

# Assessment Methods in science and mathematics education

**Rachel Mamlok-Naaman and Veronica Starkov**  
**Weizmann Institute of Science, Israel**  
**[Rachel.mamlok@Weizmann.ac.il](mailto:Rachel.mamlok@Weizmann.ac.il)**

1

# Rothschild- Weizmann Program (2008-present)

## Department of Science Teaching

### Weizmann Institute of Science

- MSc degrees to active excellent science teachers
- Supported by the Rothschild Caesarea Foundation
- Using a 'teach-the-teachers' approach to raise the quality of science education in Israel.
- In collaboration with scientists at the Institute



EuroVariety 2023

# Curriculum

- Scientific courses:
  - enhancing teachers' knowledge
  - advancing central and contemporary topics in the discipline
  - providing general introductory courses
- Science teaching courses

For example –

**An Assessment Course**



# Assessment

- A process designed to check whether the desired goals have been achieved.
- Serves as a means of measuring progress towards desired goals.
- Includes measurement and examination processes.
- Provides information about activity results

# What for?

➤ Decision making

➤ Feedback



# How?

- ▶ Using a variety of tools
- ▶ Gathering artifacts, and transforming them into evidence
- ▶ Providing an integrative interpretation of the various tasks

The implementation of a wide spectrum of instructional techniques and measurements of students' achievements and progress requires matching an assessment tool to each technique.

# Education assessment

**Education programs and projects**

**Curricula and learning materials**

**School organization**

**Teachers and staff members**

**Students**



# Assessment for understanding - improving teaching and learning



# Types of learners' assessment

(Earl & Katz, 2006)



Assessment **Of** )  
(Learning = AOL



Assessment **For** Learning )  
(= AFL



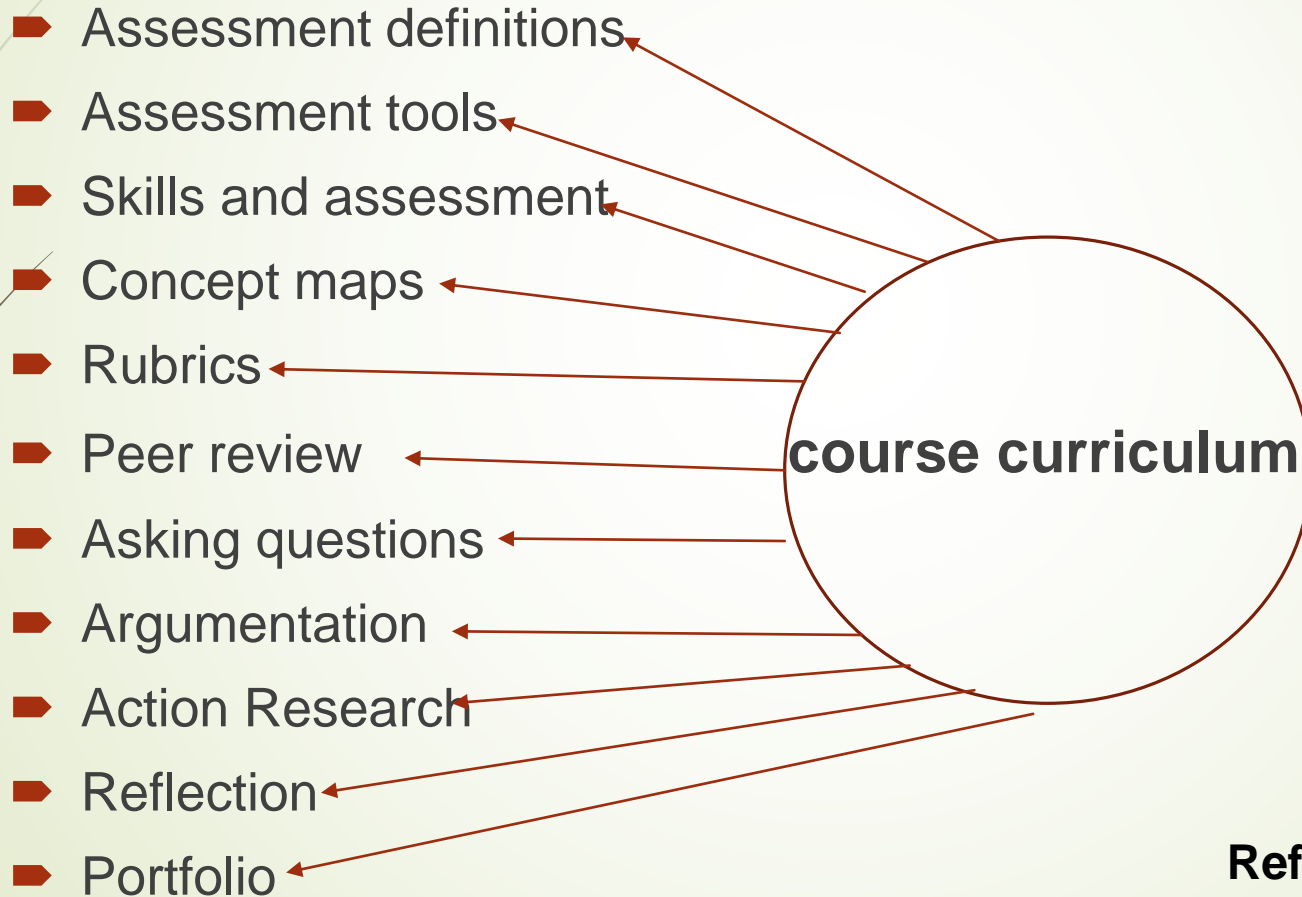
Assessment **As** )  
(Learning = AAL

# Main types of assessment methods

- Summative assessment
- Formative assessment – alternative assessment

Instructions	Accomplished 5 points	Developing 3 points	Beginning 1 point
<p><b>Answer the questions that you compiled:</b> Use precise, complete answers.</p>	<p>All the questions that the student compiled answered clearly and precisely.</p>	<p>75% of the questions that the student compiled answered clearly and precisely.</p>	<p>50% of the questions that the student compiled answered clearly and precisely.</p>

# Formative assessment methods course curriculum



Reflection ★

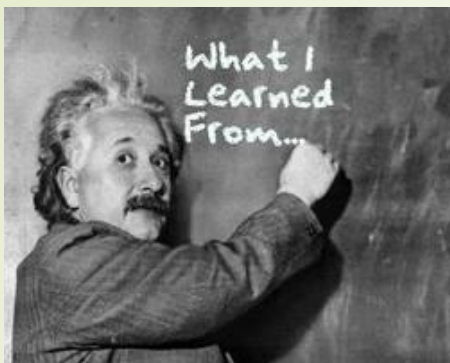
Reflection ★

Reflection ★



# Reflections

- *My main insight is that alternative assessment is an important skill for our profession. It needs to be expanded and deepened in teacher preparation and professional development. I believe that our ability as teachers to produce an assessment of good quality may be a very significant key point for our ability to promote students in the various learning subjects in the school system, as well as improving their attitudes toward science learning / towards choosing a scientific career.*
- *One of my key insights is the need for an optimal match between the assessment method and the educational goals that we would like to achieve through the assignment. Another insight is transparency! The students know according to what criteria they are being assessed. By this, it will be possible to achieve a higher quality learning - the student will know what is expected from him.*



## What have we learned?

Instructional techniques should be matched with learners' characteristics, learning styles and interests, in order to:

- Maximize the effectiveness of teaching and learning processes
- Increase student motivation to –
  - \*Study and enjoy science;
  - \*Choose science as a future career.

Mamlok-Naaman, R., Eilks, I., Bodner, A., & Hofstein, A. (2018). *Professional Development of Chemistry Teachers*. Cambridge: RSC Publications.

Thank you 😊

