Lessons learned from pre-service teachers’ narratives of math failure

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My research interests
Teacher development in pre-service teacher education, teacher identity and identity work, affect and emotions regarding mathematics, narrative research

In this talk...

About "Narrated Failures" project (Academy of Finland, 2018-2021)
What do pre-service teachers understand as mathematics failure and how do the experiences of failure shape their development as teachers, especially their teacher identity?

Findings of four studies

Lessons learned
How do pre-service elementary school teachers define failure in mathematics?

Lutovac, S., & Kaasila, R. (2021). 'There are so many ways to fail': pre-service elementary school teachers define failure in mathematics. *ICME-14 proceedings, Shanghai, China.*

<table>
<thead>
<tr>
<th>Failure definition</th>
<th>Quote</th>
<th>Frequency</th>
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</thead>
<tbody>
<tr>
<td>Failure as <em>underperformance and underachievement</em></td>
<td>&quot;Failure in math is failure in exams.&quot; (16)</td>
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<td>Failure as <em>subjective</em></td>
<td>&quot;Failure in math is largely self-reliant on what one sees as failure and success.&quot; (10)</td>
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<td>Failure as related to <em>one's own goals and expectations</em></td>
<td>&quot;Failure in math is not achieving one’s goals...&quot; (6)</td>
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<td>Failure as <em>inadequacy</em></td>
<td>&quot;Math failure is the feeling of not being good enough...&quot; (5)</td>
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<tr>
<td>Failure as a <em>learning opportunity</em></td>
<td>&quot;Failure is human... All you have to do is learn from it.&quot; (3)</td>
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What do two pre-service mathematics teachers’ narratives tell about their failure and resilience?


I have, in the moment of failure, comforted myself with sentences like: ‘I don’t need this information as a teacher’, ‘Good thing I’m not gonna be a researcher’ and ‘This wasn’t even that important for me’. ...it is not relevant for the sake of my profession if I’m barely passing the advanced math courses. The contents of the courses would not even be close to what I would actually be teaching. This is how I sort of reject the whole failure and feel that it never happened, and I can still hold on to the identity of an achiever.

Tiina, pre-service mathematics and science teacher
### What kind of experiences count as math failure?


<table>
<thead>
<tr>
<th>Pre-service mathematics teachers' experiences of failure (22)</th>
<th>Pre-service elementary school teachers' experiences of failure (45)</th>
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<tbody>
<tr>
<td>• Barely passing or repeating exams at university (11)</td>
<td>• Poor performance on the tests and low grades (15)</td>
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<td>• Solving the tasks or problems incorrectly in university</td>
<td>• Learning difficulties in advanced mathematics courses in</td>
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<td>studies (4)</td>
<td>upper-secondary school (7)</td>
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<td>• Obtaining a lower than expected grade and dissatisfaction</td>
<td>• Obtaining a lower than expected grade (6)</td>
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<td>with one's own performance in upper-secondary school (2)</td>
<td>• Learning difficulties from early years of schooling (5)</td>
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<td>• Performance tension and anxiety during school time (2)</td>
<td>• Learning difficulties due to a specific reason (e.g.,</td>
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<td>• Learning difficulties in advanced mathematics courses in</td>
<td>competitive, time-restricted environment) (5)</td>
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<tr>
<td>upper-secondary school (2)</td>
<td>• Obtaining less than the highest grade (striving for</td>
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<td>• Lacking motivation in university studies (1)</td>
<td>perfection) (3)</td>
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<td>• Errors in doing maths in an out-of-school context (2)</td>
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<td>• Unfair treatment and grading (1)</td>
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04

How does past failure influence pre-service teachers’ possible teacher selves?


Teacher traits
- Noticing and supporting students who struggle
- Taking into account all students
- Making sure all students learn
- Understanding different students
- Avoid labelling
- Avoid categorising
- Not comparing students
- Thinking before speaking
- Being encouraging and motivating
- Being inspiring

Instructional strategies
- Individual learning support
- Teach for understanding of all students
- Differentiation
- Fair assessment
- Varied and interactive teaching methods
- Concrete examples
- Teaching for successful experiences
- Fun and interesting lessons
- Finding alternative strategies (e.g., students teaching students)
- Creating competition-free classroom
- Giving feedback to motivate

Student strategies
- Care
- Persevere
- Work hard
- Practice
- Let go of perfectionism
- Know that failure is natural
- Know that failure is okay
- Maintain your confidence
- Think about your future studies
- Know your strengths, acknowledge weaknesses
- Learn from failure
- Self-assess
- Accept failure and move on

Teacher development
- Stronger math knowledge
- Better confidence
- Better pedagogical content knowledge
- Be kinder with oneself
- More experience
- Knowledge of students' needs
01 Failure needs to be understood as an autobiographical experience

- a broad range of autobiographical experiences
- personal and subjective
- defined in various ways

Pre-service teachers need to be aware that various experiences can count as failure
02 Failure experiences play an important role in the process of becoming a teacher

Past experiences of failure shape future teacher identities and are a resource for potential future action.

The process of developing a teacher identity between generalist and specialist future mathematics teachers may be more alike than earlier suggested.

The need for shared learning experiences of generalist and specialist future mathematics teachers during university studies.
Lessons learned

03 Narratives of failure as a pedagogical tool in initial teacher education

Narratives of failure stimulate a nuanced reflection upon the various dimensions of teacher's work

Enable learning from vicarious failure experiences

Joint discussion and reflection between generalist and specialist future math teachers is needed

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Thank you for listening!

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