

Making Puppets – TEALS case study

This case study describes the learning of an individual student, Ana, in a year 11 design and technology class in 2000. While the class was working towards School Certificate in design and technology, the teacher was also trialling the draft achievement standards. Although the achievement standards have been modified since 2000, this case study shows how the [Technology Assessment Framework](#) (TAF) can be used to manage assessment for qualifications. The teacher planned a unit of work entitled "That's Show Business" to enable year 11 students to develop and demonstrate the knowledge, skills, and technological practice associated with the development of a puppet. The puppet would be used for storytelling to an audience.



The teacher used the 1999 draft level 1 Achievement Standards 1.1 and 1.5 to set the criteria and negotiate learning outcomes for specific students. The assessment used in the case study has been changed to reflect the final achievement standards.

At the planning stage, three [gateways](#) that would help manage the teaching process and the formative and summative assessment of students' learning were identified. The teacher was aware of the need to negotiate learning outcomes with students during the progress of the unit, depending on the abilities and needs they revealed when undertaking their chosen technological practices. The teacher was also aware of the need to recognise and validate any unexpected learning that students demonstrated.

The plan of action

The first gateway focused on the technological practice of establishing the task and preparing an initial plan of action.

The students were given a brief to design a character puppet that appears to be "alive" when it is manipulated by the human hand. They decided to create a character to help them tell a story to a specified audience. The teacher initiated the unit with a class brainstorm, discussing puppets in general, including video puppets, Punch and Judy, and the Muppets. Next, the students explored the historical development of this art form and researched different types of puppets, their features, and their cultural significance. They made links to the socio-political aspects of characterisation in different societal and cultural eras, and identified and compared puppets used for different purposes, such as storytelling or for satirical cartoons.

Each student then prepared an initial plan of action to guide their pre-development and development work.

Ana had a good knowledge about puppets from her prior experiences. She identified a wide range of common puppet types such as rod, shadow, string, glove, marionette, and mechanical. She also listed more contemporary types such as remote-controlled puppets.

Ana also had a good understanding of the features some puppets may have, such as being strong but light, easy to hold, durable, and flexible. She discussed size in terms of handling and how puppets need to be specifically designed for their audience. She identified different characters that puppets could represent (human, real and imaginary animals, and cartoon characters) and a range of expressions they could be designed to portray, such as happy, sad, angry, cunning, mischievous, cute, and grumpy. She also identified a number of purposes where puppets are commonly used, such as in education, in storytelling, in shows, and for children's recreation.

After the class brainstorm, Ana expanded her knowledge by carrying out extensive research, exploring the different types, materials, and features of puppets from different countries and cultures, their purpose, and the techniques used to handle them. Using a range of sources, she also researched the contemporary uses of puppets, particularly the technological practice of Jim Henson, creator of the Muppets, and the history of their development, and the relevance of puppets in present day New Zealand.

She translated what she knew about puppets into a wide range of initial design ideas, explaining how a range of mechanisms and structures allowed for different joint movements. She also explored the idea of natural lines versus symbolic designs, evaluating the feasibility, degree of difficulty, and impact on an audience of both design styles in terms of construction techniques and ease of manipulation. The wide range of annotated reference materials relating to construction techniques that she gathered assisted her in selecting a focus on dragons for her own puppet development.

Although Ana had a reasonably good understanding of how a design process could be used in undertaking technological practice, she had not previously heard of the term "plan of action". She did, however, understand some of the concepts underpinning one. For example, she knew that research was an important component in the development of a solution for a given brief. In previous situations, she had demonstrated an ability to work and think independently and she had good problem-solving skills.

Developing the brief

At the second gateway 2, Ana's conceptual, procedural, and legislative and regulatory knowledge were extended and operationalised in the development of her brief.

The students identified where they needed to undertake research to develop their initial ideas and to select materials that were appropriate to the character of their puppet and the type of movement required. To do this, they explored mechanisms, structures, and materials used in puppet construction, including jointing techniques for different types of puppets. They also identified whether they needed to incorporate new features, such as electronics. Then they were ready to develop their personal brief and identify the specifications for their puppet.

All students were required to complete an assignment on health and safety in the workshop. They then developed rules and protocols to ensure safe working practices.

After selecting her puppet design, Ana identified a range of possible construction materials, such as wood, metal, plastic or plastic moulds, clay crete, fimo, fabric, and papier mâché. Her understanding of joining techniques for different materials had been developed during previous units of work and she already had a basic understanding of control systems in terms of inputs,

outputs, and switches, as well as how mechanisms such as cams, levers, and pivots could be used.



Ana's understanding of cultural sensitivity issues that were raised in class discussion prompted her to undertake specific research into the symbolic nature of dragons in other cultures, particularly in Asia, to ensure that the development of her puppet would not be incorrect or offensive to others.

From her previous experience in school workshops, Ana had a good understanding of safety protocols for machinery use and general safe workshop practices. She was able to extrapolate her general understandings of safety to the context of puppets, identifying safety issues for their construction and handling, such as the need to cover joints and to have no sharp edges, loose pieces, or long strings that could cut or wrap around limbs. However, she had limited understanding of the health and safety regulations and OSH (occupational safety and health) requirements for such things as the management of materials - their handling and storage and their toxicity. She also had no specific knowledge of copyright laws.

Ana quickly completed an assignment on safety in the workshop with no support from her teacher. The assignment focused on the need for correct attire and knowledge of appropriate behaviour in the workshop, recognition of potential dangers, and the safe use of hand tools and machinery. It also included a section on electricity. Ana explained what OSH stood for and how OSH legislation impacts on employers and employees.

Ana developed her own brief with specifications, which reflected the wide range of factors she had explored.

Brief

To design and make a puppet to suit a purpose. My puppet will be a dragon and it will be made for the purpose of education and recreation with children of any age. The operator will need to be older than ten years of age to handle the size and weight of the puppet.

Specifications

My puppet will need to:

- be lightweight so that it does not tire the arm when used;
- be made of strong materials so that it does not break or dismantle when in use;
- be made in a bright colour so that it attracts attention and stands out;
- not be complicated to use;

- have more than one movement, such as mouth and arms;
- be comfortable to use – ergonomic;
- be easily transportable, not too big and heavy;
- have a clear movement that is secure, simple, and reliable;
- be safe to use with no sharp edges, etc.;
- be inoffensive to different cultures, traditions, and races.

Even at this stage of the unit, Ana displayed confidence and competence when working independently. She had meticulously planned what she wanted to do and how she would achieve it. All aspects of the task were kept in mind, carefully thought through, and the details noted.

Implementing the plan of action

Gateway 3 required students to implement a plan of action to develop a working puppet that meets the requirements of the brief.

As the students implemented their plans of action, they continued to research, explore, and experiment with materials, mechanisms, and techniques.

The students made prototypes of different sections of their puppets and trialled their mock-ups, using a video camera to aid analysis. As they made modifications and changes to their plans of action, they recorded these in written or graphic form, explaining the reasons for their decisions. When their puppets were completed, they selected a story to tell to a chosen audience and demonstrated how their puppet could be manipulated as part of the storytelling.



Ana continued to explore ways to fulfil her brief through design work, research, and extensive experimentation. Annotated modifications to her design work clearly linked her plan of action and subsequent mock-ups to development of the final prototype. Many of her experiments with materials led her into unexpected but exciting outcomes that were effectively evaluated in terms of their usefulness in developing her dragon puppet. In her portfolio, she extensively documented all aspects of her practice, clearly demonstrating her ability to think through problems, both anticipated and actual. When faced with a problem, she responded fully, often to the point of developing multiple mock-ups and exploring a wide range of possible solutions before making a decision.

Right from the outset, Ana implemented a highly integrated technological practice where research, planning, experimentation, evaluation, modification, and adaptation were ongoing and iterative processes. The following transcript of her discussion with the teacher indicates that, when developing wings for her dragon, she had a clear vision of what she wanted and she was prepared to work at the problem until she had solved it.

I wanted them [the wings] to look real – like skin or something. I experimented a lot with them because I knew they could be quite fragile. At first I tried to make them out of clay – but then I thought they would have broken easily if they had hit something. I didn't want them to be as thick as the clay. It was hard to get the clay thin without breaking. So then I decided to make them out of wire because it would sort of demonstrate how wings have bones on them.

I got some tissue paper and folded it over and glued it, and to keep the sides from sticking up, I put glue over one side. It dried, but it was still very sticky ... it wouldn't dry properly. So that didn't really work. So, I got some more tissue paper that was a lot thinner, but it was stronger and some sort of an alcohol solution called dope. I folded over the tissue paper and put the dope over and it dried it, as well as sticking it, and it was actually quite strong when you put a few coats over. It also kept the transparency effect. After that, I dyed them green and they looked quite leathery like skin and still transparent.

Ana demonstrated her ability to plan ahead and to prioritise the factors that would impact on and be influenced by each decision, managing her time so that there was no "down" time. For example, while waiting for paper pulp to dry for the head, she worked on the jaw, experimenting with different materials, eyes, and modes of movement. Her construction of the jaw and its mechanism for movement is an example of her ability to think around a problem to achieve a solution. After much trialling of mechanisms, materials, and construction techniques, she decided upon a wire framework covered in plastic for the lower jaw because this would allow her to mould it to the required shape and size to ensure a perfect fit with the upper jaw.

Evaluation and assessment

In evaluating her overall practice, Ana noted that her plan of action was not separated out from her development recordings, but embedded within it. She commented that, by treating her plan of action in this way, it guided her towards completing her puppet without restricting her ability to make modifications or changes. It also helped her with resource management, allowing her to plan ahead to ensure that she had access to everything she needed.



This meant that her whole portfolio was clearly a working document providing evidence for assessing the learning outcomes of gateways 2 and 3.

Ana's technological practice reflected her sound technological knowledge, skills, and practice and demonstrated her high level of analytical, reflective thinking. She demonstrated evidence towards achieving 1.1 and 1.5, with excellence and therefore met all the learning outcomes covered within gateways 1 to 3.

Gateway 1: Pre-determined Component of Practice**Learning outcome**

Students can create a plan of action for the development of a puppet.
Achievement objectives: 1, 2, 3, 4, 5, 6a, 6c, 7, 8.

Linked to Achievement Standard 1.1

This standard requires outlining and refining a plan of action and using it in the development of a technical solution involving a working model, a prototype, or a finished product example, to address a given brief.

Assessment criteria

The evidence provided shows that the students can:

For achievement of the standard: Outline stages in the plan of action and identify resources required.

For achievement of the standard with merit: Structure stages in a plan of action, allocate and prioritise appropriate resources for all stages.

For achievement of the standard with excellence: Structure stages in a plan

Assessment strategies

Portfolio and conference with the teacher.

Observation of management of classroom time, resources, and materials. For example, while waiting for the head to dry, the student will work on another part of the puppet.

Gateway 2: Pre-determined Knowledge

Learning outcome

Students can provide evidence of relevant:

- conceptual knowledge;
- procedural knowledge;
- knowledge of relevant legislative and regulatory constraints, codes of practice, and codes of ethics.

Achievement Objectives: 1, 2, 3, 4, 7, 8.

Linked to Achievement Standard 1.5:

This standard involves the demonstration of understanding of relevant technological knowledge that has been accessed and applied in a technology programme.

Assessment criteria

The evidence provided shows that the students can:

For achievement of the standard: Demonstrate understanding of relevant technological knowledge.

For achievement of the standard with merit: Demonstrate in-depth understanding of relevant technological knowledge.

For achievement of the standard with excellence: Demonstrate in-depth understanding of a wide range of relevant technological knowledge, drawn from a wide range of relevant knowledge bases for all stages so that the allocation of resources is efficient and justified. of action and allocate and prioritise appropriate resources

Assessment strategies

Health and safety assignment in portfolio.

Teacher/student conferences.

Class discussions.

Gateway 3: Pre-determined Component of Practice**Learning outcome**

Students can use the developed plan of action to produce and manipulate a puppet that fulfils the requirements of the brief.

Achievement Objectives: 1, 2, 3, 4, 5, 6a-d, 7, 8.

Linked to Achievement Standard 1.1.

This standard requires outlining and refining a plan of action and using it in the development of a technological solution, involving either a working model, prototype or finished product example, to address a given brief.

Assessment criteria

The evidence provided shows that the students can:

For achievement of the standard: Outline stages in the plan of action and identify resources required.

For achievement of the standard with merit: Structure stages in a plan of action, and allocate and prioritise appropriate resources for all stages.

For achievement of the standard with excellence: Structure stages in a plan of action and allocate and prioritise appropriate resources for all stages so that the allocation of resources is efficient and justified.

Assessment strategies

Final puppet.

Manipulation of the puppet to tell a story to a chosen audience.

Portfolios, which include records of modifications and changes to the student's plan with justifications.

Teacher/student conferences.