**Analysing NCEA data to inquire into teaching and learning**

Louise Addison

[louaddison@hotmail.com](mailto:louaddison@hotmail.com)

**Some findings from Literature Review**

* Holcomb (2012) – data driven → data guided → data enriched

Timperley – evidence based → evidence informed → evidence seeking

* Three key conditions for data to be used effectively: using relevant data, an inquiry habit of mind, and relationships of respect and challenge (Earl & Timperley, 2008).
* Displaying data (Lipton and Wellman, 2012, p.66)
  + Making a display is not a neutral act. The purposeful consideration and choice of display make different data types more accessible to group work. A particular display shapes the conversation by illuminating relationships in the data set and inviting different kinds of inquiry and analysis.
  + Effective data displays should be clear, vibrant, and adequately sized for data groups to share them.
  + Visually vibrant displays capture and focus attention.
  + A ratio of approximately four to six participants to one large data display works to create a focal point. The small group size increases participation and captures individual energy.
  + A large data display serves as a third point, physically separating the group from the data and objectifying the data— making data a thing. As a result, the conversation is about what we (colleagues) notice and think about them (the data). This combination increases the emotional safety needed for group members to poke, prod, and question the data and one another.
  + Well-crafted data displays clarify and communicate often complex or abstract information. In contrast, distributing individual and often cluttered printouts dissolves group cohesion. Participants drop into personal searches, viewing the data from their own vantage points. As a result, group members may be sitting side by side, but lose access to one another’s perspectives and experiences. This lack of shared interaction limits shared understanding and collective commitment to action.
* Statistical understanding: Literacy, PPDAC, Thought processes
  + Consideration of variation – regression to mean, sample size, inference, correlation / causation
  + We notice, we wonder, we worry, we expect (Pfannkuch, Regan, Wild, Horton (2010)
* Teaching-Learning relationship, Collaborative Inquiry, Learning conversations, Data use routines, Instructional Leadership, Assessment for learning
* 1. Teacher leaders much more likely to use data to judge program success than lack of success.

2. The use of data to ‘know students’ rather than to evaluate programs, more typical to use data to evaluate students rather than to evaluate teaching. (Robinson, Phillips & Timperley, 2002)

Earl, L., Timperley, Helen, & SpringerLink. (2008). *Professional learning conversations : Challenges in using evidence for Improvement* (Professional learning and development in schools and higher education ; v. 1). Dordrecht]: Springer.

Lipton, L., & Wellman, Bruce M. (2012). *Got data? now what? creating and leading cultures of inquiry*. Bloomington, Ind.: Solution Tree Press.

Pfannkuch, Maxine, Regan, Matt, Wild, Chris, & Horton, Nicholas J. (2010). Telling Data Stories: Essential Dialogues for Comparative Reasoning. *Journal of Statistics Education,* (1), Vol.18(1).

Robinson, Viviane, Phillips, Gwenneth, & Timperley, Helen. (2002). Using Achievement Data for School-Based Curriculum Review: A Bridge Too Far?*Leadership and Policy in Schools,* *1*(1), 3-29.

**Some findings from study**

**Key enablers that this research suggests may support school leaders’ use of NCEA data to inquire into teaching and learning include:**

* A clear inquiry process that requires analysis of NCEA data.
* Use of conversations and dialogue to unpack the data and test conclusions and hypotheses, as part of a supportive learning environment for teachers.
* High expectations regarding teacher’s use of inquiry processes, and backing this up with appropriate support in terms of time and / or professional learning opportunities. “If it’s worth doing, we need to give them the time to do it.”
* Use of ‘real time’ data that can make a difference for the students that teachers are currently teaching.
* Establishing a culture of challenge and respect that encourages teachers to openly engage with the data and respond to what it might be saying.

**Key findings with regard to the ways in which NCEA data is being represented include:**

* There were no ‘standard’ representations across the 16 schools.
* There tended to be a clear emphasis on percentage based pass rates.
* NAME percentages by standard were a common statistics, however the way this was represented varied by school.
* Some schools chose to use tables rather than graphical representations to explore comparative data.
* When used, bar graphs gave no way of comparing results that come from potentially significantly different sample sizes.
* Strip graphs and line graphs are also used, but to a lesser extent than bar graphs.

**Key ways in which NCEA data is being analysed and interpreted:**

* The majority of statistics are at the *school* level, as compared to at a *subject* or *student* level.
* Comparisons over time tended to focus on the past 3-5 years.
* Comparisons of different ethnicities was common practice, including for very small sample sizes.
* Comparison with decile, or decile band tended to be more common in lower decile schools.

**Statistical reasoning required to effectively interpret and use NCEA evidence includes:**

* An understanding of how statistics are being calculated (e.g. baseline) and subsequent interpretation.
* Ability to compare samples of different sizes, including an understanding of the variation that different sample sizes introduces.
* An understanding of regression to the mean.

**Recommendations for school leaders when representing data:**

* Include measures of variation to support comparison. It is suggested here the LSD (Least Significant Difference) intervals may be an appropriate way to do this.
* Include statistics that enable comparison of courses e.g. average credits per student, or percentage of students gaining 14 credits or more.
* Include statistics at both the *subject* and the *teacher* level.
* Use Achieved +, Merit + and Excellence rates as a way of allowing comparison across years (line graph).
* Highlight the purpose or question that the representation is intended to investigate.
* Make representations large enough to discuss as a group (from literature review).
* Use colour (from literature review).

**Key findings regarding leadership practices and inquiry**

* Senior leaders report a wide range of actions as a result of NCEA data analysis including:
  + Determining inquiry processes that include analysis of NCEA data
  + Discussing NCEA data with each other, middle leaders and teachers
  + Engaging in challenging / open to learning conversations with teachers using NCEA data
* Senior leaders are more likely to report supporting teachers to use NCEA data to inquire into their teaching, than to use it themselves to inquire into their teaching.
* There appears to be a disconnect for some senior leaders in their reporting of the usefulness of NCEA data and their actual use.
* Senior leaders in expert inquiry schools report high levels of inquiry based processes by middle leaders in their school, whilst senior leaders in proficient or progressing inquiry schools report lower or mixed levels of inquiry by middle leaders.
* Senior leaders in expert inquiry schools report higher levels of statistical analysis, whilst senior leaders in proficient or progressing inquiry schools report lower or mixed levels of statistical analysis skills.
* Middle leaders in the two high inquiry schools take a wide range of action based on NCEA data analysis including:
  + Making changes to teaching programmes
  + Making changes to assessment practices
  + Using the Board Reporting process to inform ongoing improvements in teaching and learning
  + Supporting teachers to analyse their own NCEA data and share best practice in terms of what has worked
* Schools that report high levels of inquiry into teaching and learning as a result of NCEA data are carrying this out in a variety of ways.
* The rationale behind the inquiry processes in a school has an impact on the statistics, interpretation and subsequent action, e.g. a focus on ‘impact’ or a focus on ‘learners’.
* Statistical Literacy is the area that both expert and progressing / proficient inquiry schools rank lowest.
* Whilst inquiry and NCEA data use are both ranked at high levels by senior leaders, the use of NCEA data to explore student learning and teacher practice is less prevalent.
* Schools in this sample that reported *expert* inquiry practices tended to have higher NCEA achievement relative to their decile.
* Schools in this sample that reported *progressing* or *proficient* inquiry tended to have mixed achievement relative to their decile.

**Recommendations for school leaders on potential actions include:**

* Make more use of curriculum level info of NCEA standards to link to the focusing inquiry from the teaching as inquiry cycle.
* Consider the development of an analysis template for department level NCEA data.
* Consider analysing papers for the curriculum level information they can provide (formative).
* Consider what actions leaders and teachers may stop doing, as well as those they will continue and / or adapt.
* Offer professional learning opportunities regarding statistical literacy.
* Consider analysis of NCEA data in groups, with at least one ‘expert’ in statistical inquiry.

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| **Overview of NCEA Data Use** |

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| **Little or no use** | | **Progressing** | | **Proficient** | | **Expert** |
| Initial categorisation based on Reeves and Flach (2011) | | | | | | |
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| **NCEA Data Use** | | | | | | |
| There is little use of NCEA data within our school. | There is a genuine attempt to look at NCEA data, but only at very general (school wide) level. | | Appropriate analysis and use of NCEA data at subject / course and student level is widespread. | | Effective analysis and use of NCEA data contributes to ongoing improvement in teaching and learning across the school community. | |
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| **Representation of data** | | | | | | |
| NCEA data is only represented as raw data or lists with little or no analysis or interpretation. | NCEA data is represented as graphs or tables that some teachers can use to reach conclusions about student learning. | | Representations of NCEA data allow teachers to reach appropriate conclusions about student learning. | | Representations are appropriate and flexible and allow teachers to actively inquire into student learning by forming and testing hypotheses. | |
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| **Statistical Literacy** | | | | | | |
| Teachers / leaders are ‘not ready’ or able to usefully analyse NCEA data. | Some teachers / leaders are able to usefully analyse NCEA data. | | Appropriate analysis of NCEA data is widespread across the school community. | | Analysis of NCEA data is appropriate, valid, and usefully considers ‘so what’ and ‘now what’. | |
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| **Perceived Usefulness** | | | | | | |
| NCEA data is not seen as particularly useful for inquiring into teaching and learning. | Some teachers / departments see NCEA data as useful for inquiring into teaching and learning. | | NCEA data is widely seen as a useful part of analysing and evaluating teaching and learning. | | NCEA data is seen as an important part of an overall picture of evidence that can inform ongoing improvement in teaching and learning. | |
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| **Leadership** | | | | | | |
| School leaders do not model analysis of NCEA data to inquire into teaching and learning. | Some senior and middle leaders model analysis of NCEA data to inquire into teaching and learning. | | Senior and middle leaders actively model and encourage analysis of NCEA data to inquire into teaching and learning. | | Senior and middle leaders actively model and encourage analysis of NCEA data as part of cycles of inquiry into teaching and learning. | |
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| **Student Learning** | | | | | | |
| NCEA data is mainly seen as a measure of students’ ability rather than of their learning. | Use of NCEA data as a measure of student learning occurs in pockets but varies significantly between teachers / departments. | | NCEA data is widely used to identify areas of strength and weakness in terms of student learning. | | NCEA data is used in conjunction with formative and summative assessments to actively inquire into student learning. | |
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| **Teaching Practices** | | | | | | |
| NCEA data is not seen as evidence about effectiveness of teaching practices. | Use of NCEA data as a measure of effective teaching practices occurs in pockets but varies significantly between teachers / departments. | | NCEA data is widely linked to observations of teaching practice and best practices / ineffective practices are identified. | | NCEA data is used as part of a range of data about teaching practices. Best practices are replicated and ineffective practices are discontinued. | |
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| **Professional Learning** | | | | | | |
| NCEA data is not used as part of professional learning within in the school. | One or two professional learning opportunities (beginning / end of year) are available in which teachers look at NCEA data. | | All teachers are required to examine their own NCEA data as part of ongoing professional learning within the school. | | Analysis of NCEA data is seen as a key aspect of professional learning and is used to support ongoing conversations within professional learning communities. | |
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| **Communication** | | | | | | |
| Little conversation is held around NCEA data. | Some conversations are held that explore NCEA data. Explicit instructional or leadership decisions do not emerge from meetings in which data is discussed. | | Regular conversations are held to consider a variety of data sources including NCEA data. Instructional and leadership decisions are made based on these conversations. | | Teachers regularly share their insights from NCEA data with colleagues. NCEA data is used to make and evaluate instructional and leadership decisions as part of cycles of inquiry. | |
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| **Inquiry** | | | | | | |
| NCEA data is not used as part of inquiry processes. | Some teachers / departments make use of NCEA data to inquire into teaching and learning. | | Use of NCEA data to inquire into teaching and learning is widespread. | | Use of NCEA data integrated with a range of appropriate evidence to inquire into teaching and learning is widespread. | |
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