Background: Problem-Based Learning

The key feature of Problem Based Learning (PBL) is that students are confronted with a “problem” that they address as a group, leaving them in charge of the learning process themselves. The aim is for you to apply your knowledge to a specific problem as well as gain new insights in the process. Additionally, PBL aims at strengthening the student’s ability to work in groups making the group-work as important as finding a solution to the presented problem.

At the beginning of each PBL cycle, a problem or scenario is presented to the groups and will be worked on over a set amount of time during and between the seminars. In the end, the groups are expected to present their collective work.

Group Phase

There are no fixed rules on how you organize within your groups. However, each group must have a Chair leading the group session. If the groups decide to give themselves rules for the discussion in the group, it is the chairs task to make sure these rules are followed. Additionally, each group must have a Scribe who takes minutes and makes them available to the other group members. This is especially important if the PBL circle stretches over more than one session. The members of the group should take turns fulfilling these roles. Ideally, every member had every position once. Between the Chair and the Scribe every group can choose to have additional roles such as the Time Keeper who makes sure that the time-frame for each task is followed or the Reader who reads out the problem and makes sure that the group has the relevant information present. They lecturer is available to answer any questions at any time.

In order to work effectively as a group a range of online tools are available, ranging from relatively simple Etherpads (http://etherpad.org) to more elaborate project management tools like the Open Science Framework (https://osf.io).

7-Jumps

When working on the presented problem the 7-Jumps provide some orientation. However it does not have to be followed exactly, as some of the steps can be combined.

1. Clarify Terms and Concepts The first step guides students into the topic, by discussing unknown words or concepts it is ensured that all students understand the text as it stands. This first step provides a common starting point and leads the group into the topic. This step does not require that you agree on a definition for every term but rather you should make sure that the groups have a roughly similar understanding of the terms and concepts.
2. **Problem Statement** In the next step, the whole group agrees on the formulation of the problem statement that frames the whole assignment, provides a title for the session, and makes the group agree on what the general impetus of the assignment is about. Problem statements can take the form of more traditional titles, but are sometimes also formulated as broader research questions or provoking statements. Again, problem statements do not have to be very precisely formulated statements but provide some direction for the group to work together.

3. **Brainstorming** The problem statement should trigger the next step of the brainstorm. The rationale behind this step is that students collect potential interests that they might have, activate prior knowledge and share certain expectations. Everything is allowed during this step and ideas are collected unquestioned (i.e. there are no wrong ideas; everyone should be allowed to follow her/his own ideas). Only clarification questions should be asked by the group. The outcome of the brainstorm is noted on in the minutes by the scribe.

4. **Categorize and Structure Brainstorming** By structuring the brainstorm students categorize keywords that fit together and in this way they find common patterns that in the next step will allow for the formulation of specific questions. In this step, the relevance of topics for the problem can be discussed as well. Step 4 should be the step in which the group agrees on a more concrete course of action for the coming steps.

5. **Formulation of Common Research Objectives** As the last step of the pre-discussion, students agree on the formulation of common research objectives by referring to the brainstorm and the now structured collection of ideas. This way of formulating learning objectives ideally reflects the different approaches to the wider topic that students have agreed to research upon, because they consider them to be the most relevant to the specific topic and because they are interested in exploring exactly these questions. Each student takes on researching one or more questions. Ideally, there should be a clear plan as to who does what and when in the end.

6. **Research** Between the seminars, the students research their specific questions and provide the information to the rest of the group.

7. **Aggregation and Presentation** The results from the individual research are first put together and discussed in the group. After this, the group presents their findings to the class and discusses them with the other groups.

8. **Reflect** While the formal seven step approach ends here, students are also encouraged to reflect in their post-discussion about their selected learning objectives and potential aspects of the topic that they did not cover originally but found interesting while engaging with the literature. This is one of the most important aspects of the PBL cycle as otherwise, students repeat their mistakes and imprecision every time they engage in an assignment. In addition, students are also encouraged to provide peer feedback on their performance as chair, participant, and scribe. This way they ideally not only advance in the discussed topic but are also able to improve their learning process and communicative skills.
Scenario

Your group is applying for a research grant. For the application process your group is asked to design a research agenda for the coming three years. At a conference your group will present their research agenda to a wider academic audience. Please develop a poster that addresses what research questions your group will focus on, why these questions are relevant and how you will design your research project. Please include a rough schedule and note how you plan to publish your findings (articles, books, etc.) Your project needs a catchy title.