The Four Purposes of Assessment

By Peter Liljedahl

Peter Liljedahl an associate professor in the faculty of education at Simon Fraser University. He is a former high school mathematics teacher and currently one of the editors of Vector.

INTRODUCTION

Over the last several years I have worked with a number of districts across British Columbia in and around issues of classroom assessment in mathematics. These experiences, along with my experience as the Rethinking Assessment working group leader at the 2009 Canadian Mathematics Education Forum, have afforded me the opportunity to think about the topic of assessment in mathematics across a large number of discrete, but related, contexts. In doing so I have begun to synthesize and construct an alternative understanding of assessment that could stand in contrast to the narrowly focused assessment practices that are so often seen in today's mathematics classroom. In what follows I presented this synthesis as the four purposes of assessment. These purposes are not meant to be comprehensive. Nor are they meant to be prescriptive. But they are meant to be provocative.

PURPOSE ONE—COMMUNICATION

Assessment can be seen as an effective medium for communication between the teacher and the learner. It is a way for the student to communicate their learning to their teacher and for the teacher to communicate back to the student a commentary on their learning. But to what end? To answer this we offer the metaphor of ***navigation***. In order for navigation to take place—that is the systematic and deliberate effort to reach a specific place—two things need to be known: (1) where you are and (2) where you are going. This metaphor offers us the framework to discuss assessment as communication—students need to know where they are in their learning and where they are supposed to be going with their learning. Each of these will be dealt with in (out of) turn.

As teachers, in general, we have very clear goals for ourselves and our teaching. When we structure a unit of instruction, whether it is an activity, a lesson, or an entire curriculum unit, we are trying to achieve something—we are trying to induce learning of very specific content. How transparent are we about these goals with our students? What is the value, if any, of being transparent? In a framework of navigation the answers to these questions are obvious. Transparency of our goals would allow students to more clearly see where they are going, and as such, increase the likelihood that they are going to get there. As Stiggins points out, "students can hit any target that they can see" (Stiggins, Arter, Chappuis, & Chappuis, p. 57).

So, what exactly are the targets, and how can we help our students to see them? Classically, the targets of a curriculum are what are sometimes referred to as the ***prescribed learning outcomes*** (BC Ministry of Education, 2008), but will be referred to here as ***curriculum goals***. These goals are the contents of the curriculum that a teacher is meant to cover within the school year.

However, teachers have goals that go beyond these curricular prescribed learning outcomes. The expanded list of goals may include, but is not limited to, the development of proficiencies in:

- classroom routines and norms—coming to class prepared, putting up your hand, cleaning up, etc.
- habits of mind—curiosity, flexible thinking, persistence, striving for accuracy, etc.
- social skills—polite listening, turn taking, etc. (Costa & Kallick, 2000).
- mathematical processes [1] —communication, connections, mental mathematics and estimation, problem solving, reasoning, technology, and visualization found in the front matter of the BC IRP's as well as in the NCTM Principals and Standards (2000).
- numeracy / mathematical literacy—the ability to solve non-routine contextual problems requiring the use of non-specified (and often low-level) mathematics
- learning tools—comfort and competency with manipulatives, effective group work skills, note taking skills, comfort with ambiguity, etc.
- sociomathematical norms (Yackel & Cobb, 1996)—proof, argumentation, inquiry, etc.

This expanded list comprises what can be referred to as a teacher's ***learning goals*** [2] each of which would be more easily attained if students were made aware of them. Indeed, it would be almost unheard of for a teacher to work on classroom routines and norms without them first clearly articulating to the students their expectations—that is, their goals. However, this same level of clarity is rarely afforded to curriculum goals. In order for students to know where they are meant to go they need to know where the teacher is intending them to go. A clear list of learning goals provided at the beginning of a unit of instruction would give students that clarity of direction. Similarly, assessment of students' performance against these learning goals will help students to more clearly know where they are in relation to the target.

Taken together, learning goal based assessment becomes a very effective communicative tool to help students navigate their learning. This form of assessment is not to be confused with outcome based education (OBE) or standards based testing (SBT), both of which also measure students against a priori curricular goals. With their heavy emphasis on empiricism, OBE and SBT practices focus on assessment as measurement whereas the learning goal based assessment that is being offered here focuses on assessment as communication. This is not to say that marks are not gathered, or reported, but rather that the purpose for doing so is to inform the learner about where they are vis-á-vis the learning goals.

Of note are the critical assessment issues that are dispensed with when a stance of communication is adopted. For example, the issue of assigning a zero for missed work no longer has any meaning. Neither does the deduction of marks for work submitted late. In both of these instances there is no communicative value in such actions. However, as effective as this stance is at dispensing with issues, it is equally effective in raising them. For example, assessment instruments are no longer seen as holistic

[1] In BC these processes are contained in the front matter of curriculum documents (in an introductory chapter). It is unclear as to whether or not they are meant to be considered as curriculum. The same is true for numeracy and mathematical literacy skills.

[2] O'Connor (2009) also uses the term learning goals but he uses it in a context synonymous with prescribed learning outcomes.

units for which a single mark is recorded. Instead, these are now seen as collections of discrete opportunities for students to demonstrate (communicate) attainment of a variety of learning goals. This changes the way in which students' achievement is tracked. In such a paradigm, performance needs to be recorded in relation to specified learning goals as opposed to the common practice of recording performance in relation to assessment instruments (O'Connor, 2009).

Issues aside, a paradigm shift towards assessment as communication affords us much greater opportunity for students to partake in, and benefit from, self- and peer-assessment. In a culture of transparent and understood learning goals, self-assessment has great meaning. In fact, it could be argued, that self-assessment in a climate devoid of such transparency has no meaning. Without knowing what the targets are, how could a student effectively evaluate their performance? But this is more than a philosophical shift. It is also a pragmatic shift. In a climate where students have full knowledge of the learning goals and how their work relates to these learning goals self assessment can become the most effective method for assessing homework, in class assignments, and quizzes. In such a climate, there is no motivation for students to be misleading about their work. In fact, giving students the freedom to record their achievement using codes for correct, incorrect, correct with help, correct but incomplete, did not attempt, etc. will allow for students to maintain a constant and accurate record of where they are in their learning.

PURPOSE TWO: VALUING WHAT WE TEACH

Evaluation[3] is a double edged sword. When we evaluate our students they evaluate us. For, what we choose to evaluate, shows them what it is we value. The corollary to the aforementioned statement is that if we, as teachers, value something, then we should find a way to evaluate it. By placing value on something we show our students that it is important. As teachers, we have no difficulty doing this for curricular content. We regularly value achievement of these goals. In so doing we send a very clear message to our students that this is important. Indeed it is. But, so too are goals pertaining to habits of mind, sociomathematical norms, and especially learning tools. In fact, many teachers would argue that attainment of tools for learning (such as group work skills) are some of the most important goals in their practice. Is this importance being communicated to their students? It may be the case that teachers speak regularly with their students about the value of these skills but in a climate of emphasis (over-emphasis) on curricular goals it is unlikely that the relative values of the non-curricular goals are being accurately heard. By placing value (through evaluation) on all of the targeted learning goals then the relative value of these goals can be more convincingly communicated.

This is not to say that everything needs to have a mark attached to it. As intimated in the previous section, assessment as communication does not necessitate the assignment of a mark. It does, however, require the articulation of clear learning goals and then feedback of students' achievement vis-á-vis these goals. The process of providing this feedback to the student demonstrates that the goals are valued. The mere fact that a teacher would take the time to do so demonstrates how important this goal is to them. It also

[3] Much literature (c.f. Van de Walle & Folk, 2008) makes a clear distinction between assessment and evaluation. Ironically, this distinction becomes meaningless in the ***four purposes of assessment*** paradigm being presented here. As such, this report will use these terms interchangeably.

communicates how important it is that students reach this goal. This last point, in particular, will help students to see this feedback as valuable to them and their learning.

Putting forth this argument does not make the evaluation of all goals easy, however. Perhaps one of the most challenging areas for assessment is just this—the assessment of student proficiency in attaining non-curriculum learning goals. Our culture of assessment is not well equipped to deal with this. However, this is often due to the assumption that assessment is designed exclusively around the gathering of marks. In such assumptions it is very difficult to perceive of effective ways to implement subjective measures of subjective behaviours. Again, if a paradigm of assessment as communication is adopted, these concerns quickly fade away. It is difficult to *mark* a students' performance in group work or curiosity, or polite listening. It is, however, easy to *communicate* with them about their performance in these areas.

One way to do this is to use students own language around these issues. It turns out that as good as teachers are at articulating what attainment of a curricular learning goal looks like, students are often equally good at articulating what attainment of many of the non-curricular learning goals looks like. This is especially true of the goals that are built around general behaviours such as those found in the learning tools, classroom norms, habits of mind, and social skills categories. Students do not lack proficiency in these areas because they don't know what they look like. Rather, they have just not seen them as important—as valuable and, hence, have not put effort into them. Instead, they have been too busy focusing on those goals that their teachers are placing value on.

PURPOSE THREE: REPORTING OUT

It is difficult to ignore that one of the primary purposes of assessment is to gather information for the intention of reporting a student's (or a group of students') progress out to stakeholders other than the teacher and students. Indeed, such a purpose is a natural extension of assessment as communication. Not so natural, however, is the reduction of this report to a single mark (percentage and or letter grade). Such aggregation of a student's performances across a large number of learning goals serves only to make opaque how that student is performing as a learner. As a result, there is no communication going on at all. From a navigational perspective, it says nothing about where a student is meant to be going vis-á-vis the actual goals that are being focused on in the classroom, and it says even less about how they are performing vis-á-vis those same goals.

Fortunately, any jurisdictional requirement to report out student achievement in such an aggregated format is a minimum requirement. Nothing prevents a teacher from presenting student performance in the disaggregated format in which it is collected. Tracking and organizing student achievement against learning outcomes is not only an effective mechanism for teacher and learner to see progress and areas requiring further work, it is also an effective way to report out student performance and growth to parents, colleagues, and administrators. Most simply, it allows a teacher, and a student, to answer the question—"what needs to be improved upon"—a question that an aggregated mark does not allow one to answer. To answer such a question teachers are free to refer to the any or all of the data they have gathered on a student's performance and progress in relation to declared learning goals. Such an answer, based on the full spectrum of

student performance, will be both accurate and helpful.

On the other hand, when teachers are required to produce an aggregated mark the selection of which information is to be used to produce the aggregate is of utmost importance. In particular, the question as to what best represents a student's attainment of the intended curriculum comes into play. Is it best represented by the average performance (the mean), the most frequent performance (the mode), or the most recent performance? Must the performance be based on a test or can it be based on individual work? What exactly constitutes the assessable curriculum? Curriculum documents are often not clear about such questions often specifying only that letter grades and/or percentages are to be assigned based on a student's "level of performance as it relates to the learning outcomes" (BC Ministry of Education, p. 10). Such statements neither specify the circumstances of the assessment nor do they specify whether the front matter of curriculum document in general, or the mathematical processes in particular, count as learning outcomes. Rather than looking upon such lack of clarity as an impediment to effective assessment it should be viewed as liberation from the narrowly focused assessment practices that are so often assumed to be prescribed. With the support of such ambiguous curriculum documents teachers should feel free to produce any requisite aggregate marks based on a wide spectrum of indicators of student performance.

Purpose Four: NOT Sorting / NOT Ranking

There exists a significant societal assumption that one of the primary purposes of assessment is to sort, or rank, our students. Most evident in this regard, is the requirement to assign an aggregated letter grade (sorting) and/or a percentage (ranking) to represent the whole of a student's learning. However, there is a much more subtle and more damaging indicator of this assumption—equitability. That is, there is an expectation that all of our students[4] are to be assessed equally. Otherwise, how can any sorting and/or ranking be considered accurate?

Approaching assessment from the perspective of sorting and/or ranking is both internally and externally problematic. Internally, it presupposes that our assessment instruments are objective and infallible enough to accurately represent a student's attainment of curriculum goals to within a single percentage point. This is a ludicrous presupposition as it ignores the inconsistency of not only the students, but also the teacher, in representing and gauging such performance. It also ignores the fallibility of the assessment instruments themselves as well as any formulas for aggregating discrete performances into a single mark. Even when the band is widened to letter grades the fallibility and inconsistency of the students, teachers, instruments, and aggregation formulas is only mitigated (and not eliminated).

Externally, such a position on assessment ignores the individuality of students. If we are willing to accept that students are all different in where they are in their learning, as well as how they progress in their learning, then a common approach to assessment is ill-suited. As educators we have long since accepted the need for and merits of differentiated instruction to deal with the individuality and variability of students. So too, we need to accept the need for ***differentiated assessment*** to represent the learning of the fractured student collective.

[4] With the exception of students on modified educational programs.

As such, the fourth purpose of assessment is not a purpose at all. Rather, it is an anti-purpose—to NOT use assessment for the purposes of sorting or ranking. What fills the void left by the abandonment of sorting and ranking is differentiated assessment for the purpose of communicating, valuing, and reporting out on individual student progress in ways that are accurate and helpful.

CONCLUSION

There is much work left to be done in the area of assessment in mathematics. The four purposes articulated here (or rather three purposes and an anti-purpose) are, perhaps, a way to organize this work. Engaging in this work is, and will continue to be, difficult. There are no clear answers presented here as to how to actualize any of these ideas. What is offered, instead, is a clarity of purpose—a direction by which to begin the journey.

REFERENCES

BC Ministry of Education (2008). *Mathematics 8 and 9: Integrated Resource Package*. Ministry of Education: Province of British Columbia.

BC Ministry of Education (2009). *Reporting Student Progress: Policy and Practice*. Ministry of Education: Province of British Columbia.

Costa, A.L. and Kallick, B. (2000). *Discovering and Exploring: Habits of Mind*.Alexandria, VA: ASCD.

NCTM (2000). *Principles and Standards for School Mathematics*. Reston, VA: National Council for Teachers of Mathematics.

O'Connor, K. (2009). *How to Grade for Learning*. Thousand Oaks, CA: Corwin.

Stiggins, R., Arter, J., Chappuis, J., Chappuis, S. (2006). *Classroom Assessment for Student Learning: Doing It Right—Using It Well*. Upper Saddle River, NJ: Prentice Hall.

Van de Walle, J. & Flok, S. (2008). *Elementary and Middle School Mathematics: Teaching Developmentally*. 2nd Canadian Edition. Toronto, ON: Pearson Education.

Yackel, E. & Cobb, P. (1996). Sociomathematical Norms, Argumentation, and Autonomy in Mathematics. *Journal for Research in Mathematics Education, 27*(4), 458-477.