Handout 5: Assessing Learning Outcomes within a Professional Learning Model

To understand if and how a cohesive program of teacher professional development meets the overall goals, you must first determine if each professional learning activity achieves the stated objective.[1]

Levels of professional learning assessment

There are five levels of professional learning assessment:

- Level 1: Participants' reactions
- Level 2: Participants' learning
- Level 3: Organization support and change
- Level 4: Participants' use of new knowledge and skills
- Level 5: Student learning outcomes

Table 1 presents possible data sources, guiding questions, and data use suggestions for each level, specific to mathematics teacher professional learning.

[1] Guskey, T.R. (2002), Does it make a difference? Evaluating professional development, *Educational Leadership, 59*(6), 45–51.

Table 1. Levels of professional learning assessments and possible data, instruments, and data use

Level	Questions you can ask at this level	Data you can collect to answer the questions	Instruments and protocols you can use to collect data	How you can use the data you collect
Level 1: Participants' reactions	• Did the participants like the workshop? • Did participants think they spent their time well? • Did the material make sense? • Will the workshop be useful? • Was the leader knowledgeable and helpful?	• Participant feedback • Observer notes	• Participant survey after the workshop (figure 1) • Observations of the workshop or professional development session	• To understand participants' reactions to professional development • To improve program design and delivery
Level 2: Participants' learning	• Did participants acquire the intended knowledge and skills?	• Teacher knowledge • Teacher reflections • Observer notes	• Participant survey • Participant demonstrations in professional development • Participant reflections (oral and/or written) (figure 2) • Observation protocol (figure 3)	• To improve program content, format, and organization • To understand what participants learned during PD
Level 3: Organizational support and change	• Were there opportunities for coaches and participants to plan for and discuss practice? • When, how, and with what frequency did coaches support new professional development practices?	• School records • Coaching logs	• Survey or form for generating feedback from division leaders, teachers, and school leaders (figure 4)	• To identify opportunities to support the teacher professional development • To improve organization of the teacher professional development
Level 4: Participants' use of new knowledge and skills	• Did participants implement new practices? • What challenges did participants face in implementing the new practices in the classroom?	• Observation notes • Teacher lesson plans	• Teacher surveys • Peer/coaching reviews • Observation protocol for all division leaders to use in observations of teachers or participants in professional development (figure 5)	• To document and improve the implementation of new teaching practices and strategies

Level	Questions you can ask at this level	Data you can collect to answer the questions	Instruments and protocols you can use to collect data	How you can use the data you collect
Level 5: Student learning outcomes	• Did teacher learning affect student performance or achievement? • Are students more confident as learners? • Is student attendance improving?	• Student content assessments • Student self-efficacy surveys • Student attendance • Student grades	• Student assessment scores • Formative assessment on specific mathematics skills • Student surveys of mathematics engagement or self-efficacy (figure 6)	• To understand what students know • To understand how students understand themselves as math learners

Sample instruments and data collection protocols

Level 1: Participants' reactions

Collect participant feedback or observer notes to assess participants' reactions to professional learning. For example, figure 1 presents an example participant survey that can be used as an "exit ticket" after a teacher workshop.

Figure 1. An example of a participant survey

Thank you for your participation in today's workshop. Please circle the statement that best describes your experience in the workshop to help us improve the design and facilitation of future workshops.

1. To what extent did today's workshop **meet your professional learning needs?**	It addressed my professional learning needs **completely.**	It addressed **some** of my professional learning needs.	It **did not address** my professional learning needs.	I was **already familiar** with this topic, so it didn't help much.
2. To what extent was today's workshop **aligned with your school's priorities** for improving instruction?	The workshop content was **very closely aligned** with my school's priorities for instructional improvement.	The workshop content was **somewhat aligned** with my school's priorities for instructional improvement.	The workshop content **was not aligned** with my school's priorities for instructional improvement.	The workshop content was **inconsistent** with my school's priorities for instructional improvement.

3. Please share suggestions for improving today's session:
   a. I would have liked to spend more time on:
   b. I would have liked to spend less time on:

Level 2: Participants' learning

There are many ways to capture what participants are learning, including participant self-reflection and observer notes. This level focuses on participants' self-assessment of their learning and possible opportunities to learn. Figure 2 provides an example of participant reflection prompts, and figure 3 presents an example protocol for observing teacher learning.

Figure 2. Example of a reflection sheet for participants

Thank you for your tremendous work in our workshop this week. Please respond to the question below about your learning related to the course goals.

1. Do you think you are better at using visual representations to solve mathematics problems by taking this course? Please explain in detail.

2. Which aspects of the course do you think have helped you get better at using visual representations to solve mathematics problems? Consider readings, math tasks, applets, discussions, notebook reflections, etc.

Figure 3. Example of an observation protocol for observing teacher workshop

Observer Instructions: Take running notes during the workshop. After the workshop, summarize observations related to the notes listed.

Agenda Items	Notes	Summary observations
Connecting Visual Representations and Symbolic Approaches (8:45 to 10:30 am) • Covering tables task • Experiences with language strategies • Debrief *Participant learning goals:* • Identify quantities and relationships and then connections among visual representations, algebraic expressions, procedures/computations, and ratio tables • Identify how both ratio tables and Double Number Lines (DNLs) show multiplicative relationships *Purpose of activity*: • Engage teachers in mathematics tasks that encourage both visual representations and symbolic approaches • Model language strategies to support teacher learning of language strategies	*Record start and end time for each activity* *Record notable reactions and responses to each activity by participants*	*For the activities in this time block, describe/summarize:* Noteworthy participant struggles/frustrations - signs of participant confusion, misunderstandings, frustration, etc. - factors that may hinder participant learning Noteworthy participant successes, positive engagements in learning, or satisfaction - signs of participant engagement, learning, satisfaction, etc. - factors that may facilitate participant learning

Level 3: Organizational support and change

To understand organizational support and change, collect data from school division leaders, school-based administrators, and teachers. Data collection methods can include school meeting agendas, questionnaires, structured interviews with administrators or participants, or mathematics instructional coaching logs. Figure 4 presents examples of a set of mathematics instructional coaching logs that you can use to collect data on mathematics coaches and their work with participating teachers.

Figure 4. Example of mathematics instructional coaching logs

Mathematics Instructional Coaching Log		
Date	**Name**	**Notes**
2/12	Susan	Focused coaching on mathematical communication; interested in more formative assessment prompts
2/14	Akilah	Discussed importance of productive struggle and how to foster it
2/15	Derek	Used visual representations and discussed student examples

Date:	Teacher:
	Mathematics Coaching Log
Date	**Pre-Conference**
	Focus of observation:
Date	**Observation**
	Notes:
Date	**Post-Conference**
Date	**Next Steps/Follow-up**

Level 4: Participants' use of new knowledge and skills

There are various ways to collect data to understand how participants are applying their new knowledge in the classroom. For example, data collection measures can include teacher lesson plans, self-assessment of learning, and observation rubrics. An example rubric in figure 5 presents one way to measure classroom discourse in a mathematics classroom.

Figure 5. Example rubric for observation focusing on a classroom centered on discourse (Hufferd-Ackles et al., 2004[2]).

	Teacher role	Questioning	Explaining mathematical thinking	Mathematical representations	Building student responsibility within the community
Level 0	Teacher is at the front of the room and dominates conversation.	Teacher is only questioner. Questions serve to keep students listening to teacher. Students give short answers and respond to teacher only.	Teacher questions focus on correctness. Students provide short answer-focused responses. Teacher may give answers.	Representations are missing, or teacher shows them to students.	Culture supports students keeping ideas to themselves or just providing answers when asked.
Level 1	Teacher encourages the sharing of math ideas and directs speaker to talk to the class, not to the teacher only.	Teacher questions begin to focus on student thinking and less on answers. Only teacher asks questions.	Teacher probes student thinking somewhat. One or two strategies may be elicited. Teacher may fill in an explanation. Students provide brief descriptions of their thinking in response to teacher probing.	Students learn to create math drawings to depict their mathematical thinking.	Students believe that their ideas are accepted by the classroom community. They begin to listen to one another supportively and to restate in their own words what another student has said.
Level 2	Teacher facilitates conversation between students, and encourages students to ask questions of one another.	Teacher asks probing questions and facilitates some student-to-student talk. Students ask questions of one another with prompting from teacher.	Teacher probes more deeply to learn about student thinking. Teacher elicits multiple strategies. Students respond to teacher probing and volunteer their thinking. Students begin to defend their answers.	Students label their math drawings so that others are able to follow their mathematical thinking.	Students believe that they are math learners and that their ideas and the ideas of their classmates are important. They listen actively so that they can contribute significantly.
Level 3	Students carry the conversation themselves. Teacher only guides from the periphery of the conversation. Teacher waits for students to clarify thinking of others.	Student-to-student talk is student initiated. Students ask questions and listen to responses. Many questions ask "why" and call for justification. Teacher questions may still guide discourse.	Teacher follows student explanations closely. Teacher asks students to contrast strategies. Students defend and justify their answers with little prompting from the teacher.	Students follow and help shape the descriptions of others' math thinking through math drawings and may suggest edits in others' math drawings.	Students believe that they are math leaders and can help shape the thinking of others. They help shape others' math thinking in supportive, collegial ways and accept the same support from others.

[2] K. Hufferd-Ackles, K. Fuson, & M. G. Sherin (2004), Describing levels and components of a math-talk learning community. *Journal for Research in Mathematics Education, 35*(2), 81–116.

Level 5: Student learning outcomes

Collecting data from students, for example, measures of student learning or student self-assessments can help you understand how teacher professional learning has influenced student learning outcomes. Figure 6 presents an example of a student self-understanding assessment.

Figure 6. Example of an instrument to measure student mathematics self-concept and mathematics anxiety (OECD, 2013)[3]

Math self-concept questions				
To what extent do you agree with the following statements?				
	Strongly Agree	Agree	Disagree	Strongly Disagree
I am just not good at mathematics.	1	2	3	4
I get good grades in mathematics.	1	2	3	4
I learn mathematics quickly.	1	2	3	4
I have always believed that mathematics is one of my best subjects.	1	2	3	4
In my mathematics class, I understand even the most challenging work.	1	2	3	4
Math anxiety questions				
To what extent do you agree with the following statements?				
	Strongly Agree	Agree	Disagree	Strongly Disagree
I often worry that it will be difficult for me in mathematics classes.	1	2	3	4
I get very tense when I have to do mathematics homework.	1	2	3	4
I get very nervous doing mathematics problems.	1	2	3	4
I feel helpless when doing a mathematics problem.	1	2	3	4
I worry that I will get poor grades in mathematics.	1	2	3	4

[3] Organization of Economic Cooperation and Development (OECD). (2013). *PISA 2012 results: Ready to learn: Students' engagement, drive and self-beliefs (Volume III)*. PISA, OECD Publishing. https://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-III.pdf