Example 13: Technology, Level 3 - Making a lantern

FROM THE ONLINE RESOURCE *INCLUSIVE PRACTICE AND THE SCHOOL CURRICULUM*

This example demonstrates how a teacher of a year 5–6 class differentiated a technology task (Planning the stages for making a lantern) so that all her students could explore the ideas in Technological Practice. The content and purpose of the task was appropriate for students working at level 3 of the curriculum, but through use of adaptations and differentiating the expected response, students working at levels 1 and 2 were also successful.

Task

In this unit, students were working through the technological process of making a lantern: planning and producing the lantern to meet their design brief and evaluating the outcome. The example covers part of the unit – a number of lessons in which students developed a plan for producing their lantern. Students first constructed a simple lantern. This introduced them to the materials, equipment, and a simple plan that could provide guidance and direction when producing their own. For most of the class, working at level 3, the plan would be in the format of words and diagrams. For students working at levels 1 and 2, the objective of the lesson was to produce a plan that could be pictorial. The context also allowed for two students to work on the priority goals in their individual education plans (IEPs).

New Zealand Curriculum achievement objectives

Technological Practice – Planning for practice

- Outline a general plan to support the development of an outcome, identifying appropriate steps and resources (level 1).
- Develop a plan that identifies the key stages and the resources required to complete an outcome (level 2).
- Undertake planning to identify the key stages and resources required to develop an outcome. Revisit planning to include reviews of progress and identify implications for subsequent decision making (level 3).

Opportunities to use and develop key competencies

Students were *thinking* as they asked questions to clarify their understanding about planning for an outcome and as they justified their decisions. They thought about and built on what they already knew about planning an outcome within a technological framework. Students were *participating and contributing* as they negotiated who they would work with and collaborated with peers and the teacher to share their ideas and understanding. They *used language, symbols, and texts* when creating their plan.

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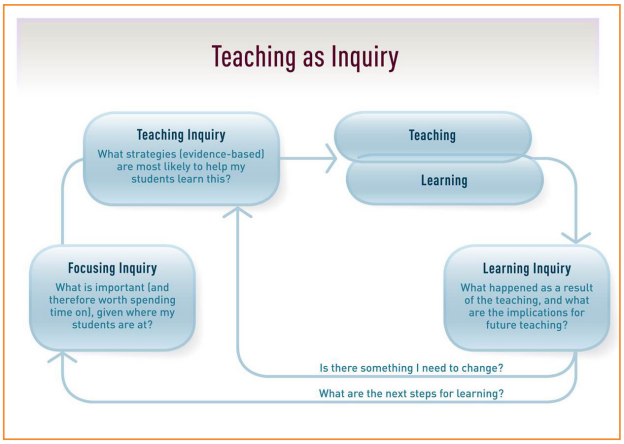
Class description

Miss Kendall has a year 5–6 class of 28 students. Within this class, the following students have been identified as needing support to access learning.

- **Braxton** has difficulty relating to others and maintaining friendships. He has recently been diagnosed with Oppositional Defiance Disorder (ODD). He has difficulty expressing his feelings and becomes very anxious when asked to complete most tasks. Braxton has an IEP, and one of his priority goals relates to learning to express his anger or frustration in an appropriate way. His teacher and school are supported through the Severe Behaviour Service, which includes teacher's aide time and support from an educational psychologist from the local Ministry of Education office. Miss Kendall has been unable to engage Braxton in any formal assessment, but her observations and formative assessments lead her to believe he is working within early level 2 of the New Zealand Curriculum.
- **Ruby** has autism spectrum disorder (ASD) and is working within level 1 of the curriculum. Visual cues and supports (for example, a pictorial timetable) assist Ruby's understanding of tasks and expectations, and so help her to engage in learning. Ruby has complex learning needs and receives additional support through the Ongoing Resourcing Scheme (ORS), which includes specialist teacher time. She has an IEP and one of her current priority goals is to use her visual supports to stay on track in classroom learning tasks.
- **Harry** has Duchenne muscular dystrophy. He has limited strength in his lower body. He is able to hold and write with a pencil but tires very easily. Harry learns at the same level as his peers, but he needs adaptations to the environment to support his mobility and uses a laptop to reduce fatigue during written activities.

Teaching as inquiry



Miss Kendall focused on a range of evidence-based strategies to support all her students to access, engage with, and learn throughout these lessons. Based on observations she had made during group work in mathematics, she was aware that some students responded better to working with a peer or in a group, while others found the social demands of group work an added challenge. For the tasks in these lessons, Miss Kendall gave the class the option of working individually, in pairs, or in a small group of three. Students self-selected their partner or group and had to establish ground rules for how they would work together. They negotiated with each other where to work within the classroom (for example, quiet booths, the cloakroom). The lessons took place when a teacher's aide, Mrs Knowles, was working in the classroom. She roved between the groups and pairs to ensure that students were aware of what they were meant to be doing and to give support when they were unsure. She and Miss Kendall worked with students who needed extra support at agreed times throughout the lessons.

Prior to these lessons, the students had looked at a range of technological outcomes for lighting to explore how different products are made. They had discussed what lanterns are used for, what they can be made from, some common features of lanterns, and where and when the students had seen lanterns. The class decided they would make lanterns to show the school's cultural diversity during International Cultural Awareness Week. They were keen to look at different lanterns across a range of cultures, their purpose, and the materials and attributes of different lanterns. Following this, the class collaboratively created a design brief.

The example covers a number of lessons as the students took what they had learned so far and applied it to planning their own lanterns that met the design brief. They were able to plan using different media (iPads, drawn models, and construction). Their learning was assessed formatively throughout the lesson. Miss Kendall was monitoring how students managed their time, the decisions they made, and their ability to identify their next steps. The students self- and peer-assessed using a simple flow chart with key reflective questions. After these lessons, students went on to make and evaluate their lanterns.

Focusing inquiry

What was important (and therefore worth spending time on), given where Miss Kendall's students were at?

Based on discussion with a colleague who had taught her class the previous year, Miss Kendall established that most of the students had completed technology units in the past and had a basic understanding that a sequence of steps needs to be taken in order to move through the design and construction process. Most students had limited knowledge of what was involved in the iterative stages of technological practice, particularly around developing a plan and knowing which materials would be appropriate. For Ruby and Braxton, the lantern task was a good context for building on their emerging understanding of developing a plan, while also providing a context to target a specific goal from each student's IEP.

Teaching inquiry *What teaching strategies (evidence-based) helped Miss Kendall's students learn?*	Learning inquiry *What happened as a result of the teaching, and what were the implications for future teaching?*
Adapting the environment • Miss Kendall set up the classroom to maximise learning opportunities for all the students. She arranged the desks so that pairs and groups could concentrate on the task together. She also allowed students to work in other areas, such as the cloakroom.	
• Miss Kendall also had a number of individual work stations in the classroom.	Miss Kendall: *Work stations work well in my class. Some students recognise they work better in an environment where noise and visual distractions are reduced. We started off with one for Ruby and now we have seven, as more students want to use them.*
• Ruby chose to work on the lantern task by herself and sat at a workstation with partitions and headphones. She also had a Swiss ball to sit on, as she tends to stay focused for longer when she can still move while sitting.	Miss Kendall: *If Ruby sits on a chair, she gets up and down all the time. The specialist team suggested we try a Swiss ball and Ruby definitely sits for longer when she uses one. She even takes it to assembly and sits at the end of the row. It's great, as she didn't come previously because she would run out all the time. Now she stays for at least 10 minutes.*
• Miss Kendall made sure there was clear access between the different areas of the classroom to ensure Harry could move around the room without tripping over. She reminded the class to be considerate and not create obstacles where people would be walking.	
Scaffolding the process • Miss Kendall knew many students in the class would benefit from the hands-on experience of making a simple lantern before developing a plan for making their own. This would support them to make appropriate decisions during their planning.	Miss Kendall: *Before the students had even started making the simple lantern, I could hear several groups talk about the features and uses of lanterns – they were using some of the language we had covered in our previous discussions about lanterns leading up to this lesson.*

The teacher adapted the classroom seating to support her students to engage with the task.

With your colleagues, discuss: What changes do you need to make to the environment to ensure that **all** students have the opportunity to engage and participate in learning tasks?

Students completed sequencing tasks and made a simple lantern as preparation for creating their plan.

Teaching inquiry *What teaching strategies (evidence-based) helped Miss Kendall's students learn?*	Learning inquiry *What happened as a result of the teaching, and what were the implications for future teaching?*
• Miss Kendall gave the students photos that showed the steps involved in making a simple lantern. Students worked individually, in pairs, or in groups to order the pictures in the correct sequence. They could choose to print the page of photos and then cut and order the hard copies, or to complete the task on iPads in the Popplet app.	
• Miss Kendall had a range of follow-up activities prepared: – Sorting a list of items (e.g., stapler, coloured card) used to make a lantern into 'equipment' and 'materials'. This was followed by a discussion with a partner on the role of each item and when it is used in the process. – Reading a list of verbs used in the steps (e.g., cut, press, roll) and labelling the pictures with the appropriate verb. – Reading written descriptions of each step and matching each pictured step with the written description.	Miss Kendall: *I could see I needed to differentiate the sequencing task for Ruby. I asked Mrs Knowles (teacher's aide) to reduce the number of cards Ruby had to sequence from 8 to 4. Ruby can read single words and works well when the task and concepts are concrete. So I used the list of item words in a follow-up task for Ruby. Categorising the items would be too tricky for her so, instead, I asked Mrs Knowles to work with Ruby to cut up the words and label the pictures with them. This provided a good model of a plan for Ruby.*
• After completing the sequencing tasks and follow-up activities, students moved on to make the simple lantern.	Miss Kendall: *This was the first time in teaching this unit that I had students make a simple lantern before developing their plan. It worked really well – several students referred to the simple lantern as they identified the steps in their plan. I'm sure this activity helped students create more detailed plans and consider the implications of each step in terms of resources required and completing the outcome.*
Personalising the context and differentiating the task • When it came time for the students to develop a plan for their own lantern, Miss Kendall knew that Ruby and Braxton would be more engaged in the task if the context was meaningful for them. Ruby has a special interest in cats and is more engaged when learning material has cats in it. Braxton is more likely to stay on task when rugby is part of the context. In discussion with these students, it was decided that Braxton would make a lantern for a rugby field and Ruby would make one shaped like a cat.	Miss Kendall: *Changing the context was easier than I thought, and what a difference it made to those students. They were both really focused on their plans. Great to see Braxton laughing and talking with other students during the planning lesson. I don't see this very often.* Braxton's mum: *I have never seen Braxton so excited about his schoolwork. He asked his dad if he would help him add to his plan. He has never done this before. So good to see Braxton and his dad working together.* Miss Kendall: *I noticed it was easier for Ruby to access the lesson because she was so excited about making a cat lantern. She showed everyone who came into the class.*

The teacher provided support so that the students could use their prior knowledge and interest to access the task.

Read more about ways to differentiate the classroom programme.

With your colleagues, discuss: How can you provide and differentiate tasks that scaffold learning for **all** your students?

The teacher chose contexts that were relevant to her students' interests to engage them in the task.

With your colleagues, discuss: How can you build on students' interests and personal experiences to engage them in new learning?

Teaching inquiry *What teaching strategies (evidence-based) helped Miss Kendall's students learn?*	Learning inquiry *What happened as a result of the teaching, and what were the implications for future teaching?*
Allowing for multiple ways of responding • Miss Kendall provided Braxton with six pictures of lanterns from rugby grounds. Each picture was cut into three (top, middle, bottom). From the pictures, Braxton chose the top, middle, and bottom he liked best and pasted them onto his paper. Mrs Knowles then guided a peer to help Braxton write the materials he would need beside his diagram.	Miss Kendall: *It's important that the teacher's aide and I work closely together. If Braxton had his way, Mrs Knowles would do all his work. We noticed that bringing in Braxton's interest in rugby meant he was much more engaged in the task.* Mrs Knowles: *Once the other boys found out that Braxton's lantern was for a rugby ground, I had plenty of volunteers to help him write his list of materials!*
• Miss Kendall gave Ruby lots of pictures of cats and a lantern template. While the other students were working on their plans, Miss Kendall spent a few minutes with Ruby discussing the materials and equipment she would need for her lantern. She referred Ruby to the labels she had cut and glued in the previous lesson to help her generate a list. Miss Kendall wrote these on a sheet under two headings: 'Materials' and 'Equipment'.	Ruby: *I need glue and scissors and grey paper to make my cat lantern.* Miss Kendall: *Having the pictures and labels from the previous task really helped Ruby to understand my questions about what materials and equipment she would need to make her cat lantern.*
• Miss Kendall suggested to Harry that he make his plan on the iPad. He and his partner, Joe, asked Miss Kendall if they could make a plan together instead of one each.	Miss Kendall: *I had intended for each student to develop their own plan and agreed somewhat reluctantly to Harry and Joe working collaboratively on a single plan. Their work output was amazing, however, and the results blew me away. Harry's and Joe's plan was more detailed than most of the other students' – they had clearly identified what resources they thought they would need for each stage. So I am going to give students the option to work in pairs when they move on to making their lanterns.*
Assessing to recognise learning • Miss Kendall formatively assessed the students' understanding of planning for practice based on what she noticed during the lessons and by looking at their plans. She made anecdotal notes on her technology unit and noted next steps for the students.	Miss Kendall: *I noticed that I need to develop students' ability to add more detail when writing written instructions. I will add this to the writing activities that they complete in literacy time.*

Students used different approaches and worked with others or individually to develop their plans.

Read more about Universal Design for Learning: how to present information in multiple ways and allow for different ways for students to respond to and engage with learning.

With your colleagues, discuss:
What opportunities do you provide for **all** students to express their ideas in multiple ways?

How can peer interactions provide opportunities for **all** your students to engage with technology tasks?

Teaching inquiry *What teaching strategies (evidence-based) helped Miss Kendall's students learn?*	Learning inquiry *What happened as a result of the teaching, and what were the implications for future teaching?*
• Throughout the planning process, the students used a simple flow chart to assess their learning. The flow chart included: – What did you achieve today? – So what did you notice? – Now what will you do in the next lesson? Miss Kendall encouraged the class to use the 'now what' question to review whether they needed to adjust the resources and materials they would need for each step. Some students working in pairs or groups chose to complete this as a peer assessment.	Miss Kendall: *The data from the flow charts showed that most of the students needed to explore materials more to enable them to make appropriate choices for their lantern. I will ensure we make time at the beginning of the next lesson to discuss this and revisit our plans before going on to the next stage.*
• As well as assessing in relation to level 1 and 2 technology achievement objectives for Braxton and Ruby, Miss Kendall also assessed these students' learning against individual goals from their IEPs. She did this through observation and conversation with the students. She was looking for Braxton's progress in managing his behaviour when working with a peer and Ruby's use of visual supports to stay on task.	Braxton talking to Miss Kendall: *I took turns with Jack. He's my friend and he said he would help me tomorrow with my maths. He said I'm a great sharer.* Miss Kendall: *Working with the specialist teacher, we have developed a range of visual supports for Ruby, such as visual timetables and activity sequences. I noticed in the lantern activity that we didn't need these supports as much. I think this was because the task itself was so visual and incorporated her interest in cats. I used to worry that I was not meeting Ruby's needs. Now I know that I can meet her individual needs within the class context. This is great, as she gets to fully participate and meet her goals.*
• When it was time for students to start making their lanterns, Miss Kendall gave the class the choice to produce their own lantern or work with a buddy to make a lantern collaboratively.	Miss Kendall: *Introducing the option to work in pairs added a further element of peer assessment to the task. Students who decided to collaborate had to decide which plan they would follow to make their lantern. Listening to the students select a plan, I heard many of them weigh up which one would be more likely to successfully achieve the outcome.*

The teacher used varied means of assessment to recognise her student's learning.

With your colleagues, discuss: How do you ensure meaningful assessment to celebrate learning for all your students?

Next steps

Now that you have explored this example, work with colleagues to:

- consider the challenges and opportunities in relation to inclusion for *your* students
- decide on the next steps in your social sciences teaching to ensure *all* your students are participating, learning, and achieving
- plan for a future meeting to review the impact of your next steps and what *now* needs to happen.

Recommended resources

A teaching and learning sequence for making lanterns for years 7-8 with a focus on ESOL students can be found on ESOL Online.