From Data Poor, Information Poor to Data Rich, Information Rich
Decision-Making: Design and Implementation of the Rocky View Schools
Student Information System

Dr. J.M. Burger
Dr. A. Nadirova

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Introduction

The Rocky View School (RVS) 2011-14 Three-Year Education Plan directs staff to “Develop a system-wide, balanced, and integrated student information system that supports instant diagnostics of individual student achievement, as well as aggregated data at the classroom, school, and jurisdictional levels” (Strategy 4.2.2). Development of a comprehensive, holistic and balanced Student Information System (SIS) represents a fundamental investment of time and staff resources. The desired outcome related to Strategy 4.2.2 is enhanced school and system student diagnostics that will support educational leadership and action research focused on achieving higher degrees of student success. Demonstrating that this outcome is achievable is necessary to convince staff and stakeholders that the required implementation investment is warranted.

Strategy 4.2.2. is premised upon an emerging focus of educational research pointing to the importance of student information systems that are transparent, multi-method, balanced, comprehensive, and directly linked to educational/instructional leadership. Educational excellence requires transparent and open education systems that use data and evidence to build partnerships with students, parents and communities in moving schools to higher performance (Fullan, Hill & Crevola, 2006). An example of early, more strategic and effective use of student data is suggested by Allignton, (2011, p. 41) who observes, “We could know on the second day of kindergarten who is at risk of becoming a struggling reader, but we typically do nothing with this information.”

Black and Wiliam’s (1998) meta-analysis of student assessment studies builds on earlier research (Bloom, 1980) and have demonstrated that balanced student assessment premised on formative assessment linked to effective teaching methods and appropriate summative assessment with active feedback to students, teachers and parents are key to effective pedagogy. The development of more balanced models of student assessment creates wonderful opportunities to capture comprehensive student data generated by classroom assessment. Rocky View Schools is actively following up on this research with the view to institutionalize balanced assessment models through the development and implementation of Policy HK, Assessment and Communication of Student Learning (see http://www.rockyview.ab.ca/board_policies/boardpolicies/curriculum/HK-Assessment-CommunicationofStudentLearning20090604.pdf/view).

Supporting the RVS approach to more balanced and holistic student assessment models, Parrilla, McQuarrie, Klassen, Georgiou & Odishaw (2010, p. 66) have suggested that contextually sensitive and comprehensive student data and evidence-informed decision-making are central components of effective school leadership. They have observed that when considering data on student achievement in Language Arts that “the methodological concerns with the evidence underline the importance of local assessment of the effectiveness, and implementation quality, of any reading interventions that are undertaken in schools.” Essentially their observations align with Buzick and Cahalan-Laitusis’s research (2010).
that supports the conclusion that organizational efficacy can be improved through proactive and transparent school and system response to accountability results – processes that are enhanced with strong student information systems.

These research-based observations suggest that schools need rich data to make well informed decisions, not only about what is working or not working, but also to identify specific strategies premised on a full and balanced picture of students, including their learning needs, aspirations, abilities, attitudes and interests. Couture (2011, p. 38) has observed, “to foster school cultures of creativity and ingenuity in Alberta we must build on the strength of an already strong teacher force by supporting ongoing school-based research and innovation, and continually pushing the limits of sound teaching practice, curriculum design and school development.” Extrapolating Couture’s observations and building on the ‘action research’ focus of Cycle Five of the Alberta Initiative on School Improvement would suggest that Alberta schools are entering a world where student data will fuel a new era of enhanced data generation and analysis (see http://education.alberta.ca/media/6657808/handbook_for_aisi_cycle_5_projects.pdf).

Supplemental student achievement data is readily available by tapping into a rich source of data, the classroom assessments that are compiled throughout the school year. It has been estimated that a student through 12 years of schooling will experience approximately 600 formal classroom-based summative assessments compared to 16 formal summative assessments based on external instruments. Incorporating classroom-based achievement data into a comprehensive student information database can open doors to greater data richness, added relevance, deeper meaning and resultant enhanced teacher ownership of student achievement improvement strategies (Burger, Nadirova, & Besenski, 2011). One caveat, however, is that comprehensive models of classroom assessment should be based on a balance between formative and summative as well as criterion-referenced and norm-referenced assessments, but the bulk of classroom assessment should be formative, criterion-referenced and authentic (Burger & Krueger, 2003).

Teachers need to know their students individually and in terms of group dynamics as prerequisite knowledge to better meet students’ needs as learners. This means not only multi-methods of data generation are necessary, but also both quantitative and qualitative methods. Emerging assessment technologies should be incorporated into student assessment practice in order to advance efficacy and establish meaningful and useful linkages between external assessment resources and ongoing, classroom-based assessment. External, often commercially produced assessment instruments that can produce useful, triangulated data would include the following categories.

Ability or IQ tests such as the Canadian Test Centre’s Insight (see http://www.canadiantestcentre.com/insight/insight.asp) can be group administered. Group administered IQ tests are less reliable but far less costly than individually administered tests such as the Wechsler Scales (WISC-III, WPPSI-R); however, as Salvia and Yesselydye (2004, pp. 366-367) note, these instruments can provide useful information regarding whether student cohorts are achieving to their potential. Ability tests also can provide some preliminary insight into individual students relative verbal and performance abilities thus informing optimal teaching and learning strategies.
Aptitude tests are less widely recognized and used, but provide useful information on what programs may best fit a student in high school or post-secondary learning. The Differential Aptitude Test (DAT) is a good example of an instrument that can provide timely data at key points in a student’s program (see http://www.creativeorgdesign.com/tests_page.htm?id=84).

Attitude linked to student motivation clearly affects student achievement. In her recent ethnographic study of a southeastern United States kindergarten class, Hatt (2012) studied students’ evolving concept of “smartness… tied to notions of academic identity (p. 439).” She observed that kindergarten students were “…more likely to be framed as smart if parental expectations closely align with those of the teacher.” Although Hatt’s methodology does not permit generalization, it is fascinating to read an account where students’ socio-economic and racial backgrounds contribute to a situation where they “…learn early on school is not where they belong or worth investing in, so they begin to disengage (2012, p. 456).

Non cognitive assessment of student attitude and affect is an emerging field in Canada. RVS is using the Tell Them From Me instrument (see http://www.thelearningbar.com/about.php) applied to grade, school and jurisdiction cohort measures at the high school level as part of a province-wide pilot project with Alberta Education. The Student Orientation to School Questionnaire (SOS-Q) for upper elementary and junior/senior high school levels also is an instrument developed in Canada. The SOS-Q measures a broad range of students’ experiences in school and beyond that may affect the observable outcomes, such as low engagement and achievement. The instrument makes it possible to evaluate student disposition toward school at multiple levels - from individual students to school or jurisdiction-wide applications. The SOS-Q was developed and tested by researchers in the Alberta Department of Education in cooperation with the Parkland School Division (Nadirova, Burger, Clarke and Mykula, 2008) and subsequently was acquired by the Educational Testing Service (ETS) for marketing and administration support (see http://www.etscanada.ca/afl/sosprogram).

Nadirova and Burger (2012) recently demonstrated that Grade 9 student achievement in Mathematics and Language Arts measured by standardized provincial achievement tests was significantly lower for students manifesting lower scores on the SOS-Q. Furthermore, their research demonstrates that student orientation to school measured by the SOS-Q with Grade 9 students has a strong predictive relationship to high school completion three years later. In this analysis students scoring on the top of the SOS-Q scale had a 85.9% completion rate three years after entering Grade 10 whereas students scoring at the bottom had a 61.3% completion rate – a 24.6% difference! Therefore, it is clear that diagnostically assessing and acting on student attitude at the individual and/or cohort levels can significantly support student achievement and school success.

Rocky View Schools (RVS) currently is engaging in action research on innovative ways to measure students’ affective school experience using the Student Orientation to School Questionnaire (SOS-Q). Initially focusing on cohort analysis the SOS-Q was administered anonymously to students in five RVS schools. This work was shared via the Canadian Association of School Administrators publication, Leaders and Learners (see http://www.casa-acas.ca/pages/leaders-learners.html). As one of the participating principals insightfully observed,

While we use many sources of data to help us evaluate our success in the area of instructional design, measuring school culture, specifically how students perceive themselves fitting into the culture, is more elusive. The SOS
Q has helped us by providing specific feedback in this area. Our goal to build a culture that allows students to thrive in a faith context has everything to do with building a safe and caring school, individual self-confidence flowing from understanding themselves in light of faith and leadership, building both internal and external resilience, finding purpose in life while seeing a connection between school and that purpose, and experiencing positive peer relationships. These are all areas measured by the SOS Q and the feedback we receive from this instrument is one more tool we use to assess our success as a school. As we move forward with the use of this survey, we see potential value in using the instrument to identify specific students who are not experiencing the culture we intend for them. We will then be able to address the areas where they do not feel supported and work diligently to fill the gaps, ensuring that every student feels valued. The use of the SOS Q is all about ensuring we are actually living our mission. (Burger, Cardinal, Hennig, Valerio, Zeigler and Nadirova, 2012, p. 28)

Current research, supported with a grant from the Alberta School Community Wellness fund, involves over 1200 upper elementary and junior high students who have been administered the SOS-Q with opportunity for voluntary student self-identification to permit individual follow-up. A key objective of this research is to identify supports or strategies to enhance school connectivity for students who manifest weak orientations to school. Taines (2012) has reported positive results of a qualitative study where student involvement in school activism generated stronger school connectivity, especially for mild and moderately alienated students. The ongoing RVS research with the SOS-Q will provide an opportunity to build on the research reported by Taines, while also providing data to inform the benefits and risks of including data on student affect as a standard data source in the RVS student information system.

Instruments that measure student interests, such as the Safran Student’s Interest Inventory (see http://career.nelson.com/ceg/safran.html) or more sophisticated computer-based career planning-interest assessments such as Web 2.0 based resource, myBlueprint (see http://www.myblueprint.ca/discovery-explorations/) provide important information that give insight into what turns students on to learning. When linked to attitude and aptitude assessment data, information on a student’s interests can enable teachers and counselors to evolve a more refined picture of how to optimize education programs to maximize student motivation and success. One RVS high school, Bert Church, has completed a pilot using the myBlueprint resource and is reporting very positive results and a commitment to proceed to school-wide implementation.

When considered comprehensively, external assessment data that captures a student’s achievement in criterion and norm-referenced contexts in combination with ability indicators, aptitude measures, and attitude and interest indicators can provide powerful data sets that complement and add enhanced understanding to the assessment picture that emerges from solely classroom-based assessments.
Moving Forward

Education is too important to leave to chance or primarily intuitive and single-source ways of assessing and programming for students. While teachers know their students best through the day-to-day interaction in the classroom, mostly intuitive and informal ways of knowing students has its limitations that can be rectified with the addition of formal assessment data and specialized and articulated student information.

In our work with Chris Gonnet, the then Superintendent of the Grande Prairie School District (Burger, Nadirova, Gonnet, Brandon & Garneau, 2011), we learned that leadership standards at both the school and jurisdiction level were useful in structuring educational leadership; however, leadership was enhanced when it was supported with data analytic processes. We observed that, “…provincially-mandated, systematically collected accountability and value-added data can be used to inform and facilitate district and school-level decision-making” (p. 257). For example,

One of the important features of comprehensive data systems is the opportunity to provide an integrated picture of a district’s student population and associated environment. Charting a comprehensive district profile using solid evidence is essential for better understanding of local contexts where students and educators interact. (Burger, et. al., 2011, p. 257)

To this end we provided comparative analyses of the Grande Prairie School District’s data to provincial data for key variables including: socio-economic status indicators, student mobility, student special needs profiles by disability classifications; Grade Level of Achievement trend data in Language Arts and Mathematics; high school achievement data by curricular stream, relationships between Grade 6 and 9 provincial achievement tests related to high school course stream selection; and lastly, relationships between high school course stream and high school completion rates.

As a result of our collaborative work with the Grande Prairie School District we concluded that,

…the opportunities and challenges in making data and evidence-informed decision making a central component of leadership at all levels of the education system is of fundamental importance. This chapter has illustrated how educational leadership is being enhanced in Alberta by linking it to more comprehensive, current, accessible and balanced (internal and external) data with practical applications at the school and jurisdiction levels, supported by an enhanced data warehouse maintained by the Department of Education. Value-added data analysis by school and district leaders supported by emerging leadership standards and support networks are in the early stages of development. These efforts, however, promise a future where leadership behaviors are better understood through the enhanced inter-connectivity of leaders’ critical reflection focused on success for all students (Burger, et. al., 2011, p. 265).
Moving forward, similar to the way that qualitative and quantitative research methods are being applied in complementary ways to form more practical and effective mixed methods of understanding and conducting education research, intuitive and more formalized approaches to measuring the full range of students’ learning styles can be developed and applied by Rocky View Schools staff. Outcome 4.2 in the RVS 2011-14 Three Year Education Plan is to “Accelerate innovation, research, and organizational development to achieve operational efficiencies.” A system-wide, balanced, and integrated student information system that supports timely diagnostics of individual student achievement and aggregated data at the classroom, school, and jurisdictional levels is key to achieving this outcome.

Hart (2012) depicts how teachers’ perception of their students can be subjective and influenced by extraneous factors. Such research supports the view that the learner needs to understand where they are in their learning in a metacognitive context, that is, having the knowledge, ability and opportunity to reflect on how to use particular strategies for learning or for problem solving. Stiggins (2001) presents compelling arguments for active student involvement in assessment. Essentially, increased data that can engage students in understanding their learning styles, strengths and challenges present important opportunities to support students’ metacognition.

Rocky View central office staff has considered how to connect formative student data in the Individual Learner Profile developed with the student, in relationship to multiple levels of student data collection applied across student, classroom, school and jurisdiction boundaries. The following diagram represents the balanced and holistic model of student information that emerged from this thinking. This diagram demonstrates how comprehensive and balanced student information systems can provide crucial information at both the individual and system levels in ways that we have hardly begun to imagine.
Figure 1 - Rocky View Schools
Student Information System Design

Priority One – Learner profiles must benefit parents, students and teachers with value-added qualitative and quantitative information on student achievement, ability, aptitudes and attitudes.

The SIS generates student cohort profiles on:
- Achievement – PATs; Diploma Exams, Classroom summative marks, CAT 4
- Ability - Insight, WISC-R (selective)
- Aptitudes – Differential Aptitude Test
- Attitudes – Student Orientation to School Questionnaire

SIS data is applied to system improvement, research and program evaluation.
The Student Information System RVS is developing will be supported with Pearson’s Power School software. Staff capacity will be further advanced to make maximum use of such rich information. Figure 2 presents the RVS Learning Model that is grounded in a stronger application of data informed decision-making at all levels of the organization. In this model the learner and data are interlinked such that data becomes a critical support for learning. In this capacity building model the following principles are applicable within RVS schools.

1. Research and data-informed critical reflection play a significant role in establishing high quality professional learning and professional practice.
2. School based collaborative and collective inquiry aligned with jurisdictional and provincial priorities is the most meaningful and effective professional learning.
3. Professional learning is job and data embedded with collaborative opportunities for guided conversation and co-creation of innovative practice.
4. Effective professional learning involves the continual transformation of practice to enhance knowledge, skills, attributes and competencies.
5. As architects and designers of lifelong learning, there is individual and shared responsibility for engaging in systemic, data informed, professional growth.
6. Professional learning is personalized, generative and focused on the actualization of exemplary practice in the learning environment.
7. Organizational learning is ongoing, supported and fully integrated into Rocky View Schools’ culture.
8. High quality professional learning and transformational leadership are integral to sustainable school and system improvement.

Figure 2
RVS Professional Learning Model
The data needed to improve student learning as detailed in this paper needs to be systemic, holistic, balanced between classroom and external sources as well as formative and summative assessments, and include achievement, ability, aptitude, interests and attitude measures. The highly variable grade structures between Rocky View schools make the implementation of systemic data approaches challenging. For example, administering a group ability test in Grade five may be ideal for a grade 5-8 middle school but would not provide similar data to a k-4 elementary school. Therefore a flexible and consensual approach is needed before the specific instrumentation underlying the Student Information System is decided. A potential model is presented in Table 1 as a draft of the key internal classroom and external inputs to the RVS Student Information System. In addition, RVS should continue to develop standard report card formats and/or reporting protocols for grade divisions 1 through 4 to support standard classroom-based achievement data input to the SIS. Table 1 defines a timeline and estimated costs of one example of a system-wide student data collection framework that would be housed in the new SIS hosted by the Power School platform.

<table>
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Development and implementation of the RVS Student Information System proffers a number of exciting benefits that will support the Division’s goals and strategies to become a 21st century, research oriented learning organization, including:

- Rich information and data are available for improved student diagnostics and evidence informed decision-making and educational leadership at the school and Division levels.
- Nested (school and system) leadership for school improvement is supported with better empirical evidence.
- New Student Information System technology (Power School) is enriched with multiple types of information on multiple student factors that influence student achievement.
- Student Information System training is more effective and meaningful with more holistic, relational data that provides broader insight into optimal student programming and supports student metacognitive approaches to their learning.
- Enriched student data supports diagnosis of student strengths and weaknesses and helps ensure students' needs are better met and students do not “fall through the cracks.”
- Educational research is better supported with contextually relevant, relational data.

**Conclusion**

This paper on the development and implementation of a cutting edge student information system represents a key opportunity to generate discussion and feedback on the strategically crucial area of educational measurement and evaluation. Rocky View School’s staff appreciates the opportunity to interact with a network of educators who recognize the value of student information systems empowered by emerging technologies as a means to support optimal levels of student growth and achievement.
References


