Setting the Stage

Section I

The current focus on classroom assessment comes out of changes that have been occurring over many years, in particular during the last decade of educational reform in teaching and learning. Section I of this document provides a context in which to understand these changes, particularly social and historical changes. It also examines how classroom assessment is used for multiple purposes, with special attention to the role of differentiated learning.

Key Ideas in Section I

- Classroom assessment practices are deeply rooted in societal expectations.
- Classroom assessment plays a major role in how students learn, their motivation to learn, and how teachers teach.
- Quality issues (reliability, reference points, validity, and record-keeping) are important in any classroom assessment.
- Identifying the purpose of any classroom assessment is critical for it to be productive and efficient.
- Planning classroom assessment based on purpose ensures that it will be coherent and effective.
- Teachers can use many different strategies and tools for classroom assessment, and can adapt them to suit the purpose and the needs of individual students.

Chapter 1

Why Change Classroom Assessment?

As society changes, educators find themselves faced with the task of creating schools that will serve their students well, even if they are uncertain about the nature of the society that their students will face in the future. During the past 50 years, massive cultural, social, economic, political, environmental, and technological changes have meant that every facet of schooling has been subjected to investigation and rethinking, including classroom assessment.

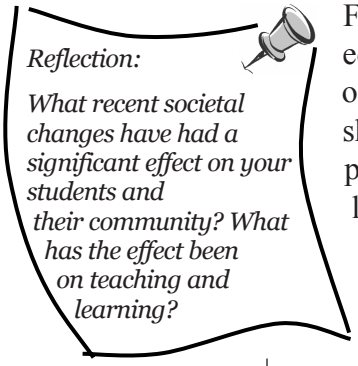
Throughout most of the 20th century, classroom assessment was considered a mechanism for providing an index of learning, and it followed a predictable pattern: teachers taught, tested the students' knowledge of the material, made judgements about students' achievement based on the testing, and then moved on to the next unit of work. More recently, however, this approach to assessment has come into question as societal expectations for schooling have changed, cognitive science has provided new insights into the nature of learning, and the traditional role of assessment in motivating student learning has been challenged.

- In the past, schooling beyond basic skills and knowledge was viewed as required by only a few. But now, high school graduation is considered a necessity for all, and the educational community is being asked to ensure that graduates be proficient in complex critical thinking, problem-solving, and effective communication to meet demanding societal, economic, and technological challenges.
- Learning was long thought to be an accumulation of atomized bits of knowledge that are sequenced, hierarchical, and need to be explicitly taught and reinforced. Learning is now viewed as a process of constructing understanding, during which individuals attempt to connect new information to what they already know, so that ideas have some personal coherence. Individuals construct this understanding in many different ways, depending on their interests, experience, and learning styles.

- Educators have traditionally relied on assessment that compares students with more successful peers as a means to motivate students to learn, but recent research suggests students will likely be motivated and confident learners when they experience progress and achievement, rather than the failure and defeat associated with being compared to more successful peers (Stiggins, 2001).

These three changes in societal expectations and in knowledge about learning and motivation have strong implications for how teachers teach, what they teach, and especially how they apply classroom assessment practices.

Classroom Assessment and Societal Change



Formal and informal assessment of learning has always been part of educational institutions. With the advent of universal schooling at the turn of the 20th century, children were expected to attend school to learn basic skills. Assessment was the mechanism for making decisions about future programs, and for providing information to parents about their children's learning.

At the middle of the 20th century, it became clear that schooling was an important key to social mobility, and that achievement in school was the basis for entry into the workplace. Tests and exams took on major importance in deciding which students would have access to higher education. Many jurisdictions instituted standardized testing programs alongside classroom assessment to ensure fair, accurate, and consistent opportunities for students.

Since the 1960s and 1970s, the purposes for classroom assessment have expanded. The terms *formative assessment* and *summative assessment* entered the language of educators—formative assessment being assessment that takes place during teaching to make adjustments to the teaching process, and summative assessment being assessment at the end of a unit or term to convey student progress. In order to fulfill these two purposes, educators extended their assessment practices and began assessing a wider range of student work, such as practical tasks, coursework, projects, and presentations. For the most part, however, assessment was still a matter of making statements about students' weaknesses and strengths.

Expectations of schooling now include these types of valued outcomes:

Knowledge: knowing and understanding substantive subject matter content

Reasoning: using the knowledge and understanding to figure out things and solve problems

Performance skills: doing something where it is the process that is important

Dispositions: developing valued feelings, attitudes, interests, and motivations

(Adapted from Stiggins, *Leadership for Excellence in Assessment: A Powerful New School District Planning Guide*)

More recently, the focus in educational policy has been on preparing all students for tomorrow's world. At the same time, the expectations for students have increased in breadth and depth, dramatically affecting teachers' instructional and assessment roles, and students' roles as learners.

The Effects of Classroom Assessment on Learning

Resource:
Lambert and McCombs, *How Students Learn: Reforming Schools through Learner-Centered Education*

There is considerable evidence that assessment is a powerful process for enhancing learning. Black and Wiliam (1998) synthesized over 250 studies linking assessment and learning, and found that the intentional use of assessment in the classroom to promote learning improved student achievement. Increasing the amount of time on assessment, however, does not necessarily enhance learning. Rather, when teachers use classroom assessment to become aware of the knowledge, skills, and beliefs that their students bring to a learning task, use this knowledge as a starting point for new instruction, and monitor students' changing perceptions as instruction proceeds, classroom assessment promotes learning.

Learning is an interactive process by which learners try to make sense of new information and integrate it into what they already know. Students are always thinking and they are either challenging or reinforcing their thinking on a moment-by-moment basis.

Before teachers can plan for targeted teaching and classroom activities, they need to have a sense of what it is that students are thinking. What is it that they believe to be true?

This process involves much more than "Do they have the right or wrong answer?" It means making students' thinking visible and understanding the images and patterns that they have constructed in order to make sense of the world, from their perspective.

(Earl, *Assessment as Learning: Using Classroom Assessment to Maximize Student Learning*)

When learning is the goal, teachers and students collaborate and use ongoing assessment and pertinent feedback to move learning forward. When classroom assessment is frequent and varied, teachers can learn a great deal about their students. They can gain an understanding of students' existing beliefs and knowledge, and can identify incomplete understandings, false beliefs, and naïve interpretations of concepts that may influence or distort learning. Teachers can observe and probe students' thinking over time, and can identify links between prior knowledge and new learning.

Learning is also enhanced when students are encouraged to think about their own learning, to review their experiences of learning (What made sense and what didn't? How does this fit with what I already know, or think I know?), and to apply what they have learned to their future learning. Assessment provides the feedback loop for this process. When students (and teachers) become comfortable with a continuous cycle of feedback and adjustment, learning becomes more efficient and students begin to internalize the process of standing outside their own learning and considering it against a range of criteria, not just the teacher's judgement about quality or accuracy.

Human beings engage in metacognition—reflecting on their own thinking processes. Experts describe metacognitive thinking as an internal conversation—monitoring their own understanding, predicting their performance, deciding what else they need to know, organizing and reorganizing ideas, checking for consistency between different pieces of information, and drawing analogies that help them advance their understanding.

(Costa, Prologue to Heryle, *Visual Tools for Constructing Knowledge*)

When students engage in this ongoing metacognitive experience, they are able to monitor their learning along the way, make corrections, and develop a habit of mind for continually reviewing and challenging what they know.

Stages in Growth from Emergent to Proficient

Little or no practical experience. Dependent on "rules" and emulating those thought to be proficient.	Expects definitive answers. Some recognition of patterns. Limited experience. Still relies on rules.	Locates and considers possible patterns. Has internalized the key dimensions so that they are automatic.	Uses analysis and synthesis. Sees the whole rather than aspects. Looks for links and patterns. Adjusts to adapt to the context.	Understands the context. Has a holistic grasp of relationships. Considers alternatives and independently integrates ideas into efficient solutions. Makes ongoing adaptations automatically.

When they are learning in any area, students make connections and move along a continuum from emergent to proficient. Learners at the emergent stage are generally uncertain, and rely heavily on direct instruction, modelling, and whatever "rules" may exist to give them direction about how to proceed, with little sense of underlying patterns. As learners become more competent, they develop more complex schemata of understanding, gain in confidence and independence, and become efficient in problem-solving within new contexts. They are able to apply the new learning independently and direct their own learning.

Reflection:

Think about something in which you are proficient. How did you move from emergent to proficient? Describe the experiences that you had along the way and what insights they provide about your growth in learning.

Think of something in which you consider yourself to be at the emergent stage. What are those who are proficient in this area doing that you want to emulate?

When teachers understand this emergent-to-proficient process as it relates to curriculum outcomes, they can use assessment as the mechanism for helping students understand and value their own learning and predict what comes next. The ongoing cycle of assessment and feedback can guide students and scaffold their learning as they move along the learning continuum.

Classroom Assessment and Its Effects on Motivation

Motivation is essential for the hard work of learning. The higher the motivation, the more time and energy a student is willing to devote to any given task. Even when a student finds the content interesting and the activity enjoyable, learning requires sustained concentration and effort.

Resource:
Brophy, "Synthesis of Research on Strategies for Motivating Students to Learn"

Past views of motivation were heavily influenced by the behaviourist psychology of the 1960s and 1970s, in which a schedule of rewards and punishments led to either reinforcing or extinguishing a particular behaviour. It was believed that assessment and grading motivated students to work hard and to learn. It is now understood that the relationship between grades and motivation is neither simple

The logic of using assessment to motivate improvement is relatively simple:

- Assessments can communicate meaningful standards to which school systems, schools, teachers, and students can aspire.
- These standards can provide focus and direction for teaching and learning.
- Results from the assessment support important insights on the nature, strengths, and weaknesses of student progress relative to the standards.
- Educators and students use this feedback to understand and direct their attention to improving relevant aspects of student learning.
- Assessment can motivate students to learn better, teachers to teach better, and schools to be more educationally effective.

(Herman and Klein, *Assessing Opportunity to Learn: A California Example*)

nor predictable. Grades have been found to be motivating for some students, and demotivating for others. Students who generally do well are often motivated by the likelihood of success and praise that accompanies doing well. Students who typically do not do well may choose to avoid the likelihood of a failure by devaluing the assessment process and even school.

According to current cognitive research, people are motivated to learn by success and competence. When students feel ownership and have choice in their learning, they are more likely to invest time and energy in it. Assessment can be a motivator, not through reward and punishment, but by stimulating students' intrinsic interest. Assessment can enhance student motivation by

- emphasizing progress and achievement rather than failure
- providing feedback to move learning forward
- reinforcing the idea that students have control over, and responsibility for, their own learning
- building confidence in students so they can and need to take risks
- being relevant, and appealing to students' imaginations
- providing the scaffolding that students need to genuinely succeed

Using Classroom Assessment for Differentiating Learning

Classes consist of students with different needs, backgrounds, and skills. Each student's learning is unique. The contexts of classrooms, schools, and communities vary. As well, the societal pressure for more complex learning for all students necessitates that teachers find ways to create a wide range of learning options and paths, so that all students have the opportunity to learn as much as they can, as deeply as they can, and as efficiently as they can.

Resources:

- Gregory and Chapman, *Differentiated Instructional Strategies*
- Hutchison, *Inclusion of Exceptional Learners in Canadian Schools*
- Manitoba Education and Training, *Success for All Learners: A Handbook on Differentiating Instruction*

Many jurisdictions have moved toward differentiated instruction—from the one-size-fits-all emphasis on the whole class to identifying the unique learning patterns of each student, using various instructional approaches to accommodate the range of learning patterns and styles, including designing instruction for students with various learning challenges and disabilities.

In the past, instruction and assessment were differentiated only for those students with identified needs. The class was typically regarded as a

homogeneous unit, and teachers used phrases such as "The lesson went well for the class" or "My students seemed to grasp that concept well." Any student for whom the lesson did not go well was considered an exception. Students with labels such as "learning disability," "English as a second language," "attention deficit disorder," or "gifted" were seen as "different" from the rest of the class, and the rest of the class was seen as a single entity. Yet, differences exist among all students, not just those with such labels. It is individuals, not classes, who learn. When students learn, they make meaning for themselves, and they approach learning tasks in different ways, bringing with them their own understanding, skills, beliefs, hopes, desires, and intentions. It is important to consider each individual student's learning, rather than talk about the learning of "the class."

Universal Design for Learning

Universal Design for Learning extends principles used in architecture and product design to learning. Universally designed environments and products accommodate the widest spectrum of users, and adaptability is subtle and integrated into the design. So, too, can teachers adjust teaching, assessment, and learning to accommodate all students, not just those with disabilities. Learning materials can be varied and adaptable to include, for example, multi-sensory digital learning tools and digital resources, rather than centering on printed text. Assessment tasks can be designed to allow students to demonstrate their accomplishment of learning outcomes through visual, active, and oral modes, as well as through writing.

(Adapted from Center for Applied Special Technology, Universal Design for Learning)

Assessment practices lead to differentiated learning when teachers use them to gather evidence to support every student's learning, every day in every class. In order to meet the wide range of abilities, motivations, and learning styles of their students, teachers need to differentiate the extent of independence with which students work, and the types and complexity of the learning. Curriculum guides and programs of study provide the learning outcomes that teachers use to tailor assessment and instruction to help students learn and make sense of their learning.

Shifting Paradigms: From "Deficit" Explanations of Diversity to "Inclusive" Strategies for All

Deficit Paradigm	Inclusion Paradigm
• what's wrong with the child	• what's wrong with the environment
• focus on deficits	• focus on strategies
• prescriptive	• malleable
• tolerates differences	• embraces differences
• takes child out of class	• keeps child in class
• reliance on external expert	• teacher/parent as expert
• professionalized	• personalized

(Adapted from Philpott et al., *Supporting Learner Diversity in Aboriginal Schools*)

The learning needs of some students are so significant, however, that they may require individualized learning plans in which the curricular learning outcomes have been adjusted. Teachers of these students can access support from professionals and resource materials specific to the student's particular learning needs.

Quality in Classroom Assessment

Classroom assessment involves complex processes requiring teachers' professional judgement. Teachers decide how to assess, what to assess, and when to assess. They also interpret students' learning according to reference points for success, such as curricular learning outcomes. The inferences about students'

learning that teachers make need to be credible, fair, free from bias, and connected to their intended purposes.

> Assessment methods should be free from bias brought about by student factors extraneous to the purpose of the assessment. Possible factors to consider include culture, developmental stage, ethnicity, gender, socio-economic background, language, special interests, and special needs. Students' success in answering questions on a test or in an oral quiz, for example, should be not be dependent upon prior cultural knowledge, such as understanding an allusion to a cultural tradition or value, unless such knowledge falls within the content domain being assessed. All students should be given the same opportunity to display their strengths.
>
> (*Principles for Fair Assessment Practices for Education in Canada*)

Assessment is fundamentally a measurement process, subject to the principles of measurement. Measurement, as it is used here, is defined in the broadest sense of "determining the degree of something." In order to make the right decisions about students, it is necessary that teachers adhere to these basic measurement principles.

There are four basic principles or quality issues that are important in classroom assessment: reliability, reference points, validity, and record-keeping.

Reliability

In classroom assessment, reliability addresses the questions How sure am I? How confident am I that this assessment process provides enough consistent and stable information to allow me to make statements about a student's learning with certainty?

When teachers make statements about students' learning, they are making inferences about what students know and can do from the evidence that is available to them through assessment. If the assessment process is reliable, the inferences about a student's learning should be similar when they are made by different teachers, when the learning is measured using various methods, or when students demonstrate their learning at different times. If teachers are unsure about whether the inferences would be consistent under all these conditions, there is a question about reliability. When there is any doubt, there is probably not yet enough information to make a reliable statement.

There are many ways to promote reliability:

- Teachers can use a variety of assessment tasks to provide a range of information. The more information gathered, the clearer is the picture of a student's learning profile.
- Students can show their learning in many different ways. If teachers are to have a good understanding of an individual student's learning, they need to allow that student to demonstrate his or her competence in a manner that suits his or her individual strengths. For example, one student may choose to do an oral presentation to demonstrate understanding of a concept, while another may choose to complete a written text. Teachers can use a variety of systematic processes—for example, scoring keys, rubrics, rating scales, and continua—to make statements about student work in relation to the learning outcomes.

Enhancing Reliability by Working Together

Little et al. ("Looking at Student Work") found that when teachers were "invited to look closely together at evidence of student learning," it opened up the dialogue about what counts and what is good evidence. Discussions became valuable when the teachers started talking about their instruction and framed their suggestions in ways that linked to the problem of student learning as reflected in the student work. This took time because teachers had to get to a point where they were doing the unfamiliar—looking at student work without evaluative judgement. But, as they talked about what was in the work in descriptive rather than in evaluative terms, they were able to make their criteria more explicit and talk about the criteria with the group.

- Teachers can work with other teachers to review student work. By working together, they establish agreement among themselves about what is expected and what can be learned from a particular assessment. Bringing a collective insight about what is expected to the exercise results in more reliable determinations of what students understand.

Reference Points

The interpretation of any kind of measurement depends on reference points. When carpenters measure distance, they use metres and centimetres; meteorologists refer to temperature in relation to the freezing point of water (0° C); restaurant reviewers rate the food in restaurants based on quality, originality, and presentation. In classroom assessment, there are three reference points teachers use when considering a student's performance:

1. How is the student performing in relation to some pre-determined criteria, learning outcome, or expectation (criteria- or outcomes-referenced)?
2. How is the student performing in relation to the performance of other students in the defined group (norm-referenced)?
3. How is the student performing in relation to his or her performance at a prior time (self-referenced)?

If all three of these reference points are used together, and the distinctions among them are blurred, the resulting score or statement of learning does not provide clear information about the nature or quality of the specific learning. A common but problematic scenario when considering a student's work is to pay particular attention to the content knowledge that the student has demonstrated in the unit or course. Then that student's work is compared to that of other students in that class and other classes. Finally, adjustments are made to the judgement based on past performance and behaviour (e.g., work turned in, attendance, work habits). The lack of clarity inherent in this process, however, makes it difficult for anyone other than the teacher to disentangle the three reference points. The resulting score or statement doesn't provide detail about the nature or quality of the specific learning.

Each reference point results in a different kind of interpretation about students' learning. It is only by clearly distinguishing the reference points that teachers can provide students, parents, and the general public with meaningful information about what is deemed important, and what the stages are in the journey from emergent to proficient.

Validity

Validity in classroom assessment is about the accuracy of the interpretation and the use of assessment information: How well does the assessment measure what I'm trying to measure? Does the interpretation of the results lead to appropriate conclusions and consequences?

When thinking about validity, we focus on the inferences that are drawn from an assessment and the consequences of these inferences for those who have been assessed. When an assessment is misinterpreted or used for purposes that were not intended, the result may be poor decisions and problematic consequences.

Validity of classroom assessment depends on

- analyzing the intended learning and all its embedded elements
- having a good match among the assessment approaches, the intended learning, and the decisions that teachers and students make about the learning
- ensuring that the assessment adequately covers the targeted learning outcomes, including content, thinking processes, skills, and attitudes
- providing students with opportunities to show their knowledge of concepts in many different ways (i.e., using a range of assessment approaches) and with multiple measures, to establish a composite picture of student learning

Unintended Consequences from an Invalid Interpretation

Imagine that a social studies curriculum outcome for students is "organization and communication" and that the objective includes these sub-items:

- students recall, rank, and select historical information
- students accurately select and use chronological conventions
- students communicate their knowledge and understanding of historical events

In teaching this complex constellation of concepts in a unit about events that led to World War II, a teacher provides the students with detailed graphic organizers and processes for identifying the pertinent information, organizing it, interpreting it, and presenting a summary. As an end-of-unit assessment, the teacher asks the students to review a selection of material that they had studied in class and use a graphic organizer to produce a detailed summary of the events leading to World War II.

The teacher intends this assessment to infer whether the students had internalized the concepts and skills associated with "organization and communication," and to report to parents about each student's level of competence on this outcome.

However, because the material that appeared on the assessment was not new and the students had already practised creating graphic organizers with this material, the teacher's inference is faulty. In fact, he is able to assess only the students' recognition and recall from prior exposure, not their ability to organize and communicate new material.

When these students move to the next teacher, they are assumed to have a base of skill in organizing and communicating, and so may not be given an opportunity to develop and internalize these key skills.

Record-Keeping

High-quality record-keeping is critical for ensuring quality in classroom assessment. The records that teachers and students keep are the evidence that support the decisions that are made about students' learning. The records should include detailed and descriptive information about the nature of the expected learning as well as evidence of students' learning, and should be collected from a range of assessments.

Chapter 2

Purposes of Classroom Assessment

Chapter 1 provided the context and arguments for the necessity of changing classroom assessment. In this chapter, the emphasis is on the purposes of classroom assessment. It asserts that assessment works best when its purpose is clear, and when it is carefully designed to fit that purpose.

The focus of this document is on three[2] distinct but inter-related purposes for classroom assessment: assessment *for* learning, assessment *as* learning, and assessment *of* learning.

1. Assessment *for* learning is designed to give teachers information to modify and differentiate teaching and learning activities. It acknowledges that individual students learn in idiosyncratic ways, but it also recognizes that there are predictable patterns and pathways that many students follow. It requires careful design on the part of teachers so that they use the resulting information to determine not only what students know, but also to gain insights into how, when, and whether students apply what they know. Teachers can also use this information to streamline and target instruction and resources, and to provide feedback to students to help them advance their learning.
2. Assessment *as* learning is a process of developing and supporting metacognition for students. Assessment as learning focusses on the role of the student as the critical connector between assessment and learning. When students are active, engaged, and critical assessors, they make sense of information, relate it to prior knowledge, and use it for new learning. This is the regulatory process in metacognition. It occurs when students monitor their own learning and use the feedback from this monitoring to make adjustments, adaptations, and even major changes in what they understand.

2. Some authors identify only two categories: assessment *of* learning and assessment *for* learning. As such, the term assessment *for* learning encapsulates the ideas described here in two categories—assessment *for* learning and assessment *as* learning.

It requires that teachers help students develop, practise, and become comfortable with reflection, and with a critical analysis of their own learning.

3. Assessment *of* learning is summative in nature and is used to confirm what students know and can do, to demonstrate whether they have achieved the curriculum outcomes, and, occasionally, to show how they are placed in relation to others. Teachers concentrate on ensuring that they have used assessment to provide accurate and sound statements of students' proficiency, so that the recipients of the information can use the information to make reasonable and defensible decisions.

Reflection:

*What is an example from your teaching practice of assessment **for** learning? assessment **as** learning? assessment **of** learning?*

Balance and Tensions in Assessment Purposes

Assessment *for* learning, assessment *as* learning, and assessment *of* learning all serve valuable, and different, purposes. It is not always easy, however, getting the balance right. If we want to enhance learning for all students, the role of assessment *for* learning and assessment *as* learning takes on a much higher profile than assessment *of* learning. Traditionally, the focus of classroom assessment has been on assessment *of* learning—measuring learning after the fact, using the information to make judgements about students' performances, and reporting these judgements to others. Teachers traditionally have also been using assessment *for* learning when they built in diagnostic processes, formative assessment, and feedback at various stages in the teaching and learning process, though it was often informal and implicit. Systematic assessment *as* learning—where students become critical analysts of their own learning—was rare. Although some teachers have incorporated self-assessment into their programs, few have systematically or explicitly used assessment to develop students' capacity to evaluate and adapt their own learning.

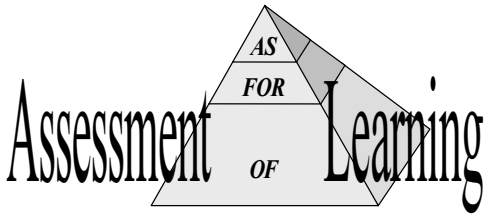
The first pyramid illustrated in Fig. 2.1 shows the traditional relationship of the three approaches to one another, assessment *of* learning being the predominant focus. The second pyramid suggests a reconfiguration of the balance among the three approaches, one that emphasizes assessment *as* learning, and assessment *for* learning. Assessment *of* learning has an important role to play, but is used only when summative judgements are required.

Reflection:

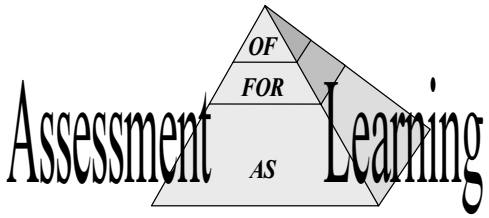
Where are you on an emerging-proficient continuum in your understanding of different classroom assessment purposes and how purpose influences the assessment process?

It is purpose that dictates how assessment is constructed and used. If the purpose is enhancing learning, the assessment needs to give students an opportunity to make their learning apparent without anxiety or censure. If the purpose is checking learning for reporting, teachers need to be especially concerned about the quality of the assessment, and how it might be used by others. It is very difficult, and sometimes impossible, to serve three different assessment purposes at the same time. It is important for educators to understand the three assessment purposes, recognize the need to balance among them, know which one they are using and why, and use them all wisely.

Fig. 2.1 Balance Among Assessment Purposes



Traditional Assessment Pyramid



Reconfigured Assessment Pyramid

Earl, *Assessment as Learning: Using Classroom Assessment to Maximize Student Learning*

Planning the Assessment Process

Careful planning is required to ensure that there are logical connections among the purpose, methods, and use of the results. Classroom assessment is planned in relation to purpose and in alignment with curriculum and instruction. Curriculum, assessment, instruction, and learning are interconnected and interact in an iterative and sometimes (but not always) cyclical process. All four need to be aligned and coherent for the learning to be effective and meaningful.

Resource:
Wiggins and McTighe, *Understanding by Design*

The process of planning is what provides a blueprint that centres on the purpose, makes the connections explicit, and creates a coherent organizational structure. Against this blueprint teachers can constantly question their strategies: Are my strategies still appropriate and aligned? Do I need to make adjustments or perhaps even shift direction? Although teachers do not need to adhere strictly to their plans, without proper planning it is difficult to ensure balance and coherence. Section II outlines a set of planning considerations for designing and using assessment *for* learning, assessment *as* learning, and assessment *of* learning.

Backward Mapping: Planning with the End in Mind

As teachers, we sometimes begin planning a unit or sequence of learning activities by identifying a topic and favoured lessons and activities that optimize the resources we already have on hand, then proceed with teaching the material. Somewhere at the end of this process, we assess what students have learned, only to discover that the lessons or the assessment tools did not align well with curricular expectations.

Backward mapping, on the other hand, creates the necessary alignment among desired outcomes, assessment tools, and teaching strategies by turning the planning process on its head. It prompts us to start at "the end" with the goals and outcomes we hope to achieve. Once the Where do we need to end up? question is answered, then the subsequent questions How can we best get there? and How will I know when we've arrived? can be considered. Backward mapping requires us not only to think about the curricular goals we want students to meet, but also to deconstruct the complex learning processes involved to identify the stages of learning. It also requires us to consider the misconceptions and confusions we might encounter along the way, and decide how we will assess whether students are progressing toward the goals. Only then should we begin considering which assessment and instructional strategies would work best to support students in working toward the desired outcomes.

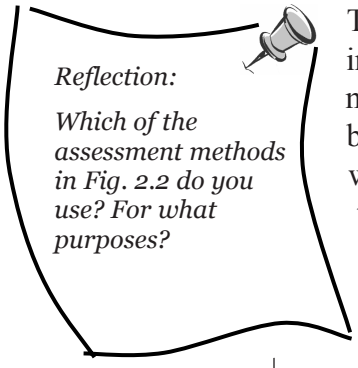
Reporting

The fundamental purpose of reporting is to enable parents and students to understand the student's performance at a specific point in time, and to decide what is required for future progress. More complex forms of classroom assessment require new ways of reporting. These new ways need to include both a frame of reference and sufficient information, so that an outsider can make sense of the information. Suggestions should be included about how the information could be used to help make reasoned judgements. The reports should clearly state purpose and learning outcomes, and should present an accurate profile of a student in relation to these. G. Wiggins (1998) suggests that reporting be outcome-based, honest yet fair, rich in context, and user friendly. This kind of reporting

> Revision of report cards is best not construed as a matter of teachers coming up with new designs and grading systems based on their own interests. Better reports require that we ask a radical question: Who is the audience and what is the purpose of reporting?
>
> (Wiggins, *Educative Assessment: Designing Assessment to Inform and Improve Student Performance*)

- explicitly identifies the purpose of the assessment
- provides sufficient context and points of reference to make interpretation reasonable
- uses a variety of descriptors and symbols (e.g., letter or percent grades) that have clear, agreed-upon, and stable meaning
- provides rich, detailed information and evidence (not just a single grade)

Assessment Tool Kit



The variety of methods available for collecting, interpreting, and reporting information about what students know and can do is endless, and there are many excellent resources for teachers.[3] Although some methods have come to be associated with assessment during instruction and learning, and others with assessment at the end of a unit or term, there are a variety of methods that can be used for all three purposes: assessment *for* learning, assessment *as* learning, and assessment *of* learning. What is important is that teachers first clarify the purpose of assessment and then select the method that best serves the purpose in the particular context. The list in Fig. 2.2 is not exhaustive, but gives examples of the kinds of methods that teachers can use for assessment purposes. Although the methods have been organized by function—gathering information, interpreting information, keeping records, and communicating—there are indeed interrelationships among them, and it is important to note that some methods belong in multiple categories.

3. See Resources for Further Reading at the end of this document for a partial list, as well as the resources noted in the margins throughout.

Fig. 2.2 Assessment Tool Kit

Method	Description
Gathering Information	
Questioning	asking focussed questions in class to elicit understanding
Observation	systematic observations of students as they process ideas
Homework	assignments to elicit understanding
Learning conversations or interviews	investigative discussions with students about their understanding and confusions
Demonstrations, presentations	opportunities for students to show their learning in oral and media performances, exhibitions
Quizzes, tests, examinations	opportunities for students to show their learning through written response
Rich assessment tasks	complex tasks that encourage students to show connections that they are making among concepts they are learning
Computer-based assessments	systematic and adaptive software applications connected to curriculum outcomes
Simulations, docudramas	simulated or role-playing tasks that encourage students to show connections that they are making among concepts they are learning
Learning logs	descriptions students maintain of the process they go through in their learning
Projects and investigations	opportunities for students to show connections in their learning through investigation and production of reports or artifacts
Interpreting Information	
Developmental continua	profiles describing student learning to determine extent of learning, next steps, and to report progress and achievement
Checklists	descriptions of criteria to consider in understanding students' learning
Rubrics	descriptions of criteria with gradations of performance described and defined
Reflective journals	reflections and conjecture students maintain about how their learning is going and what they need to do next
Self-assessment	process in which students reflect on their own performance and use defined criteria for determining the status of their learning
Peer assessment	process in which students reflect on the performance of their peers and use defined criteria for determining the status of their peers' learning
Record-Keeping	
Anecdotal records	focussed, descriptive records of observations of student learning over time
Student profiles	information about the quality of students' work in relation to curriculum outcomes or a student's individual learning plan
Video or audio tapes, photographs	visual or auditory images that provide artifacts of student learning
Portfolios	systematic collection of their work that demonstrates accomplishments, growth, and reflection about their learning
Communicating	
Demonstrations, presentations	formal student presentations to show their learning to parents, judging panels, or others
Parent-student-teacher conferences	opportunities for teachers, parents, and students to examine and discuss the student's learning and plan next steps
Records of achievement	detailed records of students' accomplishment in relation to the curriculum outcomes
Report cards	periodic symbolic representations and brief summaries of student learning for parents
Learning and assessment newsletters	routine summaries for parents, highlighting curriculum outcomes, student activities, and examples of their learning

A Vignette of Assessment in Action

Assessment happens every day in classrooms. It is inextricably tied to instruction, and is always mediated by the particular needs of students. The following vignette shows two teachers' learning journey as they collaborate, plan, rethink, try out, and reflect on their assessment and instruction practices. Their explanation sets the stage for the approaches elaborated upon in subsequent chapters.

Christine was in the staff room of her Middle Years school, marking math tests and thinking about what she could do to help Sam. He'd failed another math test. Sam was an enigma to her. Sometimes he responded well to questions she asked him in class, but mostly he just looked down. Recently, he had begun disturbing others in class.

Paul, the drama teacher, came in. *"Hi Chris. You look to be deep in thought. Is something wrong?"*

"I'm concerned about Sam. He just failed another test. Have you noticed anything unusual about his behaviour in drama class recently?"

"No. But I have been very impressed with the creative ideas he has for blocking the set."

"Blocking the set? What do you mean?"

"It's part of staging a play, deciding where to place things on the stage, what props we need, who should enter from where, things like that. Sam has a different way of seeing things that really helped the class plan the stage layout. He's able to visualize the scene and the entire stage. He had several suggestions about where to put the props to divide the stage into areas that are complex irregular shapes, but are all about equal size so that each area is just large enough for the characters and the action. And he suggested a way to move just one wall to make a different configuration for another scene, without disrupting the visual proportions."

Christine looked surprised. *"It sounds like he's applying mathematical concepts. It doesn't sound like the same Sam that I had just been thinking about."* Christine began to think about how to tap into Sam's ability to visualize spatial relationships and use this to scaffold his math learning.

"You know, Paul, I've also been thinking about the professional growth plan that we're to do. I'd like to do something to help me better understand Sam. Maybe we could work as a team, if you're interested? We could focus on differentiating instruction, not just for Sam, but for all of the kids." Christine had been thinking about the diversity of the students in her class and the need for diversity in relation to their learning. Two of the students were following individual learning plans and several others were new learners of English. In fact, one boy, Saad, had just arrived from North Africa.

The next day, Paul and Christine began drafting their joint professional growth plan. They agreed to take an action research approach to understanding Sam's and the others' learning needs. The focus would be mathematics. Christine would work with Sam in the classroom, and Paul would make focussed observations of Sam in drama class and one day a week in Christine's math class. Paul would also contribute and learn by being be a "critical friend" to Christine as they generated ideas, planned instruction, debriefed how things worked, and reflected on what they were learning. They made a list of books and websites to investigate, and agreed to meet once a week. They would each keep journals of their planning, the results of their strategies, their reflections, and questions for follow-up.

Christine was about to start a mathematics unit on operations with fractions. Here was their chance to put their plan into action. Before moving into adding and subtracting fractions, Christine needed to assess what each student already

understood about fractions, the gaps in understanding, and their thinking processes when working with fractions. Christine and Paul developed a set of tasks designed to gather some initial understanding of students' prior knowledge in relation to the following outcomes from previous grades:

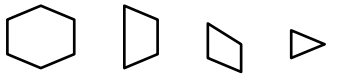
- basic concepts and representations of fractions: transfers easily among concrete, pictorial, verbal, and symbolic representations
- ordering of fractions: independently orders a sequence of fractions involving any combination of conditions
- equivalent fractions: given a fraction, can find and state a whole series of equivalent fractions
- communicating mathematical thinking in fractions: work is shown and explanations are clear and fully developed; use of mathematical language is precise

Each student was given grid paper, counters, and a set of fraction tiles to use in any way he or she wished. They were each given six sheets of paper, with one task on each sheet. On their task sheets they were to demonstrate their thinking as they came up with solutions. They could demonstrate this thinking by drawing or writing, or both. The first task would be done in their "home groups." The remaining five tasks would be done individually, but their explanations would be shared with their "math buddy" later.

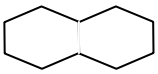
Christine explained that their work on these tasks would give them, as well as her, a good idea about what they needed to do next in order to fully understand fractions and the operations with fractions that they would soon be learning.

Following are the six orientation tasks that the students were given:

1. For this task, you can work in your "home groups." You'll need the following fraction tiles.



   Suppose the following shape is 1 whole.



   By placing fraction tiles on the shape, represent one or more of the following fractions in as many ways as possible: 1/2, 2/3, 1/6, 3/4.

   Draw and write the symbols for all the equivalent fractions that you make.
2. Which fraction is larger: 1/6 or 1/5? Show or explain your thinking.
3. Replace the "?" with a number to complete the following equation: 18/24 = 6/?
4. Put the following fractions in order from smallest to largest: 3/4, 1/6, 4/3, 5/6, 7/6, 7/12, 1/5.
5. Suzanne has 11 cookies, and she wants to share them with her 3 friends. How many cookies will Suzanne and each of her friends get? Show how you know with a diagram.
6. (a) Odette and George each have the same kind of chocolate bar. Odette still has 3/4 of her chocolate bar left. George has 7/12 of his left. Who has more chocolate left? Show how you know this with a diagram.

   (b) How much chocolate do Odette and George have in total?

As they were approaching the end of the math class, Christine asked the students to look at the six sheets that they had been working on and make two piles. One pile would contain the tasks they thought they understood how to do; they marked all of the pages in this pile with a check mark (✔). The other pile would contain the tasks they felt they didn't fully understand, or

ones where they were unsure about how to proceed. These pages were marked with a question mark (?). After class, Christine reviewed the task sheets.

At the beginning of the next math class, the students were given their math task sheets and, with their math buddies, shared their thinking and how they arrived at their solutions. The math buddies' task was to ask for more information or clarification about their buddies' thinking. During these exchanges, Christine circulated about the room, observing and making notes about their understandings, gaps, and misconceptions.

In a class debriefing with the students about the tasks, Christine asked questions.

Christine: *Let's start with the second task. Sabrina, which fraction is larger, 1/6 or 1/5? How do you know?*

Sabrina: *1/5 is larger. I know because I drew two identical circles and cut one into 5 equal parts and the other into 6. When you look at them, the slice that represents 1/5th is bigger. If it were a pizza, I'd rather be sharing among 5 than 6. That way I get more.*

Christine: *Clifford, do you agree?*

Clifford: *Yes I do. If the whole thing is cut into 5 pieces, then the pieces are bigger than if it is cut into 6 pieces.*

Christine: *So, 1/5 is bigger than 1/6. Even though 6 is bigger than 5. Sam? Is that true?*

Sam: *Yeah, it kinda doesn't make sense but when you look at it in a picture, you can see it. When there are fewer pieces, the number on the bottom of the fraction is smaller. And the pieces are bigger.*

Christine: *Anthony, what do you think about the third task? What does the "?" stand for?*

Anthony: *I'm not sure. It might be 8. I tried to think about having 24 marbles and if I took 18 of them, that would be 18 of 24. So, if I had 6 marbles out of something and it was the same, I think it would be out of 8, but I'd only have 6 marbles. I don't know. It's confusing.*

Christine: *Any thoughts about this one, Penny?*

Penny: *Yeah, 18/24 is 3/4 and 6/8 is also 3/4. So, Anthony is right. The question mark stands for 8.*

Christine: *Let's look at the fourth task. Trevor, what did you think is the largest fraction, and why?*

Trevor: *4/3 and 7/6 are the largest because they're both larger than one. 4/3 is the same as 8/6, which is larger than 7/6. Therefore, 4/3 is the largest fraction.*

Based on her observations of students working on the tasks (in groups and individually), their explanations of their thinking to their math buddies, her review of their task sheets, and the questioning in class, Christine completed an observation form that she and Paul had designed. The accompanying chart provides a sample of her records.

When Christine met with Paul next, she explained how this process of collecting evidence of students' understanding had already shown her much. After Paul had reviewed her notes, he said, *"Well, it looks like the kids are all over the map in their understanding. And Sam doesn't stand out as a problem. His profile is not that different from some of the others. He actually seems to have a pretty good sense of the concepts. Am I right?"*

"Yes. Sam has trouble expressing what he knows and can do, but I think he basically understands the concepts. It's as if he doesn't have the mathematical language to represent what he is thinking. The pictures he draws are accurate, but that doesn't translate into the abstract language of mathematics. What I find amazing is that there are many kids like Sam who get the concepts, but don't know how to express what they know. And, there are some who really need to have more direct experience with the concepts related to 'parts of a unit' before they go on to do operations with fractions. A couple of them need even more than that. I need to find a way for them to catch up."

Based on what each student needed to learn next, Christine began planning her instruction and determining groups. Many of the students already demonstrated a solid grasp of the concepts and were ready to move forward with some consolidation

Summary of Observations: *Prior Knowledge of Fractions*		
Student	**Understanding**	**Feedback, ideas, and follow-up**
Trevor	*Readily transfers among concrete, pictorial, symbolic representations and has a good sense of the congruence across different representations.* *Correctly ordered the entire series of equivalent fractions and was already talking about how they would be represented in decimals and percents.* *Uses mathematical language. Explanations (verbal and written) are clear and precise.* *Understood all questions, including the basic addition of fractions task.*	*Ready to work with addition and subtraction of fractions.* *Provide challenging opportunities to apply fractions and complex representations.*
Anthony	*Was able to work with the shapes with ease and found several equivalent fractions.* *Provided the correct answer for the equation 18/24 = 6/? but was very self-conscious when describing his reasoning to his math buddy.* *Indicated uncertainty in the debriefing. Only partially completed the tasks and put '?'s on all pages.*	*Had assumed Anthony had a better understanding than he was able to demonstrate. Seems like there may be something troubling him in his life outside of school.* *Work individually with him to find out what is confusing him and then ensure he gets lots of opportunity to practise and consolidate his learning.*
Sam	*Completed the task with the pattern blocks very quickly and accurately and moved on to play with alternate configurations. When consulting with his math buddy, didn't use the language of fractions or of mathematics—simply said it "just went like this" and "like this," and when asked how he knew it he said "It's just obvious." Yet he could articulate his processes using pictorial references.* *Didn't complete the ordering of fractions task during class because he had to first pictorially view what they looked like, but those he did complete were correct.*	*Seems to have a good understanding of how fractions work but needs to learn mathematical language (e.g., "numerator" and "denominator") and move from concrete to abstract representation of mathematical concepts. Some difficulty when concepts are applied to something other than area, perhaps because he can't visualize it.*

Student	Understanding	Feedback, ideas, and follow-up
Penny	Has a solid grasp of the notion of fractions. Was insistent that 1/2 was the only "right" way to represent half of the object. Realized that the other fractions were the same, but in her view, they were "wrong." Saw the same pattern in her written work. Found the answers and represented them right away in numbers rather than pictures. Wanted to know the "rules." This limited her willingness to experiment with various configurations in task #1. Is already representing fractions as percentages, e.g., she mentioned that 3/4 also equals 75%.	Has a good understanding and is ready to move on to more complex work, but is stuck on "rules." With more experience with concrete representation and manipulatives, she may recognize that finding alternatives is an important strategy in problem-solving, and that there are often other "right" ways. The challenge will be convincing her that the use of manipulatives is acceptable when problem-solving.
Clifford	Although he didn't make any marks on task sheets # 1 and #2, he was able to tell his math buddy about fractions of a unit and equivalent fractions. Had begun work on task sheets 3 to 6 on his worksheet, but no written explanations provided.	Is doing very well with his individual learning plan. Needs to continue working with manipulatives to consolidate his understanding of equivalences and ordering of fractions. Should soon be ready to move on to adding and subtracting fractions, with support.
Saad	Provided well-developed solutions to all of the tasks using diagrams. Not very familiar with mathematical language—not surprising given his command of the English language is still very limited. Used pictures and gestures so effectively that his group members and his math buddy could understand and translate into mathematical language.	Needs work on the language of mathematics and confidence in what he knows. Is ready for some more advanced work in fractions. Will contact Saad's parents to bring them up to date. They have been concerned about his progress.
Lydia	The first task was designed with Lydia in mind. After her "home group" members showed her how to represent some simple fractions using the tiles and shapes (1/2 and 1/4), Lydia manipulated the tiles, fitting various configurations into the shape. Remained quiet throughout. Because she did not articulate her thought processes while completing the task, I couldn't accurately determine her depth of understanding.	With her individualized program, I had hoped from the first task that I would learn more about what she understands, but it didn't work. Will try doing the tasks with her individually to get a sense of what to do next.

and extension of their learning. This included Trevor, Bill, and Saad. With Saad's emerging English language skills, Christine and his group members needed to help him, but he seemed ready for more challenging math tasks.

A second set of students seemed to understand the concepts, but needed to work on describing their work in mathematical language. Most of them were not yet confident about their knowledge because they were not able to communicate what they knew. They needed some direct instruction so that they could express themselves mathematically and be better positioned to do operations. This included Sam.

However, rather than forming groups within these two sets, Christine and Paul opted to try small mixed groups made up from across these two larger sets. Those who were already adeptly using mathematical language may be able to model this language for the others in their groups. For these mixed groups, Christine and Paul planned a series of challenges designed to provide practice and consolidation of their understandings and skills with adding and subtracting fractions.

Another group would benefit by working intensively with manipulatives and having opportunities to practise and talk about relationships of parts of a unit. Without a solid grasp of these concepts, they would feel frustrated, and would not be able to fully perform operations with fractions. Christine intended to work very closely with this group to help them catch up to the other groups. This group included Clifford and Lydia. Lydia was a concern, even though Christine was comfortable with the way she was programming for her according to her individualized learning plan. Christine would continue to work with her individually, and include her in as many class activities as possible.

Christine had some more assessment sleuthing to do with some of the other students. She needed to find out more about what was going on with Anthony, for example, before she could determine which group would best fit his needs. Penny was going to be a challenge. She was so sure of herself, dependent on rules and unbending in her convictions. Christine decided to put her in the group with Sam because they would be working on developing language to describe equivalences, and this would reinforce the idea that there are several ways to represent fractions.

In planning their instructional strategies for the unit, Christine and Paul discussed some of the reading they had been doing. Paul was particularly interested in helping students develop the "habits of mind" that are essential for learning new information and skills, and in knowing how to act on what they learn. Young people require explicit teaching, modelling, and practice in order to develop these habits.

From Christine's point of view, these habits of mind are essential in math. To be successful in math, students need to view and represent problems in various ways, form a hypothesis, and find solutions. This requires, for example, thinking flexibly, questioning, applying past knowledge to new situations, imagining and innovating, taking risks, and persisting. As Christine discovered, *"Many of the students are not very aware of their own thinking processes and they don't seem to have ways of knowing if they are on the right track or not. I was surprised by the number of students who placed question marks on their task sheets—even those who completed the tasks successfully. They wanted me to tell them if they are right or not. Maybe working on habits of mind will help them reflect on their own work."*

Christine began the next day by introducing the Sixteen Habits of Mind, which they would use increasingly in their work throughout the rest of the year:

Habits of Mind

1. persisting
2. managing impulsivity
3. listening with understanding and empathy
4. thinking flexibly
5. thinking about thinking
6. striving for accuracy
7. questioning and posing questions
8. applying past knowledge to new situations
9. thinking and communicating with clarity and precision
10. gathering data through all of the senses
11. creating, imagining, innovating
12. responding with wonderment and awe
13. taking responsible risks
14. finding humour
15. thinking independently
16. remaining open to continuous learning

(Costa and Kallick, *Habits of Mind*)

To start, they would focus on posing questions. The class discussed how questioning what you are thinking can lead to new ideas. Christine used examples from television, showing how detectives ask questions to find more evidence and come closer to understanding what might have happened. Sometimes their questions cause them to change their hypotheses or to think about the problem in completely different ways. Like detectives, the students would be learning to think about their thinking. What questions could you ask about the way you are thinking? What makes sense and what doesn't, and why? What makes you wonder about your ideas?

Christine discussed with the class how they were going to approach this unit, their groupings, and the kinds of learning they would be doing. Together they moved the furniture into a new configuration of activity stations for group work, and quiet places for individual work. She also indicated that they would write their habits-of-mind questions in their notebooks and on sticky notes that would later be assembled into concept maps.

For the next few math sessions, the students continued working in their groups on the assignments that Christine and Paul had developed. Christine worked with each group and with individuals to give them focussed, descriptive feedback and more complex challenges that would enable them to apply new learning in a number of contexts. As she worked with them, she wrote her observations about each student on a clipboard. During the one class per week in which Paul was able to be in the math class, he also observed and discussed with the students their questions and the concept maps they were developing.

Near the end of every math session, the students shared with the class some of their questions, and many ideas and possible explanations emerged. Christine asked students to write the idea or explanation that they thought was most sound in their notebooks. By reviewing these, Christine could get a sense of what they were thinking.

When Christine and Paul met next, they decided that the next habit of mind that they would introduce was "gathering data through all senses." They also agreed that they needed some way for the students to monitor their own learning about fractions. They began discussing criteria that students could use when Paul asked, *"Why are we doing this for them if they're learning to be skilled at self-assessment? We can all develop criteria together."*

The criteria that the class developed, with Paul's guidance in maintaining focus on the learning outcomes, are as follows:

Self-Assessment Criteria for Operations in Fractions			
Knowledge	**Skills**	**Communication**	**Insight**
Do I understand operations with fractions, and why they're important to learn? Do I ask thoughtful questions to help me better understand?	Can I do operations with fractions (add, subtract) and know when to use them? Am I sure that my work does not contain calculation errors?	Have I shown my work and explained my thinking clearly and accurately so that others can understand it? Can I show my understanding in pictures, in writing, in speaking, and in numbers and symbols? Have I used correct mathematical language?	Can I find alternative ways to solve the problem? Do I understand operations with fractions well enough to use them in new contexts?

The students used the criteria to consider the work that they had done in the unit. By reviewing worksheets, project notes, and other materials in their math folders, they answered the self-assessment questions and provided evidence for their answers, just like detectives.

As they approached the end of the unit, Paul and Christine struggled with how they would communicate all that they had learned about the students' accomplishments, and all that the students had learned about their own learning, using only

letter grades and short comments on a report card. They decided to use the anecdotal comment space to provide a concise summary of each student's current level of understanding, and share the detailed information at parent-teacher night.

With guidance, each student prepared a package that included

- the student's self-assessment based on the "self-assessment criteria"
- the teacher's assessment of the student's work linked to the outcomes-based criteria for operations with fractions
- examples of student work as evidence for the statements, with reflections by the student
- notes about growth made by the student and the teacher
- ideas for work at home

While assembling the packages, Clifford said, *"You know, some of us think that we should have a celebration of our work."* Paul and Christine agreed, and during the next session they guided the class in drafting the invitation, preparing a display and presentations, and organizing a process for parents to participate in math.

❊

Invitation to Parents to Share in Our Math Learning

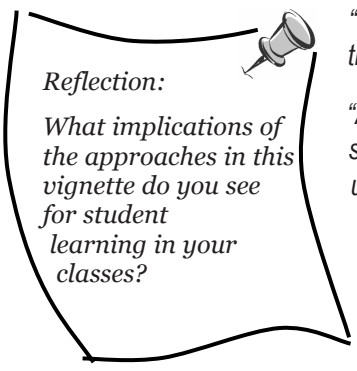
❊

We invite you to join us this Friday afternoon in a celebration of learning about fractions. The students have been preparing packages of their work and reflections to share with you. There will also be demonstrations and presentations that we hope will provide you with deeper insight into what we have learned.

❊

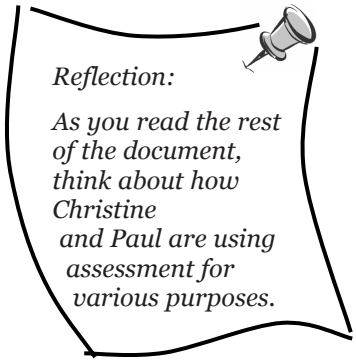
On Friday the room was buzzing. Each student shared his or her package of material with his or her parents. Some students made presentations for groups of parents about aspects they found interesting in what they had learned about their learning. These presentations revealed how different the learning process was for different students.

Saad and Sam both spoke about how they could use mathematical language to describe what they were doing, and about how they had very different ways of understanding their work with fractions. Saad worked with the numbers and Sam "saw" the relationships. Penny shared how important it was to consider a range of alternatives. As she said, *"There may be several ways to do something, and when you think about all of them, you can see advantages and disadvantages and make better choices. Just knowing the rules isn't enough. You have to use the 'reasonableness test' to check your solutions, as well as the rules."*



In the following week, Paul and Christine met to review the activities of the past few weeks. *"Well, that was a successful start to our journey in differentiating learning,"* said Paul. *"Seeing the look on Saad's father's face was worth it all."*

"And hearing Sam confidently using mathematical language to explain the way in which he sees relationships was also worth it," replied Christine. *"We have to credit Sam for steering us toward this learning journey. It's amazing how focussing on each student's learning can accomplish so much. Now we really have to keep going with this. And find a way to do this in all subject areas."*



"And a way to share it with our colleagues," Paul added. *"Let's write a formal reflection on the whole process, what worked and what didn't, and present our research to the rest of the staff."*

At the next staff meeting, they shared their story. And the process continued.