solutions by visualizing the relationships between causes and effects.

Structure of the Ishikawa diagram

1. **Central "fish head":**
   The "head" of the diagram shows the **problem** or effect to be investigated.
2. **Main categories:**
   The "bones" of the fish represent possible categories of causes. Typical categories are:
   - Manpower (personnel, working methods)
   - Machine (technology, equipment)
   - Material (raw materials, quality)
   - Method (processes, procedures)
   - Mother nature (environmental influences, conditions)
   - Measurement (measured values, quality controls)
3. **Detailed causes:**
   Starting from the main categories, specific causes are identified and added as sub-branches.

How is the diagram used in teaching?

1. **Group work:**
   Each group is given the topic "Irregular braking effect" and collects possible causes in the six categories.
2. **Categorization:**
   The groups create their own Ishikawa diagram by structuring their causes according to categories.
3. **Presentation:**
   Each group presents its analysis, including the main causes.
   - Example results: "The most common cause could be low-quality brake fluid that fails at high temperatures."
4. **Discussion and evaluation:**
   - The groups compare their results.
   - The teacher presents other plausible causes and gives feedback.
5. **Solution approaches:**
   - Each group develops practical proposals to eliminate the identified causes.



Example:

Problem: A production line has broken down.

- **Manpower:** Incorrect operation by untrained personnel.
- **Machine:** Defective component or lack of maintenance.
- **Material:** Faulty raw materials or inadequate storage conditions.
- **Method:** Unsuitable process sequences.
- **Mother nature:** Power failure or high temperature.
- **Measurement:** Incorrect calibration, inaccurate measurement methods

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Ishikawa diagram: Example for the Automotive faculty at BSDU

Topic: Quality problem - Irregular braking effect in vehicles

Central problem (fish head):
"Irregular braking effect in vehicles after maintenance"

Main categories (bones):

1. **Manpower (personnel)**
2. **Machine (tools and diagnostic systems)**
3. **Material (brake components)**
4. **Method (maintenance and repair processes)**
5. **Mother nature (external factors)**
6. **Measurement (measured values, quality controls)**

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1. Manpower (personnel)

- Inadequate training of technicians
- Lack of experience with modern braking systems
- Failure to exercise due care during maintenance
- Lack of expertise in the maintenance of modern brake systems (e.g. ABS, electronic brake force distribution).
- Incorrect assembly due to lack of attention or time pressure.
- Insufficient communication between mechanics and workshop management.

2. Machine (tools & diagnostic systems)

- Outdated or faulty diagnostic devices that do not display defects correctly.
- Unsuitable or worn tools
- Problems with the calibration of the measuring devices
- Incorrectly calibrated tools (e.g. torque wrench) that lead to incorrect settings
- Malfunctions in test benches for brake systems

3. Material (brake components)

- Poor quality brake pads
- Use of unsuitable or old brake fluid
- Wear on brake discs and drums
- Use of inferior or incompatible spare parts.
- Storage of brake fluid under poor conditions, resulting in poor quality.
- Ageing or damage to brake lines and seals

4. Method (maintenance & repair processes)

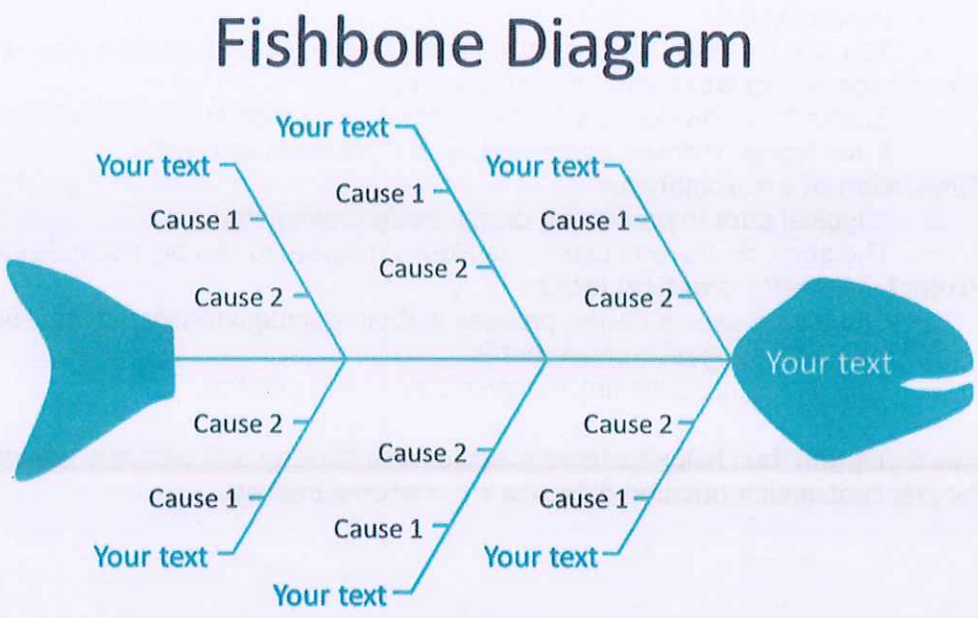
- No standardized test procedures
- Insufficient documentation of maintenance steps
- Lack of follow-up inspection after maintenance
- No standardized test procedure for brakes after maintenance.
- Skipping important tests, e.g. for brake pressure or braking distance.
- Inefficient documentation, which means that problems from previous maintenance are not considered.

5. Mother nature (external factors)

- High humidity (influence on the brake fluid)
- Extreme temperatures (expansion or shrinkage of components)
- Road conditions (dirt, water, sand impair braking performance, potholes or water accumulation that cause long-term damage)
- High temperatures that can affect the brake fluid (e.g. due to overheating)

6. Measurement (measured values & quality controls)

- Inaccurate brake pressure measurement
- Uncalibrated test devices or incorrect calibration
- No uniform test standards for braking performance



Recommended 6M categories of the Ishikawa diagram for BSDU:

1. **Manpower** - mistakes or lack of qualification of employees, motivation
2. **Machine** - Defects, unsuitable machines/tools, susceptibility to faults
3. **Material** - quality or availability of raw materials, storage, procurement
4. **Method** - Incorrect or inefficient workflows, processes
5. **Mother Nature (Environment)** - External conditions, such as temperature or safety regulations, dust, noise
6. **Measurement** - Inaccurate measured values or insufficient quality controls, incorrect calibration, inaccurate measurement methods

Use in problem-based vocational training lessons:

The Ishikawa diagram can help develop real-world problem-solving skills. Here are some ways to integrate it into the classroom:

1. **Analyze case studies and real-world problems**
   - The students work on real problems from their specialist area (e.g. quality problems in production).
   - You use the diagram to systematically identify causes and develop solutions.
2. **Encourage group work and critical thinking**
   - Students are divided into teams to analyze a problem from different perspectives.
   - Each group works on one category and presents its results.
3. **Simulation of error analyses**
   - A typical error in production or in a trade is simulated.
   - The students have to use the Ishikawa diagram to identify possible causes.
4. **Project work with practical tasks**
   - Students examine a work process in their training, identify potential sources of problems and suggest improvements.
   - This strengthens the link between theory and practice.

The Ishikawa diagram thus helps to develop systematic thinking and problem-solving skills, which is ideal for practical, action-oriented didactics in vocational training.

Why it can work very well at BSDU:

1. **Practice-oriented training:**
   - As BSDU works according to the **Swiss Dual System**, a problem-oriented and practical approach makes sense.
   - The Ishikawa diagram can be used directly in **workshops and laboratories**.
2. **Industry orientation:**
   - BSDU cooperates with companies and has a strong focus on **skills development**.
   - Quality assurance, process improvement and error analysis are relevant topics for many training professions.
3. **Occupation-specific adaptation:**
   - The diagram can be used in the various **skill faculties** such as computing, healthcare, manufacturing, general education or automotive engineering.
   - Each faculty can define its own cause categories (e.g. "material", "tools" and "technology" could be weighted more heavily in the skilled trades).