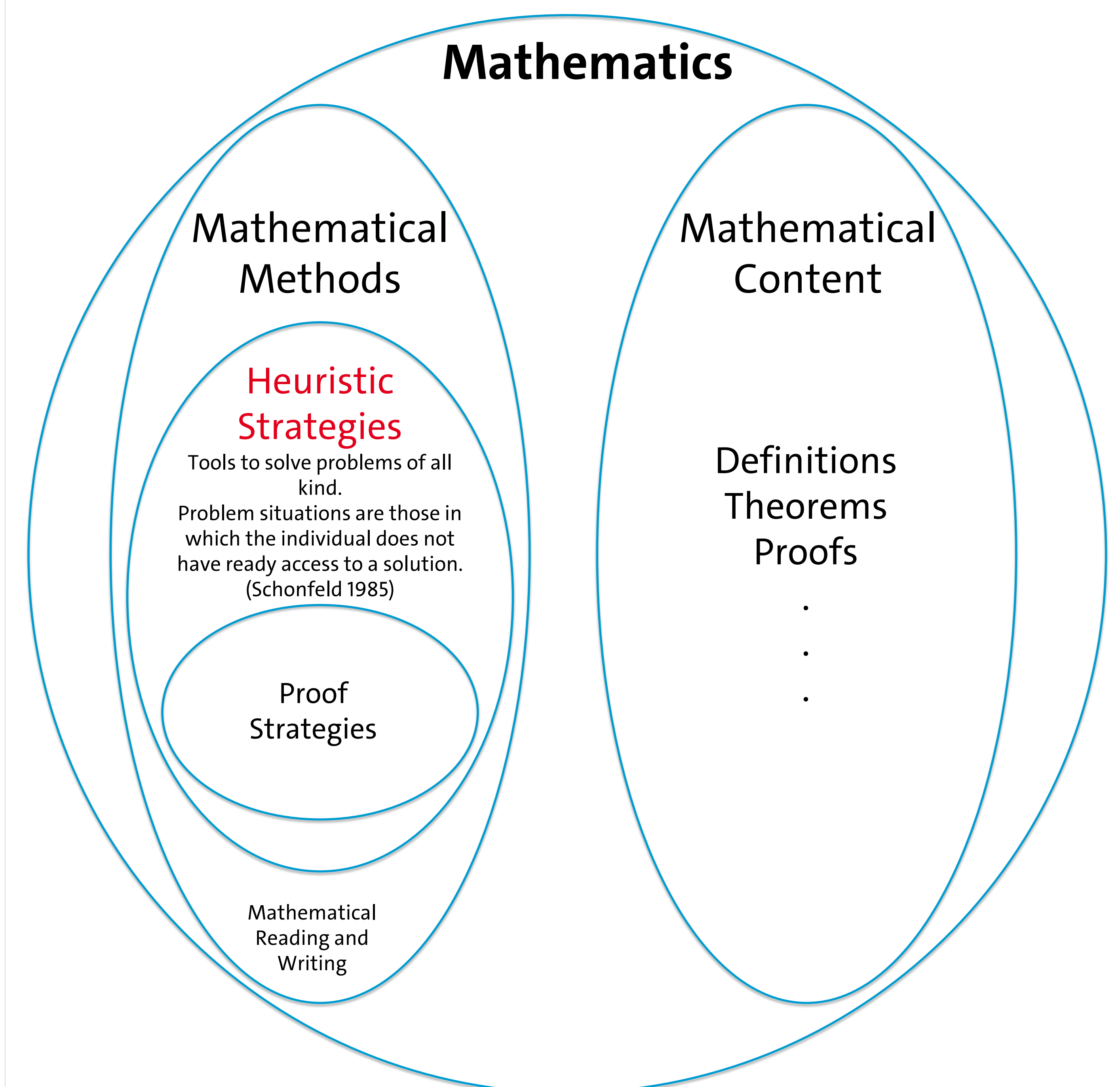


Heuristic Strategies in Mathematics Teacher Education

Take Pólyas “A new Aspect of Mathematical Method” seriously

Theoretical Concept



Theoretical Concept

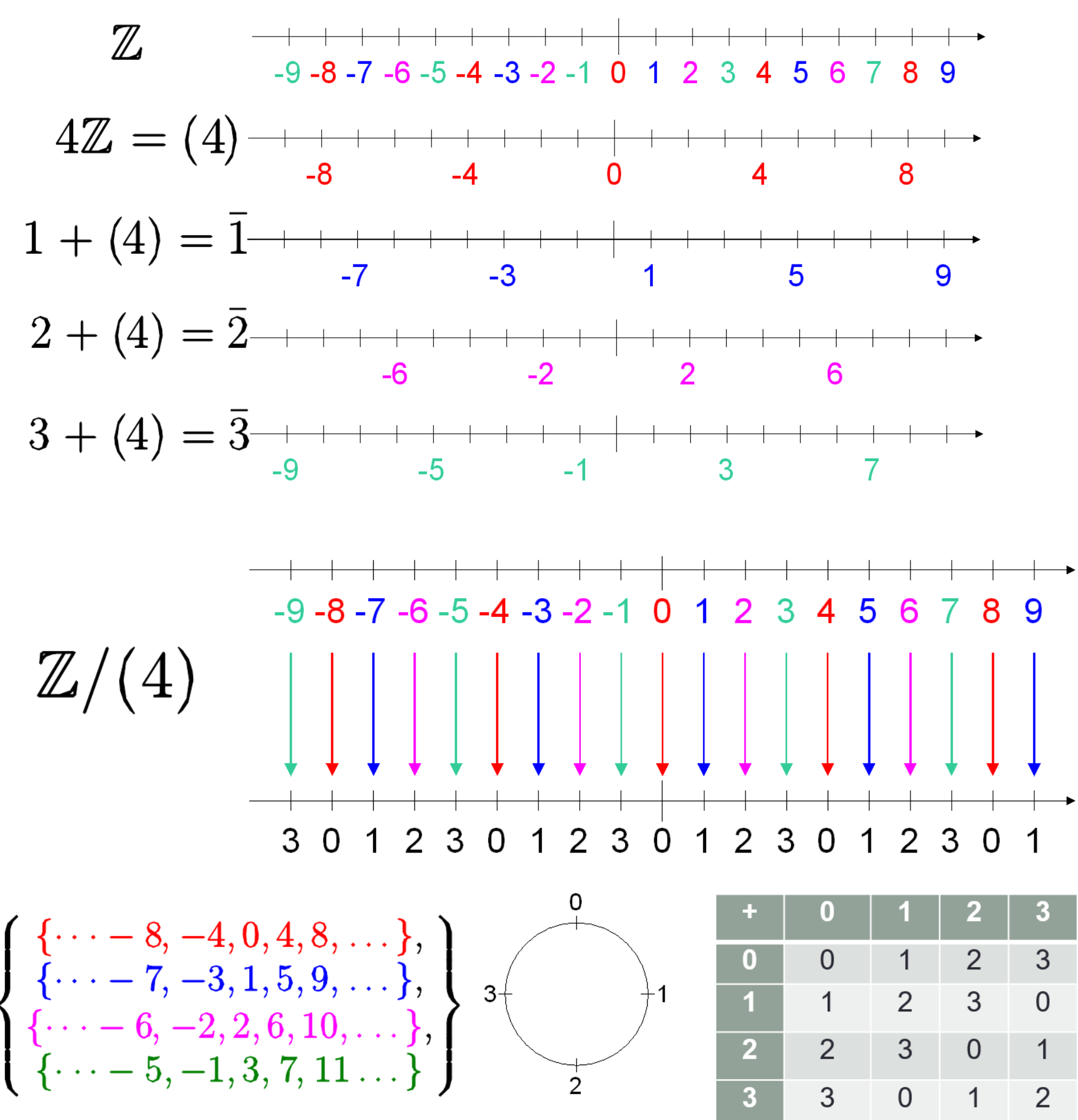
Heuristic strategies:

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

- Explanations 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.