

PROFALE PROFESSIONELLES LEHRERHANDELN ZUR FÖRDERUNG FACHLICHEN LERNENS

# Heuristic Strategies in Mathematics Teacher Education Take Pólyas "A new Aspect of Mathematical Method" seriously

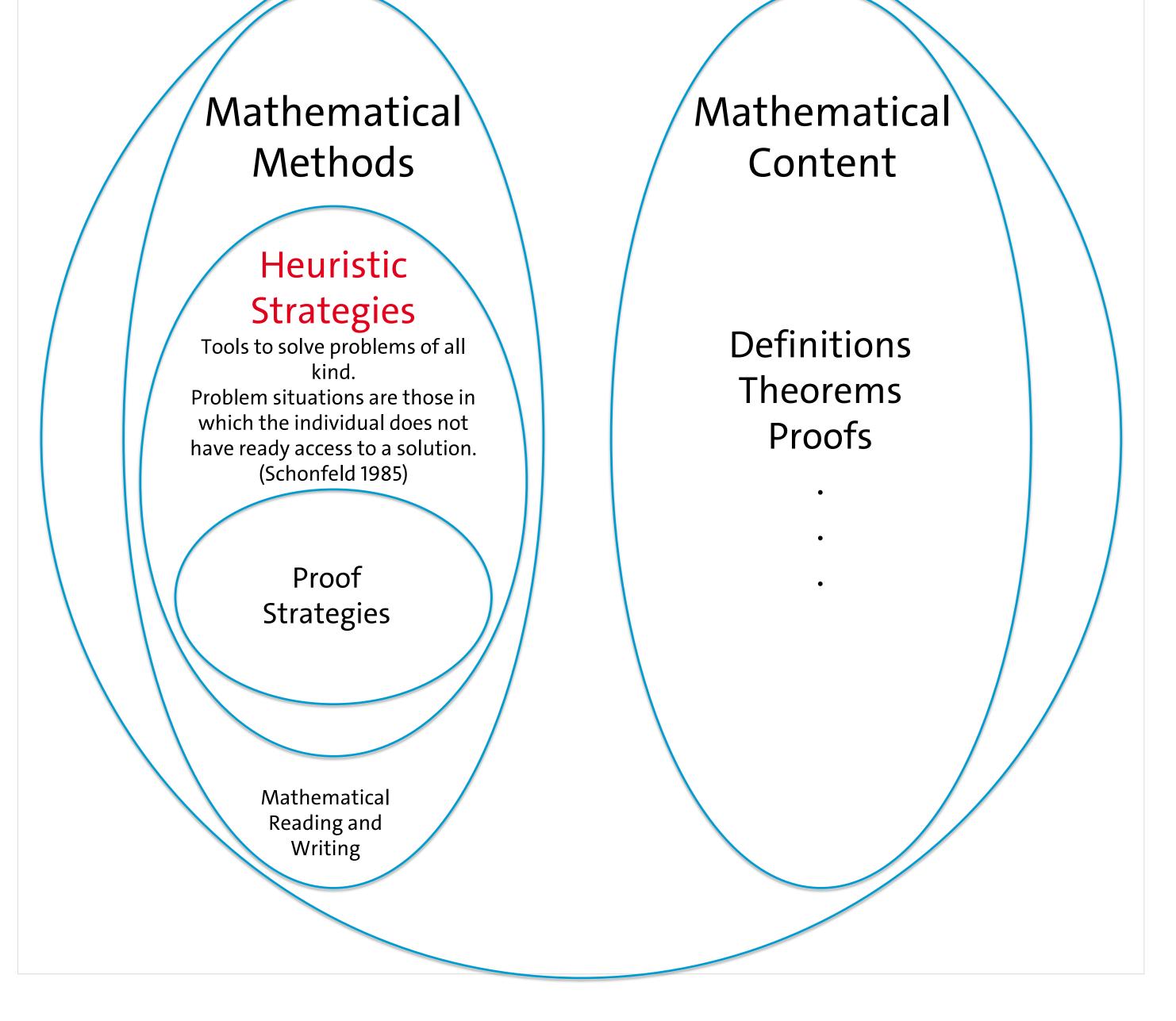
#### Theoretical Concept

**Mathematics** 

#### Heuristic strategies:

- Organize your material / understand the problem:
  - change the representation of the situation so you can discover patterns and structure,

Theoretical Concept

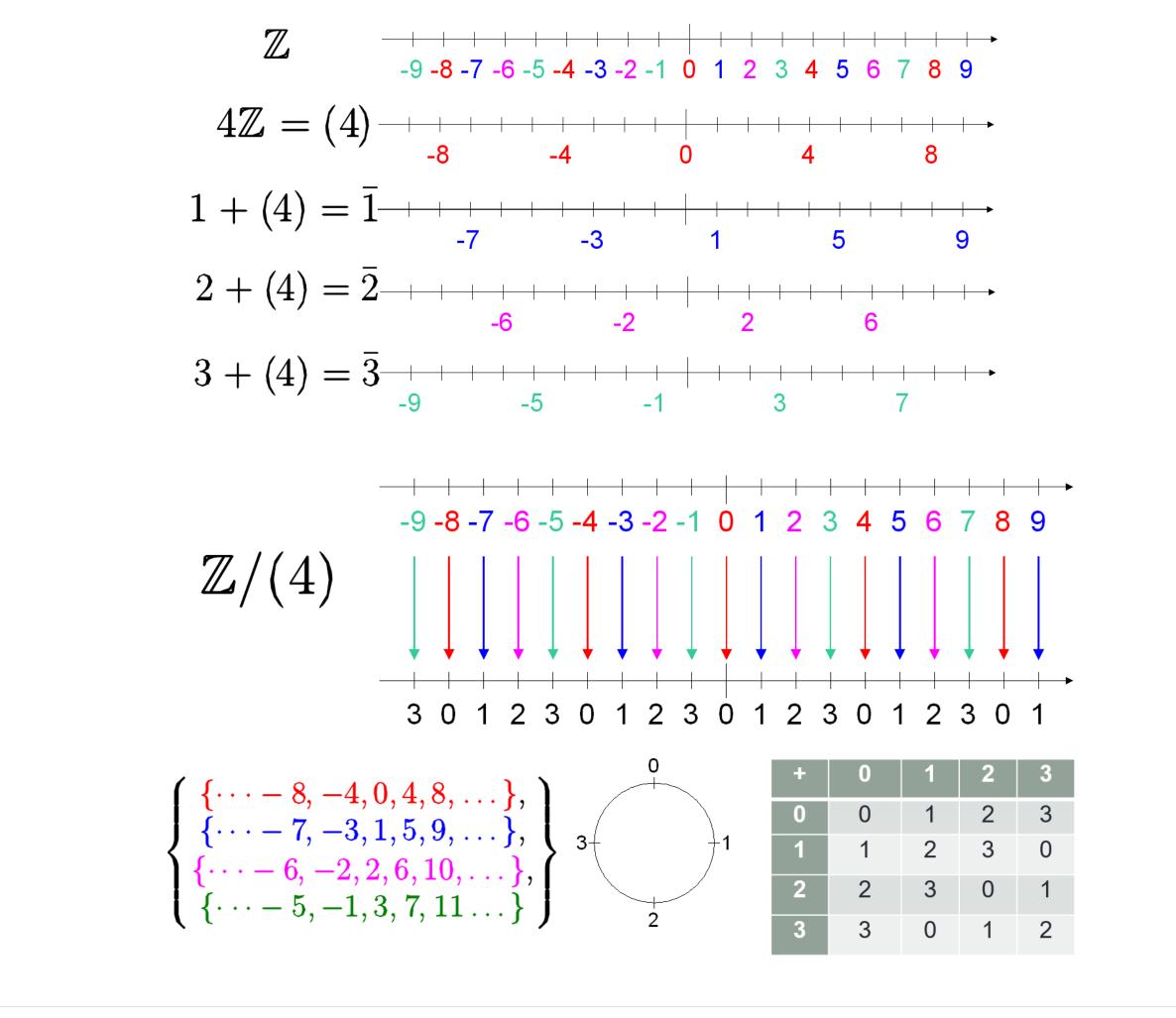


- try out systematically,
- use simulations with or without computers,
- discretize the situation.
- Use the working memory effective:
  - combine complex items to supersigns (supersigns represent the concept of "chunks" formulated by Miller (1956)),
  - use the symmetry of the situation,
  - break down your problem into sub-problems.
- Think big:
  - don't think inside dispensable borders,
  - generalize the situation.
- Use what you know:
  - use analogies from other problems,
  - trace back new problems to familiar ones,
  - combine partial solutions to get a global solution (often: superposition),
  - use algorithms where possible.
- Functional aspects:
  - analyze special cases or cases at the limit,
  - for optimization you have to vary the input quantity.
- Organize the work:
  - work backwards and forwards,
  - keep your approach change your approach at the right moment.

# Example of Tutorial Input

In the Lecture the concept of quotient spaces in linear Algebra was established on rings in a very abstract way.

Different less abstract representations were given and the role of supersigns was pointed out.



#### Students Feedback

Five students that participated in the tutorial were interviewed based on a manual.

- Explenations based on visualizations were emphasised as helpful and instructive.
- Input connected to heuristic strategies were remembered well, if the input was connected to school mathematics or was helpful for understanding the current content of the lecture in linear Algebra.

# Conclusion

The concept to support students by stressing the mathematical methods particularly by stressing the heuristic strategies seems to have a positive impact but is not realized easily. Thus the concept will be used over a longer period with the same students and be evaluated again.

#### GEFÖRDERT VOM



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