

Activating students in cartographic education

Georg Gartner^a

^a TU Wien, Research Division Cartography, georg.gartner@tuwien.ac.at

Keywords: education, learning theories, cartographic curriculum

Abstract:

Activating students in disciplines such as cartography (Gartner, 2022) can involve several concepts such as hands-on learning, project-based instruction, and problem-based learning. These approaches aim to engage students in the learning process by providing them with real-world problems to solve, allowing them to apply the concepts they have learned to practical situations. Additionally, incorporating technology and collaboration into the classroom can also help to activate students and promote active learning. Another concept is to use design thinking and creative problem solving in the classroom to help students develop their critical thinking and problem-solving skills. It is also important to create a positive and supportive learning environment where students feel comfortable asking questions and participating in class discussions. All of those concepts are applied in several classes of the International MSc Cartography program (cartographymaster.eu) and several experiences have been gained.

- Problem based learning (PBL)

Problem-based learning (PBL) is an instructional approach that involves presenting students with real-world problems or scenarios to solve. This approach can be used in cartography to help students develop their skills in map-making and spatial analysis. In PBL, students work in teams to research and analyze a problem, and then use the information they have gathered to create a map that addresses the problem. This process allows students to apply their knowledge of cartography and GIS to real-world issues, and it also helps them develop critical thinking and problem-solving skills. An example of a PBL project in cartography could be creating a map that shows the distribution of a certain disease in a certain area. Students would have to research the disease, gather data about it, and then use cartographic skills to create a map that illustrates the information they have gathered. They would also have to analyze the data and come up with recommendations for addressing the problem (Gartner et al., 2022).

- Project-based Instruction (PBI)

Project-based instruction (PBI) involves having students work on a project or a series of projects to learn new concepts and skills. This approach can be used in cartography to help students develop their skills in map-making and spatial analysis. In PBI, students are presented with a project or a series of projects that require them to use their knowledge of cartography and GIS to create a map or a series of maps.

- Hands-on Learning

Hands-on learning is about trying to engage students in the learning process through direct experiences and experimentation. Some examples of hands-on learning activities that can be used to teach cartography include:

- Fieldwork: Students can collect data using GPS devices or other tools and then use cartographic software to create maps that show the location of different features, such as buildings, streets, and natural features.
- Map-making: Students can use cartographic methods to create maps of a certain area.
- Spatial Analysis: Students can use maps to analyze spatial data and perform spatial analysis
- Map Design: Students can learn about cartographic design principles and practice designing maps that are clear, effective and visually appealing
- Historical cartography: Students can learn about the history of cartography by studying historical maps and understanding how cartographic methods and technology have changed over time.

In order to embed these methods in cartographic education program a general aim on using design thinking and creative problem solving in the classroom is appropriate (Fairbairn et al., 2021). While design thinking is concerned with a user-centred approach by understanding the user, prototyping and iteratively improving maps by testing solutions the creative problem solving involves using innovative and out-of-the-box thinking to find new and effective solutions to engineering challenges. This can involve using a combination of analytical and intuitive thinking, as well as utilizing a variety of tools

and techniques, such as brainstorming, lateral thinking, and design thinking. Additionally, it often involves collaboration and communication with other team members, experts in related fields, and even customers or end users.

Based on the rich experiences gathered within the International MSc Cartography program of 4 European universities over more than ten years, examples and lessons learned of applying several ways of activating cartography students are presented.

References

- Fairbairn, D., Gartner, G. and Peterson, M., 2021. Epistemological thoughts on the success of maps and the role of cartography. In: *International Journal of Cartography*, 7:3, 317-331, DOI: 10.1080/23729333.2021.1972909
- Gartner, G., 2022. Underpinning Aspects of Developing a Cartographic Curriculum. In: *Journal of Geodesy and Geoinformation Science*, 5:3, 41–50, DOI:10.11947/j.JGGS.2022.0305
- Gartner, G., Binn, A., Retscher, G., Gikas, V., Schmidt, M. and Wang, W., 2022. From project-based to problem-based learning in engineering disciplines: enhancing Cartography and Geomatics education. In: *8th International Conference on Higher Education Advances (HEAd'22)*. Universitat Politècnica de València, València, 2022. <http://dx.doi.org/10.4995/HEAd22.2022.14473>