National Standards – Not one test, not one day, not one classroom

Using evidence from student work in technology to inform overall teacher judgments for National Standards.

By Brenda Weal and Selena Hinchco

Introduction

The new school year for 2010 brought with it the introduction of national standards for reading, writing and mathematics (Ministry of Education, 2009a; 2009b). All schools with students in Years 1-8 are now required to report on students' progress and achievement against these standards. Also, in 2010, the *New Zealand Curriculum* [NZC] (Ministry of Education, 2007) is expected to be fully implemented in schools. This curriculum specifies eight learning areas and five key competencies that are important for a broad and general education. National standards need to be viewed within the NZC. It is not a matter of teaching the NZC or the national standards. The national standards come from the NZC and align with the achievement objectives at each level.

However, there is a fear by some that the focus on the introduction of the national standards may lead to a narrowing of the curriculum to merely reading, writing and mathematics, and that learning areas such as the Arts, Science and Technology may be marginalized (Hattie, 2009). This should not be the case because evidence of how a student meets a standard should be collected across a range of contexts and/or learning areas (Ministry of Education, 2009b; Ministry of Education, 2009c). Just as it is not enough to use only one assessment tool, it is also not enough to just look for evidence within only the specific teaching sessions of reading, writing, and mathematics. How students use reading, writing and mathematics in other learning areas can and should provide evidence towards making an overall teacher judgment.

In this article we will use the example of Jack, a Year six student, to describe examples of how he uses reading, writing and mathematics in technology. We will outline how evidence of his learning can be used by his teacher when making an *Overall Teacher Judgment* [OTJ] against the reading, writing and mathematics standards.

Jack's wind chime

> Jack is a Year six student at Tuatahi Street School. During an integrated unit on sound his class identified the opportunity to create some wind chimes for their school environment. Jack examined the range of wind chimes his teacher brought to class and researched wind chimes using the internet and non-fiction books. He learnt the names of

the parts of a wind-chime, how they were constructed and decorated, and what materials they were made from. This research helped him decide and record the attributes for his wind chime. He decided that his wind chime needed to be waterproof, made from metal to get a better sound, have strong string to hang from, and that it needed colour, a theme and detail to ensure it had good aesthetics. Because Jack had not worked with metal before he looked into the properties of three materials: aluminium, brass and copper. This helped him decide on which materials would be best for his technological outcome. He did sketches of several ideas and modelled his two initial ideas through 2D drawings. Through evaluating these ideas Jack decided on his final design. He chose a space themed wind chime, which he showed through a detailed 3D annotated drawing with measurements of the components he needed to construct. He planned the key stages of his work using a flowchart. Over several sessions he created his space themed wind chime. Firstly he tested aluminium chimes of different lengths to find the best sound and then drilled holes in them to enhance their sound. The star and planet were created by cutting and filing plastic into shape. Jack built a UFO shape by using a steel base and shaping, gluing and painting foam. Jack kept a daily diary of manufacture, recording his achievements, problems and next steps. He evaluated his final outcome and described possible modifications for the future.

(This story is fictional but is based on a real student's work from a student show case available on the Techlink website; http://www.techlink.org.nz/student-showcase/materials/dylan-wind-chimes.htm (Techlink, 2010a))

Overall Teacher Judgment

New Zealand's national standards differ from many overseas versions in that no single test or source of assessment information is being used to decide where a student is at in relation to the standards (Ministry of Education, 2009c). Instead, the existing formative assessment practices of New Zealand teachers are supported by the need to reach an OTJ. An OTJ involves teachers making use of a range of assessment evidence to support a judgment about students' progress and achievement in relation to the standards. The OTJ is made using the triangulation of;

1. Observing students, i.e. their workbooks, observations, approaches to tasks
2. Learning conversations with students, i.e. conferencing, interviews, self assessments
3. Formal assessments, i.e. standardized tests (e.g. PAT, e-asTTle, Gloss, STAR)
   (Ministry of Education, 2009c)

There are opportunities in technology education that can assist a teacher when making an OTJ. Within the story of Jack's technological practice we can see examples of his use of reading, writing and mathematics in a variety of ways. These examples could be considered by his teacher when making an OTJ about his progress towards the year six national standards. Below we describe the examples of how Jack used his reading, writing and mathematics understandings and skills within his technology experience.

Mathematics

> Jack made sketches of several ideas and modelled his two initial ideas through 2D drawings. Through evaluating these ideas Jack decided on his final design, a space themed wind chime, which he showed through a detailed 3D annotated drawing with measurements of the components of his wind chime.

The year six mathematics national standard states;

> "*By the end of year 6, students will be achieving at Level 3 in the mathematics and statistics learning area of the New Zealand Curriculum"* (Ministry of Education, 2009a, page 35).

The national standard further describes what year six students could be expected to do, including "*students will be able to: draw or make objects, given their plan, front and side views*" within the *Geometry and Measurement* strand (Ministry of Education, 2009a, page 35).

Jack drew his designs in both 2D and 3D drawings. While his drawing did not include different front and side views, his 3D drawings showed that he had a good understanding of perspective and shape. Jack then used his

final design drawing, with the estimated measurements, to measure, cut and shape the materials into the parts of his wind chime. This shows that within the context of his technological practice, while designing and constructing his wind chime, Jack is able to "*represent objects with drawings and models"* as per the Geometry and Measurement achievement objective for Level 3 within the NZC (2007). Together with standardized tests and discussions with Jack, his teacher could use these examples of Jack's use of geometry within the context of technology to contribute towards an OTJ.

Mathematics:		
Mathematics National Standard – By the end of year six	NZC Mathematics Level 3 Achievement Objective	Jack...
By the end of year 6, students will be achieving at Level 3 in the mathematics and statistics learning area of the New Zealand Curriculum; <u>Geometry and Measurement:</u> Draw or make objects, given their plan, front and side views	<u>Geometry and Measurement;</u> <u>Shape:</u> Represent objects with drawings and models	• drew initial ideas in 2D • drew final design in 3D and included measurements of the main components • using the measurements on his plan he created the components needed and constructed his wind chime

<u>Writing</u>

> Jack's research helped him decide and record the attributes for his wind chime. He decided that his wind chime needed to be waterproof, made from metal to get a better sound, have strong string to hang from, and that it needed colour, a theme and detail to ensure it has good aesthetics. He decided on his final design, a space themed wind chime, which he showed through a detailed 3D annotated drawing. He planned the key stages of his work using a flowchart and kept a daily diary of manufacture, recording his achievements, problems and next steps. Jack evaluated his final outcome and described possible modifications for the future.

The year six writing national standard states;

> "*By the end of year 6, students will create texts in order to meet the writing demands of the New Zealand Curriculum at Level 3. Students will use their writing to think about, record and communicate experiences, ideas and*

information to meet specific learning purposes across the curriculum" (Ministry of Education, 2009b, page 31).

The actual knowledge and skills expected to measure a student against this standard can be found in the NZC and in the *Literacy Learning Progressions* (Ministry of Education, 2010). The *Literacy Learning Progressions* describe the knowledge, skills and attitudes of writers and readers, and is a reference tool that should be used alongside the NZC when making an OTJ in writing and reading. For writing, we can see evidence in Jack's work that meets some aspects within the *Literacy Learning Progressions* for the end of year 6, which requires a student to "*independently create texts that are appropriate for their purpose and audience, choosing effective content, language and text structures"* (Ministry of Education, 2010, page 16).

Jack wrote in a variety of ways during his technology experience and each of these text structures had a different purpose. Each of these pieces of writing used different language and structure to meet its purpose and/or audience;

- He wrote annotations on his drawings which clarified his ideas for his audience. These annotations were concise and descriptive - "*star made out of plastic and when wind blow make a noise*"(sp)(Techlink website, 2010).
- He created a smiley face ratings chart as the structure in which to illustrate the evaluation of his final design idea.
- He used a flow chart to outline the key stages in his practice, so both he and his teacher could manage their time effectively.
- He used subject-specific vocabulary that is appropriate to the topic and purpose – "*properties*" and "*attributes*".
- He kept a daily diary which included his successes, problems, reflections, and the identification of his next steps. He used paragraphing and complex sentences to describe the detailed problems he encountered and how he resolved them - "*the problems were sawing the planets because when I sawed them out they didn't look like a circle, but when I filed it, it looked like a circle" (sp)*(Techlink website, 2010).

Together with other forms of evidence, including standardized tests and discussions with Jack, his teacher could use these examples of Jack's writing within the context of technology to support an OTJ.

Writing:		
Writing National Standard – By the end of year six	Year 6 Literacy Learning Progression; Writing	Jack
By the end of year 6, students will create texts in order to meet the writing demands of the New Zealand Curriculum at Level 3. Students will use their writing to think about, record and communicate experiences, ideas and information to meet specific learning purposes across the curriculum;	• use an overall text structure that is appropriate for their purpose • using visual language features (such as headings, charts or maps) to extend or clarify meaning and engage their audience • using mainly simple and compound sentences, along with some complex sentences, that vary in their beginnings, structures, and lengths and are mostly correct grammatically.	• flowchart of key stages • annotations on drawings • smiley face ratings chart to evaluate final design • daily diary • edited spelling • subject specific vocabulary; a) topic related vocabulary (e.g. wind chimes) – striker – chimes b) technological vocabulary – attributes – waterproof – product analysis

<u>Reading</u>

Jack researched wind chimes using the internet and non-fiction books. He learnt the names of the parts of a wind-chime, how they were constructed and decorated, and what materials they were made from. This research helped him decide and record the attributes for his wind chime.

The year six reading national standard states;

> "*By the end of year 6, students read, respond to and think critically about texts in order to meet the reading demands of the New Zealand Curriculum at level 3. Students will locate, evaluate and integrate information and ideas within and across a small range of texts appropriate to this level as they generate and answer questions to meet specific learning purposes across the curriculum.*" (Ministry of Education, 2009b, page 29).

As with the writing standard, the *Literacy Learning Progressions* (Ministry of Education, 2010) should be used alongside the *NZC* when making an OTJ in reading. The nature of this unit of work in technology does not

provide many explicit opportunities for structured reading. However, it does present an opportunity to observe Jack using reading as an interactive tool when researching wind chimes to help him develop the brief for his project. Through the use of prompts and questions, Jack's teacher can ascertain how well Jack is locating, evaluating, and making use of the information he gained from his reading. Jack read both non-fiction texts and online material to locate information about what the parts of a wind-chime are called, how wind chimes are constructed and decorated, and what materials they were made from. The research reading Jack did involved him in skimming and scanning for key words, such as *materials*, *how to*, *components*. Jack successfully collated ideas that he collected from a range of sources and inferred information that was not directly stated in those sources; all which helped him to develop his own design.

He discovered vocabulary that he was unfamiliar with (e.g. *chimes, striker* and *properties*), which he then attempted to use correctly in his own written and oral language. One way to gauge his level of comprehension is to look at how he makes use of the knowledge he has gained from his reading when planning and creating his own wind chime. For example, he uses the new terminology in his plans (*striker, properties*) and he can explain why he uses similar materials in his wind chime to the ones he read about. Together with other forms of evidence, including standardized tests and discussions with Jack, his teacher could use these examples of Jack's writing within the context of technology to support an OTJ.

Reading:		
Reading National Standard – By the end of year six	Year 6 Literacy Learning Progression; Reading	Jack
By the end of year 6, students read, respond to and think critically about texts in order to meet the reading demands of the New Zealand Curriculum at level 3. Students will locate, evaluate and integrate information and ideas within and across a small range of texts appropriate to this level as they generate and answer questions to meet specific learning purposes across the curriculum	• locating and summarising ideas (e.g. by skimming and scanning, by identifying key words) • finding and learning the meanings of unknown vocabulary • interpreting illustrations / diagrams / charts	• generated key questions for research • researched wind chimes, non-fiction texts and online texts • skimmed and scanned for key words • collated ideas gained from a range of sources to infer information that was not directly stated • discovered and attempted to use new vocabulary

Discussion

The example described above outlines how Jack's use of reading, writing and mathematics in Technology can contribute towards an OTJ in relation to the national standards. However, it is imperative to remember that this does not replace Jack's teacher's assessment of his achievement in Technology. Technology learning area achievement objectives must still drive the teaching and learning and must therefore be taught and assessed to show student progression and achievement in Technology. Technology education in New Zealand has a strong research base and this research has led to the development of the *Indicators of Progression* (Techlink, 2010b). The *Indicators of Progression* provide support for teachers to interpret the achievement objectives for each strand of the technology curriculum within the NZC. They describe what student achievement at each particular level might look like, across all three technology strands and across all eight levels of the NZC.

It could be said that teachers have always made judgments about their students' progress and achievement in reading, writing and mathematics. This is true, but national standards now call for teachers to make judgments about how students can demonstrate these skills not only in dedicated reading, writing and mathematics teaching sessions but also, as they work mainly independently, across the curriculum. Students need to connect what they have learnt in reading, writing and mathematics sessions into other curriculum areas. This will require teachers to make this transfer explicit, as students seldom make the connection independently.

We have identified three stages that we believe teachers may progress through as they come to terms with understanding how to make defensible OTJs for national standards. Initially, teachers will most likely consider making OTJs based solely on how students perform during their dedicated reading, writing and mathematics teaching sessions (stage 1). The second stage of development could involve teachers identifying some evidence from other curriculum learning areas when seeking evidence to support their OTJ, as we have demonstrated above (stage 2). We would hope, as teacher understanding grows, that we would see a shift towards a more cohesive approach to making OTJs. At this third stage teachers will take deliberate action when planning across the curriculum, to utilise authentic situations for students to use reading, writing and mathematics knowledge and skills that will provide evidence for making defensible OTJs (stage 3). Only then can we say that the judgement is genuinely an overall one.

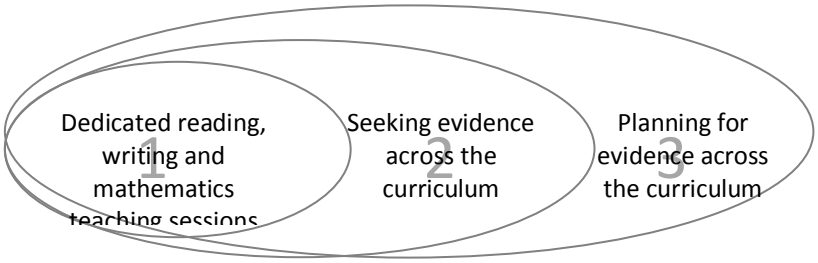

Figure 1: Three stages of teachers seeking evidence for OTJs

Conclusion

In this article we have described how Jack has revealed his understandings and skills in reading, writing and mathematics within his technology experience. We have outlined how evidence of his understanding and skills, while undertaking the designing and construction of his wind chime, can be used by his teacher when making an overall teacher judgment in relation to the national standards. Whilst this article uses Technology as its context, similar opportunities in other learning areas such as Science, Social Sciences, etc will also be valid. The national standards are putting the spotlight on literacy and numeracy and we have no argument about the importance of this. However, as educators, we must ensure that we all fully understand how to embed the standards so that they are in service to the broad scope of the NZC. The NZC provides the opportunities for developing confident, connected learners and well-rounded citizens. It is vitally important that we do not fall into the trap of disregarding the rest of the curriculum in favour of focusing solely on reading, writing and *mathematics*. It is going to take some time for all teachers to fully understand the implications of how to embed the national standards, particularly with regard to making sound overall teacher judgments. School leaders need to ensure that national standards professional development and discussions include all staff, not just curriculum leaders of the English and mathematics learning areas.

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