Bridges: A Unit of Work by Sue Lemmer

Discovery Network Teacher 1999

Level of schooling
Year 6/7

Duration
One term @ two hours of computing lessons per week

Integrated areas of study
- Studies of Society and the Environment
- Maths
- Technology
- English

Information Technology Focus
- *Kidpix* and *Paintbrush* programs - for self-created graphic designs
- the *Internet* and *CD Roms (e.g. Encarta)* - for research
- *Microsoft Publisher and Clip Art Gallery* - to import text and graphics
- *scanning* photographs from factual texts
- *Hyperstudio* program - for presentation purposes

Outline
This unit involved a Year 6.7 class refining and extending their understanding of bridges through a number of class group learning activities. Using a variety of factual texts, CD Roms and Internet sites, students utilised their notetaking skills while researching the history of bridges, the bridge types, the characteristics of each type, the materials used to build the bridges and specific examples of famous bridges built. Students were able to graphically portray the knowledge and understanding gained from their research, through the use of the Kidpix and Paintbrush programs. The Hyperstudio program, enabled students to collate their notes and examples of bridges, and present their information as a learning tool for other students.

Context
This topic began as an integrated unit of work, where students undertook and completed a variety of tasks in *Studies of Society and the Environment, Maths, English,* as well as the *Constructive and Learning Technology* curriculum areas.

Establishing an integrated curriculum stimulated student interest and provided enough background to motivate students to conduct further research using factual books, CD Roms and the Internet.

The planning of the unit was done in collaboration with the librarian and Computer Co-ordinator. The topic elicited many creative ideas, and was refreshingly different to past student learning experiences. It was therefore felt that both the male and female students of the class would respond positively and benefit from their learning.

The students had access to the computer room twice a week. This room houses 17 networked computers, with the Internet supplied to each. This enables two students to have access to one computer during computer lessons.

The school has had the advantage of a Computer Co-ordinator for four years, which has ensured growing student and teacher confidence in the use of computers and programs. The room also provides access to two scanners. A digital camera is shared within the school.

The students were proficient in the use of *CD Roms, Paintbrush,* a *scanner, and Microsoft Publisher*

Developing teacher *and* student skills on the *Internet, Kidpix* and the *Hyperstudio* programs was done in close collaboration with the Co-ordinator.

Learning Outcomes

Studies of Society and the Environment
Resources
- Recognise and accept that individuals within a group/partnership, value different forms of work.
- Through the process of *Designing* and *Making*, discover how limited resources and specific factors will often determine the choice and general use of particular materials.
- Identify how information is used as a resource to make and record decisions.

Investigation, Communication and Participation
- Able to frame questions and identify the types of data and sources required to gain and present information.
- Recognise significant issues during research and select ways of collating these effectively.
- Recognise conflict and ineffectiveness in partner and group tasks, and negotiate suitable strategies to resolve a problem or concern.

Mathematics
Space
- Use spatial ideas, tools and techniques to interpret, draw, make an accurate version of the drawing, and ensure correct placement of parts, in the *Designing* and *Making* process.
- Able to visually represent and use a network diagram to depict the order of information and the paths that can be taken to provide the information for the *Hyperstudio* program.

Number
- Able to divide amounts of money or measurements by a one digit number to calculate the percentage of materials required to build a bridge, and the overall cost involved.

Measurement
- Estimate and measure time and duration of time, and able to accurately record and compare elapsed time while undertaking the process of bridge building.
- While researching types of bridges and existing examples, students were able to compare and order length and mass measurements, using appropriate language.
- Ability to make a bridge that met simple measurement specifications, and use the known size of familiar things to help make and improve estimates of length and mass.

Technology

Systems
- Able to describe how the elements of the *Hyperstudio* program work together, and use a number of techniques to organise, assemble and trial a linear or creative research path.

Information
- Able to explain and apply a variety of formats for creating, constructing, presenting , storing and transmitting information for particular audiences and users.
- Support text information with selected / altered graphics.

Designing, Making and Appraising
- Can examine different possibilities for collating researched information and presenting it in a format that would appeal to a variable audience.
- Able to create and prepare design proposals that show evidence of options considered and provide reasons for the choices made.
- Able to modify the *Hyperstudio* presentation by substituting text, changing background, importing graphics, and so forth, to improve the quality of presentation.
- Assess the effectiveness of the *Hyperstudio* presentation by reflecting on achievements, modifications and listening to suggestions made by users.

English

Speaking and listening
- Listen and respond to peers experiencing problems with computing, by reflecting on explanations, offering practical solutions, considering other suggestions, and generating plans for completing the task.
- Identify, prepare and present the main idea and supporting details of a spoken report to peers,in a summary format.
- In a variety of group situations, present a strong point of view, and respond to the points of view of peers, constructively, and with supportive reasons/arguments.

Writing
- Experiments with interrelating ideas and information when writing a report format about bridges, and will adjust writing to take the context of the *Hyperstudio* program into account, as well as the overall purpose and audience.
- Recognises the importance of a published piece of work and will use a range of strategies, (e.g. tools bar / own learning) to proofread own writing and use the *Hyperstudio* samples of work to help plan and review the presentation.

Reading and Viewing
- Able to use informational texts and CD Roms containing some unfamiliar concepts,to find information, and interpret this information correctly.
- In a partnership or as a group member, will brainstorm and identify key areas and develop focus questions to guide the search for information and make brief notes relevant to each category.

Teaching and Student Learning Experiences

Before undertaking the Learning Technologies, I wanted to be certain that my year 6/7 students had a sound knowledge base from which to work, and, in turn, had the confidence to think diversely and creatively about the topic. My teaching content and methodology, therefore, targeted specific curriculum areas which allowed for this.

English

- *Aural Comprehension* - from songs (i.e. "Bridge over Troubled Water" by Simon/Garfunkel;
  "View From The Bridge" by Kim Wilde, etc)
- *Daily class reading* – "Bridge Of Terabithia" by Katherine Patterson
- *Comprehension* and *Language activities* - based on excerpts from "Bridge To Terabithia" and
  Current Affairs articles (e.g. events/ circumstances surrounding Hindmarsh Bridge in Goolwa, etc)
- *Dictionary usage* and v*ocabulary development* - through Comprehension / Language activities.
- *Genre Writing*
- *Exposition*; Current Affairs articles, problem solving from "Bridge To Terabithia"
- *Narration*; of personal experiences related to "Bridge To Terabithia"
- *Reporting*; in both *oral* and *written* formats, on aspects of research
- *Poetry;* beginning with students writing *acrostics*, then going onto *Haiku* and *Cinquain* poetry writing*,* much later in the unit.

Constructive Technology

- Groups of 3-4 students formed a bridge building company, creating a company name and designing a company logo. As a class, a list of jobs relating to company organisation and bridge building were brainstormed, published and printed on computer, then shared equally amongst the students within the company. This served as their role specification and record of company contribution during the building of the bridge.

- As a project for their bridge building company, each group was expected to *design, make and* later*, appraise,* a bridge spanning 750mm – 1000mm, with a height of 500mm, and able to hold a minimum of one Kilogram. Four millimetre thick cardboard, string, wire and hot glue guns, were the main materials to be used.

- Students were issued with 'order forms' and expected to order the materials for their bridge model from a 'supply company'.(i.e. the teacher)

Although students did not begin their bridge model with a budget, they were 'charged' for supplies at a price agreed to by the class prior, to initial ordering. The total cost of their bridge was taken into account when appraising the model.

Mathematics

The *Construction Technology* of a bridge model, culminated in a maths focus in the space and measurement strands. The following content areas were incorporated:

- *Angles, lines and shapes.* This unit of work helped define specific bridge types during student research and group/class discussions. Students were able to use this information to confidently plan designs for their bridge model. Students also used their knowledge of this area to choose and assess the effectiveness of construction materials that would best achieve a bridge type for their bridge models.

- *Measurement – millimetres, centimetres, metres.* Students already had background knowledge in this area, so it served as an exercise in revision. The ordering and gathering of construction materials to begin bridge building, the actual making of the bridge and the techniques used to ensure that each company's bridge model met expected design criteria, relied heavily on the measurement process. Student measurements were randomly checked by me, particularly orders, as these were 'charged to companies, and therefore had to be accurate. Most items were priced by the metre, centimetres and millimetres – even sticky tape!

- *Mass.* Before, during and after construction of bridges, students experimented with testing the strength of various materials, supports and frameworks using commercial and individually made weights .

Essential Teaching and Learning Experiences - Learning Technologies

Locate, collect, analyse and organise information
- Students used various texts from the school's library and individual students' personal library as a starting point. Locating information from CD Roms, was a natural progression from this. *Encarta* and *Chronicles of the 20th Century* were mainly used, highlighting students' notetaking and computer printing skills.
- Students organised their information under specific headings:
- **Bridge type** (i.e. beam, arch, cantilever, suspension, cable-stay, opening), *characteristics* associated with bridge type, *materials used* , and *famous bridges* of each type. Some students chose to add bridge *disasters* and *history* of bridges. Students accessed the *Internet* for additional information. The school's I.T. Co-ordinator had researched and recorded a list of possible Internet sites, which I had then accessed to determine the relevance of each site to our topic. Students accessed the sites I considered appropriate.
- To **plan** how all this information would be presented in a *Hyperstudio* program, students designed either a linear or branching flowchart that could be followed when compiling *Hyperstudio card stacks.*

Work with others and in a team of two
- to locate information, establish roles and responsibilities before working together at a computer, and to collaborate and share computing skills so that the partnership works towards the same goal.
- Partners were chosen from *random cards.*

Communicate ideas and information:
- *orally* during computing sessions, and in preparation and planning times for *Hyperstudio* presentation, through informal student-partner , student-peers, and teacher-student dialogue. Students also *reported* on specific research in structured *class discussions*. This ensured understanding of information-particularly that accessed from the *Internet* - and allowed for less-able students to 'catch up' on information
- by students w*riting* in a specific genre, (i.e. report genre), notetaking, and summarising key points for *Hyperstudio* program
- by creating *graphics* in the *Kidpix* and *Paintbrush* programs to illustrate what students have learnt about specific bridge types (i.e. *beam, arch,… etc.)*
- by acknowledging *CD Roms, Internet* sources and dates accessed in the form of a *Bibliography*

Solving problems

- creatively and in a non-threatening way, and in collaboration with peers/partner. I expected students to practise their problem solving skills when confronted with difficulties in understanding information, when accessing specific Learning Technologies, such as the CD Roms/Internet, and in trying to work through the process of completing their planned *Hyperstudio* presentation.

Planning and organising personal activities in collaboration with their partner

- by organising all information, and planning the presentation outside of computer lesson times.
- ensuring students and their partners make good use of their time in the computer room by remaining focussed and exploring the specific Learning Technologies
- with students and their partners openly discussing their goals with me, at the beginning of computing lessons, then providing oral feedback to the class, in relation to their achievements,at the end of each lesson.
- in relation to students applying the plan for their presentation to the actual *hyperstudio* program, they needed to sort out priorities. These ranged from whether to complete a card at a time or complete the backgrounds only of the whole stack. It also included decisions on where and when to use animation, if this should be completed before all the buttons are to be included ……….and so on.

Understanding, using and exploring Technology

- As students had no prior knowledge of accessing the *Internet,* or the *Kidpix* and *Hyperstudio* programs they, were explicitly taught the skills of each, through a series of stuctured lessons. For this to happen, I needed to spend time with the IT Co-ordinator developing my own skills and ability to teach the programme to students. The *Hyperstudio* program required a lot of structure in terms of ensuring students were aware of the potential of the program. Students began practising skills associated with the *Hyperstudio* program by preparing a presentation about themselves. This helped the students relax and gain confidence, as they experimented with animation and sound.
- Students were encouraged to seek other Learning technologies/programs related to student experience, that would support their *Hyperstudio* presentation.

For example:

- use the *scanner* to scan photographs
- transfer skills from *Microsoft Publisher* and *Paintbrush* to create quiz-type learning experiences for an audience, at the end of presentation. (e.g. Find-a-word, multiple-choice questionnaire)
- access *Clip Art* to import text and graphics to use as a background or change them into *buttons* for the *Hyperstudio card stack.*
- makeup and import a bitmap from *Paintbrush* to insert as a picture
- create a bridge type using *Moopies and Stampimator* in the *Kidpix* program and transfer this into the *Hyperstudio* presentation.

Assessment – Learning Technologies

Assessment in this area was initially on an informal basis, using:

- *observation* of student work practises when accessing, analysing and organising information
- *questioning* students about the information they have gathered
- *listening* to student answers and justifications as to why specific information is useful
- *oral feedback* on a student's ability to structure information in a report format, using own words.

I continued to use informal assessment procedures during student implementation of a *Hyperstudio* presentation.

My focus during this time was on:

- students and their partners defining task orientated goals and providing oral and visual feedback on their computing skills for each lesson.
- students ability to follow my directions and save work as a *Hyperstudio stack* in 'C' drive, and in a class folder under *Network Neighbourhood.*
- individual and collaborative student skill in final layout, design and inclusions, as well as appropriate key wording skills and accuracy of editing. At the completion of the students' presentations, I prepared a checklist of skills students would have acquired while working on their H*yperstudio* presentations. This checklist was adapted from one originally compiled by the school's I.T. Co-ordinator, and provided a more formal assessment process. I used a similar process to compile a checklist of skills for *Kidpix* .
- *peer assessment* was also undertaken at the students' completion of their *Hyperstudio* presentations, at the request of a number of students and then by a unanimous response from the class. I approached this by ensuring that pairs of students viewed another two students' work. The viewing audience was armed with a formal *peer assessment sheet,* which enabled them to record their responses. Each presentation had two sets of viewing audience and also two peer assessments.

Assessment – Integrated Curriculum Areas

The majority of assessment undertaken in these areas was on an informal level, using teacher observation, questioning and reflective listening. This was particularly true of English. Although Maths began on a similar level, its assessment eventually became embedded into the Constructive Technology Area, which was assessed on a more formal level, and looked at a number of different aspects of bridge model building. For instance: roles and responsibilities of team members, skills for working with others, meeting design criteria.

This formed the basis of peer assessment strategies in rating individual student's work performance within the group, as well as measuring, checking, questioning and deciding on an overall achievement as a class, of a group's completed bridge model.

Teacher Evaluation

This unit of work was originally planned for one term, but with frequent extra curricula interruptions, specifically associated with year 6/7 students, the unit evolved over 2 terms.

Although a lot of work in terms of organisation and management, there were numerous positive outcomes in terms of student and teacher learning. These include:

- students developing a high level of skill in accepting differences, collaborating and solving problems amongst themselves.
- the majority of students, as well as myself, having their first experience with the *Internet,* not to mention the *Kidpix* and *Hyperstudio* programs.
- students revising their skills in specific maths areas, as well as in *Microsoft Publisher* and *Paintbrush,* and were willing to take risks due to their confidence with these programs.
- students experiencing and effectively using a huge range of graphics associated with the Learning Technologies.
- the students and myself, confidently experimenting with animation and graphics in *Kidpix* and *Hyperstudio,* with students drawing on their skills in other Learning Technologies to create presentations that use an enormous range of interconnected skills. To see the students at work in the computer room was truly amazing.

I believe that the implementation and success of this unit was due in part, to the support of the school's I.T. Co-ordinator, Sue Lemmer. I have developed a lot of skills and confidence from working with Sue, and this continues as I watch my students at work.

Resources

Encarta / 20th Century Chronicles – CD Roms
Internet access to sites relating to bridges
Non-fiction reference materials relating to bridges
Building Toothpick Bridges – Pollard, Jeanne
Planning the inclusion of Key Competencies in a unit of work – DETE
The Advertiser
Computing skills continuum R-7 –checklists compiled by Lemmer, Sue