

EXPLANATORY PAPER

The Technological Practice Strand: Planning for Practice

ABSTRACT

The purpose of this explanatory paper is to clarify and define the nature of effective planning that supports technological practice. It presents the component descriptor, the key ideas underpinning it, and illustrative examples of these from technology and technology education.

COMPONENT DESCRIPTOR

Effective planning techniques are critical for informed and responsive technological practice. Planning tools must be fit for purpose if they are to ensure the successful development of outcomes. Planning allows understandings from past and current experiences, as well as those that may be reliably forecast, to be taken into account in a systematic and managed way. Efficient resource management and accessing of stakeholder feedback relies on forward planning. Planning for practice incorporates ongoing critical evaluation and efficient and appropriate documentation. Planning for Practice can be thought of as the organising practice of technological practice.

KEY IDEAS

Effective planning techniques ensure efficient resource management (including the management of materials, time, money and personnel) and as such are critical for informed and responsive technological practice. Planning for practice includes a recording aspect to support resource management, enable reflection on past decision making, and ensure vital documentation is maintained.

A range of planning tools can be used to make sure record keeping does not become arduous or irrelevant to enhancing the quality of the practice undertaken. These planning tools should be selected and/or developed on the basis that they are best suited to the nature of the practice being undertaken, and the communication strengths of the technologist. Record keeping may therefore include oral, graphical, written, and/or electronic modes of documentation as appropriate. Technological practice is enhanced when the documentation of planning strategies best meets the needs of all stakeholders, including the technologist themselves.

Planning tools include such things as: brainstorming, mind-maps, idea banks, reflective journals and/or scrapbooks, plans of action, Gantt charts, flow diagrams, graphical organisers, and structuring/diagramming techniques etc. In order to work most effectively and responsively, specific planning techniques need to be developed as part of technological practice to ensure that all factors key to success are taken into account throughout the developmental work.

Ongoing reflection and evaluation of past and current planning experiences, (both one's own and those of others), can enhance the ability to make informed planning decisions. Planning should take into account the physical and social environment into which the outcome is to be situated, as well the environment in which the technological practice is occurring.

A significant aspect of supporting such planning is the analysis of the impacts and implications (ethical, environmental, political etc) of the practice, as well as those that result from the development of the outcome itself. Analysing both historical and contemporary contexts can help identify past planning strengths and weakness and inform future planning decisions.

Effective planning for practice should result in planning that is both flexible and robust. That is, It should be flexible enough to incorporate modifications as based on a critical evaluation of progress to date, and be able to respond to unforeseen eventualities (barriers or new opportunities), and/or changing factors. However, it should be robust enough to provide clear guidance of 'where to next?', ensure resource availability, and allow critical feedback to be gained in time for key decision points. Records should provide enough detail to enable them to be

used to justify past decisions, or provide direction for new plans should the practice result in a dead end or should the development be queried by an external evaluator. This is particularly important to ensure ethical and/or legal protocols are followed in as required by social and/or legal conventions.

ILLUSTRATIVE EXAMPLES FROM TECHNOLOGY

Wellington City Council is always planning ways to enhance its city. The waterfront is a key feature of Wellington's landscape, and a focus on enhancing and expanding the Oriental Bay beachfront was decided to be a justifiable project for the Council to undertake. When undertaking technological practice to change the natural environment a number of key and wider community stakeholders must be part of the consultation process, and managing this, alongside the complex environmental issues that arise when undertaking such a project, requires effective planning to ensure critical feedback is gained at crucial decision making points and that resources are managed in appropriate and sustainable ways. For examples of the nature of planning underpinning this project see [Oriental Bay Beach Development](#)

Putting together a film is a complex management process as people are a key resource and as such require specialised resource management strategies. 'This is not a Love Story' is a Loose Unit film production by Keith Hill. With significant resource constraints to contend with – such as limited money, Keith had to also carry out strategic planning at every stage of the development, to ensure the project would continue and his ideas would be realised. For examples of some of the planning techniques used to work within severe constraints see [This is not a Love Story](#)

ILLUSTRATIVE EXAMPLES FROM TECHNOLOGY EDUCATION

The following learning experiences have been provided to support teachers as they develop their understanding of the Planning for Practice component of the Technological Practice strand. There is no expectation that these would form the basis of any specific unit of work in technology. The learning experiences have been summarised from classrooms across New Zealand and provide examples of student achievement across a range of levels. This stance reflects the majority of classrooms, within which it is expected that students will demonstrate a range of levels of achievement.

Junior Primary (NE-Year 4)

A group of students had been learning about electricity as part of a science unit. They then decided to use this knowledge to make their own motorised toys to star in a puppet show for younger students at the school. For details of this unit please see the Ministry of Education's Connected Series 2005 Volume 1 – Super Toy Makers.

Students achieving at level 1 could:

- explain how they looked at a range of toys brought from home, to give them ideas about the features their toy could have and the type of material it could be made out of
- suggest how they could balance their toy by adding weight to the base of the fairy and how they could make a storage compartment for the battery
- suggest that the thick piece of cardboard could be used for the heavy base and the thinner cardboard could be used to hold the battery

Students achieving at level 2 could:

- identify the key stages required to complete an Angel toy with a spinning halo; these being the need to complete their design first, then make a working model of their toy to test that the halo spins properly, before making the proper body of the toy and applying the finishing decorations
- explain that old pieces of card were used to make a working model of the Angel's body and the spinning mechanism when they were test how well their design might work
- record key stages and resources needed in a flow diagram including an estimate of how much time it will take organise the materials they need, and make and test their toy, and that they would need new plain card, coloured pencils and ribbon to use in its final construction

Senior Primary/Intermediate (Years 5-8)

A group of students found that their school garden was producing more vegetables than could be used during particular growing seasons. They worked alongside a community expert to develop a pataka for storing the vegetables, so the gardening efforts would not go to waste. For details of this unit please see the Ministry of Education's Connected Series 2005 Volume 3 – Our Pataka.

Students achieving at level 2 could:

- identify the key stages required to ensure the construction of a storage hut within the timeframe and financial constraints and record these in a plan of action
- draw a design of their outcome and label the materials it could be made of

Students achieving at level 3 could:

- record a plan of action that showed key stages and how much time each stage would require, what knowledge was needed, and who could be approached to provide any additional expertise/skill needed to ensure the plan could be put into action
- review the initial plan of action and modify as needed to take account of changes to their timeline and environmental factors

Students achieving at level 4 could:

- develop a plan of action that included key stages, activities that needed to be undertaken and the resources required for these to be successful. Plan also included details of experts that would need to be accessed at each stage and how they could be contacted, and identified review points to reflect on progress to date
- allocate time for meeting with stakeholders (teacher, others involved in garden, outside expert, principal, local council) to ensure ideas and materials selected were in keeping with stakeholder expectations
- undertake periodic reflection of progress and use this to update their timelines and resource needs as the project proceeded to ensure dates for building were confirmed well in advance and plans made to cater for the helpers on the day

Junior Secondary (Years 9-10)

A year 9 class developed a class time capsule, with personalized contributions being designed by each class member. The students worked to a given brief but were required to personalize this to guide their individual pieces. Planning was a key part of the process to ensure the practice undertaken was coordinated and completed in time for the capsule's closure. For details of this unit please see [Time Capsule](#)

Students achieving at level 3 could:

- identify the key stages in the development of the class capsule, and the implications of these for their own capsule
- identify the materials they would need for the name stand, the resin artefact and the individual time capsule, and where they expected to access these from
- draw diagrams detailing how the name stand, the resin artefact and the individual time capsule would be made and the materials needed for each
- review diagrams and modify, as a result of progress to date and resource availability.

Students achieving at level 4 could:

- develop initial plans for their own capsule showing how they fitted in with the class plans
- draw diagrams showing how the name stand, resin-captured flower and capsule would be constructed; annotate diagram with notes about possible materials and their costs, and identify times to use gain feedback from the teacher, technician and other students
- review diagrams, develop step-by-step instructions, and compile a list of materials selected and where and how they could be accessed.

Students achieving at level 5 could:

- discuss the planning decisions made during the development of the class capsule, and past planning they had been involved in to identify strengths and weaknesses of particular planning tools
- use a combination of action plans, Gantt charts and flow diagram to plan how they could access knowledge and skills required to construct each part of their project; and ensure they had enough time with people at the museum to ensure their perspectives could inform future planning decisions
- develop a Gantt chart to clearly align tasks to be done with their timeframes, and provide guidance for where to next
- draw detailed flow diagrams showing how the name stand, the resin-captured flower and the capsule would be constructed; annotate diagram with notes about possible materials and costing
- document planning decisions and outcomes in a digital scrapbook of design ideas, including previous plans, charts and diagrams annotated with reflective comments showing why decisions and any changes had been made.

Senior Secondary (Years 11-13)

A group of year 11 students was provided with an opportunity to develop software to meet a specific learning need. The students were asked to identify a user with a specific learning need and investigate that need over the coming weeks. The users identified by the students had a range of needs.

One student had a ten-year-old sister who was just starting to do algebra; he wanted to make the subject fun, because when he had done it he had found it intimidating. Another wanted to create a learning programme that would teach his sister about healthy eating. Several students worked with ESOL students in the school and one worked with the school learning support unit. During the unit the students needed to learn about programming principles, interface design, coding animations and interactivity. For details of this unit please see [ICT Programming](#)

Students achieving at level 4 could:

- develop possible sketches and storylines for their programme, and use these to develop a list of resources required to support their development
- plan future activities that would provide opportunity to develop the knowledge and skill they required to develop their programme ideas; time with their target user was planned to occur at many stages to trial design ideas and check the suitability of the programme being developed
- develop a storyboard to communicate key ideas to others for feedback
- revise storyboard to serve as guide for the development of the programme

Students achieving at level 5 could:

- reflect on previous planning decisions they had made, identifying things they did well and not so well in the past, in terms of organising their time and resources
- evaluate possible planning tools for use in this project and select a visual diary format, a planning framework, and a storyboarding template to support their practice
- establish and record their initial plans in a format that demonstrated they were making informed decisions about what was required of them, in terms of accessing information from their target user, guidance from their teacher and/or mentor, and their personal development of skills and knowledge in the area of programming
- draw sketches of possible ideas for games and suggest potential storylines, using these to gain feedback from the target user before reviewing ideas for the programme
- capture their progress to date in a visual diary, and explore the implications for what steps they needed to take next and the resources required to support this
- develop diagramming techniques to communicate current thinking for feedback and to provide guidance for the construction of the programme
- evaluate progress to date, by reflecting on plans, drawing and structuring diagrams, and recording reasons for decisions made in their visual diary

Students achieving at level 6 could:

- critically analyse their own and others' planning practices to establish personal organisational abilities, and explain how these could be enhanced through the use of well selected planning tools
- research and evaluate a range of planning tools, to select tools justified as suitable to the context of the project and their personal organisational ability
- draw detailed sketches of feasible ideas for games and develop potential storylines, using these to gain feedback from the target user before reviewing ideas for the programme
- employ the use of selected planning tools (a visual diary, updateable planning framework, and a range of diagramming templates) at different times, to best support their forward planning, and time and resource management; provide justifications for decision making in terms of the physical and social environment in which they were working and the specific requirements of the target user

Students achieving at level 7 could:

- critically analyse their own and others' experiences of self and team management, to identify a range of planning tools that could be successful in enhancing management practices
- identify personal strengths and weaknesses in relationship to the planning and management requirements of the brief, and develop planning tools that would specifically address these in the context of the project
- employ specifically developed planning tools (a visual diary, updateable planning framework, and a range of diagramming techniques) in an effective manner, to manage, document and justify decisions in terms of the physical and social environment in which they are working and the specific requirements of the target user

Students achieving at level 8 could:

- critically analyse their own and others' project management experiences in the field of ICT, to identify key factors essential to efficient project management
- identify personal strengths and weaknesses in relationship to project management in technology, and plan learning opportunities to develop and enhance these
- critically analyse a broad range of planning tools and select those that would best support their project management practices
- develop an initial plan that allowed for extensive exploration of what efficient planning and resource management would require in this environment
- employ the use of specifically selected planning tools to support the project management of their work in an efficient and critically reflective manner, ensuring decisions about information presented, means of presentation, resources used and the management of time and resources were informed and critically evaluated in an ongoing manner, in keeping with contemporary understandings and project management best practice in the field of ICT.