Teachers and textbooks:
Can two walk together except they be agreed?

מורים וספרי לימוד:
הילכו שניים יחדיו בלתי אם נועדו?

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Relationships between textbooks and teachers

Textbooks are main source for teachers in the work of teaching mathematics:

- Content
- Teaching sequences
- Class activities
- Tasks for students

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Ayalon & Even, 2014, 2016; Eisenmann & Even, 2009, 2011; Even & Kvatinsky, 2009, 2010; Silverman, 2017

Relationships between textbooks and teachers

Textbooks are main source for teachers in the work of teaching mathematics.

- Teachers rarely participate in textbook development.
- **Should this situation be changed?**

What might be gained and what might the challenges be

- if the community of mathematics teachers is given an opportunity
- **to participate in textbook development?**

The M-TET Project (2010-2016)*

Invited teachers to:

- collaborate in editing the textbooks they used in their classrooms,
- produce, as group products, revised textbooks suitable for a broad and diverse student population.

*Part of the Rothschild-Weizmann Program for Excellence in Science Teaching, supported by the Caesarea Edmond Benjamin de Rothschild Foundation.

The M-TET work environment

- Teachers could freely edit the textbooks as they wished.
- Consultants were available to answer teachers' queries:
  - Textbook authors
  - Mathematician

What might be gained and what might the challenges be when offering such a work environment to teachers?

Opportunities and Challenges

- Teachers' wishes regarding textbooks.
- Mathematical modifications.
- Connections between teachers and textbook authors.
- Connections between teachers and mathematicians.


Shai Olsher


Michal Ayalon


Ayelet Gottlieb

Even, Ayalon & Olsher, 2016; Even & Olsher, 2014; Gottlieb, 2016; Olsher & Even, 2018

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Even, Ayalon & Olsher, 2016; Even & Olsher, 2014; Gottlieb, 2016; Olsher & Even, 2018

Teachers' wishes and desires regarding textbooks?

- Literature review: limited information.

Research setting: Curriculum enactment

- Modifications that teachers make in textbooks when using them in class, related to:
  - mathematical content,
  - approaches to teaching and learning mathematical content.
- Often not based on deliberate and thoughtful considerations.

Ayalon & Even, 2014, 2016; Eisenmann & Even, 2009, 2011; Silverman, 2017

M-TET teachers: Organizing tools embedded in the textbook

Teachers' Goal: Making the textbook more user-friendly.

- A type of change not reported in the literature.
- Related neither to mathematical content nor to approaches to teaching and learning mathematical content.

Example: Marking the core of the textbook

Teachers' Goal

To make clear which parts of the textbook are essential, and thus should not be skipped when teaching.

Challenges

- What to include as core?
- Where to mark the core: textbook? teacher guide?
- How to mark the core?

Teachers’ wishes regarding textbooks

- Setting for learning about teachers’ needs, desires, and aspirations regarding textbooks.
- Challenges teachers might encounter when they attempt to accommodate textbooks to fit their needs and preferences.

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Even, Ayalon & Olsher, 2016; Even & Olsher, 2014; Gottlieb, 2016 Olsher & Even, 2018

Equivalent algebraic expressions in the edited textbook

Algebraic activity	Original role	Added role
Manipulating expressions using properties of real numbers	Generating, maintaining, or proving equivalence of expressions	
Substituting numerical values into expressions	Proving non-equivalence of expressions	Checking potential for equivalence of expressions generated by manipulating a given expression

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Conventional connections between math teachers and textbook authors: unidirectional and limited

Textbook authors → **Teachers**

- Textbook writers
- Initiate and lead professional development of teachers.

- Textbook users
- Rarely influence professional development of teachers.

Editing the Pythagorean Theorem unit

I agree. This is a wonderful opportunity.

Why? We need to put the mistakes on the table.

It's not good to ask students to evaluate a false statement.

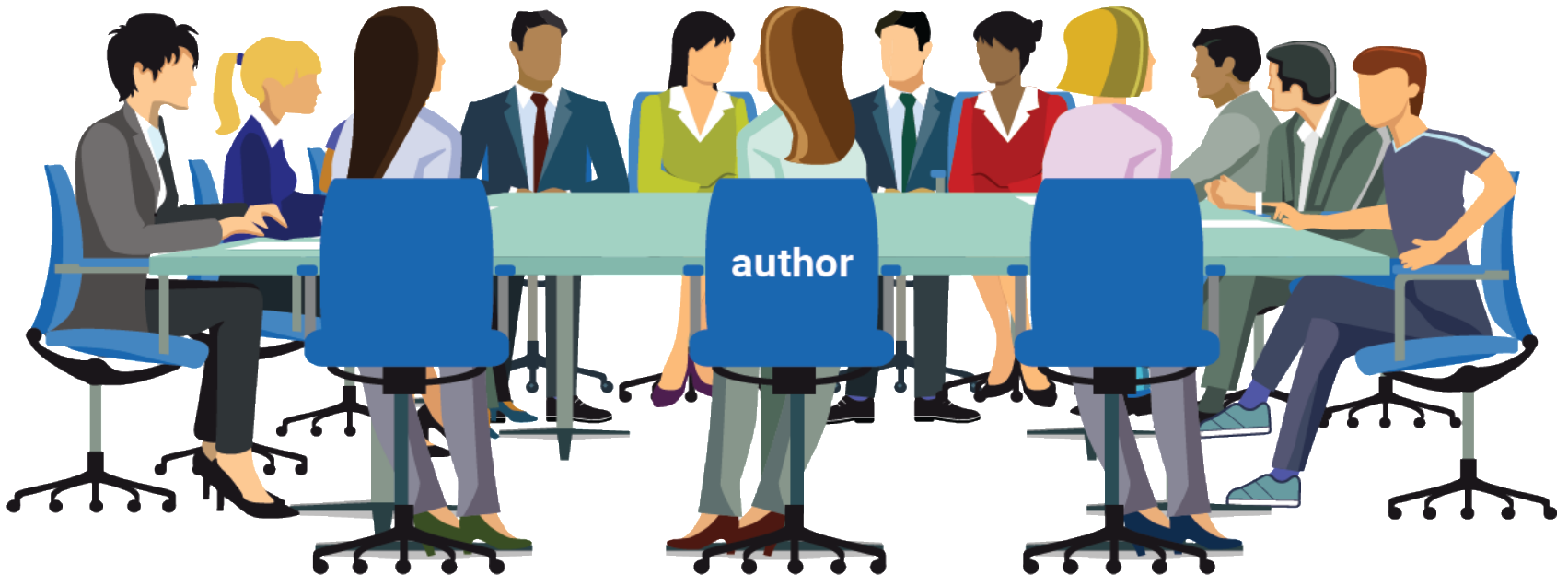
Why, then, isn't a proof added, even a visual one?

You are right. We should include a proof.
If we revise the textbook we will include a proof.

This is a golden opportunity to build up the need for a different sort of justification of the Pythagorean Theorem, not generalization from examples.

It is similar to the Pythagorean formula and it's confusing.

I think that we need to change this.



Meeting with the author

Novel connections between math teachers and textbook authors: bidirectional and more productive

Textbook authors  **Teachers**

- Textbook writers
- Initiate and lead interactions with teachers (professional development).

- Textbook users and contributors to textbook development.
- Initiate and lead interactions with textbook authors; determine content, timing, and format, based on their needs and goals.

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Conventional connections between math teachers and mathematicians: limited

Mathematicians

- Teachers of academic math during teacher preparation stage.
- Lead interactions with (prospective) teachers.

Teachers

- Students of academic math during teacher preparation stage.
- Rarely influence interactions with mathematicians.

Conversation with a mathematician about a suitable proof for the Pythagorean Theorem

- Supported the teachers' decision.
- Shared the role proof plays in his everyday work as a research mathematician.
- Stressed that the teachers are the ones who have the expertise of what proof is appropriate at this stage.

Novel connections between math teachers and mathematicians: more productive

Mathematicians  **Teachers**

- Answer questions about math taught in class throughout teaching career.
- Accept teachers' terms.

- Ask questions about math taught in class throughout teaching career.
- Initiate and lead interactions; determine content, timing, and format, based on their needs and goals.

Teachers' professional development and building of a professional community of teachers

The ability and the motivation to test my intentions all the time… to analyze the lesson and the tasks, to reflect on the lesson and to consider a change…

The interactions with the other teachers… listening, talking, and sometimes even arguing with other teachers, learning from different people having different opinions—this is all part of me now.

Teachers' professional identity and classroom teaching

The collaboration with the authors and the mathematician, there are not such things anywhere. It makes me feel important that they want to listen to me and to work with me. They talk to me at eye level…

It changed the way I see myself and the way I use the curriculum in class. I now ask myself: What is the aim of this task? What would the author say about this part of the lesson? Is the mathematical concept in this lesson used correctly?