

Murder under the Microscope 2007
5th National Waterwatch Conference
November 26, 2007

www.cli.nsw.edu.au

Introduction

Murder under the Microscope (MuM) is designed for students in Years 5 to 8 and links to several curriculum areas. It is an online environmental mystery game in which students are presented with a problem. The problem is that an animal or plant has gone missing from its natural environment somewhere in Australia. The scenario changes each year so that students can play several times without getting bored. This year *MuM* ran from April to June and it is scheduled to run again from April to June in 2008.

The students work together in teams, taking the role investigator. They must collaborate and cooperate in order to solve the mystery. That is, they must find the cause (villain), the effect (victim) and the specific environment (crime site) in a limited time. This enables a competitive side to the project which heightens the excitement and engages students in their learning. To sum up their learning, students produce a catchment management plan that will prevent any chance of the villain striking again and offer a long-term solution for the catchment.

Web site

Using the *MuM* web site, students and teachers develop a schedule for the classroom game, download lists of villains, victims and crime sites, read and review clues, view and review the video transmissions, ask questions of the science experts, make their accusation and submit their management plan.

MuM aims to push the boundaries of student use of Information and Communications Technologies (ICT) for improved learning outcomes, particularly in the areas of web information skills, research, collaboration, communication, publication and critical evaluation.

Curriculum links

MuM has been designed to support student learning in a number of curriculum areas across the Middle Years of schooling.

For NSW, the main curriculum areas include:

- Stage 3 Science and Technology
- Stage 3 Human Society and its Environment
- Stage 4 Science
- Stage 4 Geography.

How does it relate to Waterwatch?

Investigating environmental degradation inevitably leads to issues related to water. Waterwatch classroom activities may lead into OR round off the learning for students involved in *MuM*. In the lead-up and during the first two weeks of the game, teachers are advised use the classroom activity cards. These may be viewed, printed or downloaded from the website. The activity cards cover 10 topics related to water.

Before the game starts, students can research water issues by studying the water issues cards, available on the web site. These activities help them to understand the language of water issues. For example:

1. Accidents
 - Spills of many kinds can be villains.
 - A spill can occur a long distance from the site it affects. Pollutants are carried in the water and may reach the groundwater.
2. Flow
 - Dams and other artificial changes (irrigation) to the river change the flow.
 - The flow affects the amount of dissolved oxygen in the water.
3. Land use
 - Human activity affects water quality.
 - Pollutants directly emptied into the water system can be generated by factories, sewage, abattoirs.
4. Nutrients
 - Nutrients from run-off, chemical fertilisers and sewage cause increase in plant and algae growth in rivers.
 - Water temperature is raised, flow is lowered, and oxygen is lowered.
5. Run-off
 - Run-off is the rain that is neither absorbed by the ground nor evaporated.
 - Run-off can carry with it all the loose materials in the catchment, washing soil, fertilisers and pesticides into the waterways.
6. Salinity
 - The level of salts and minerals in the water is affected by the rising water table.
 - Land clearing and irrigation (including domestic lawn watering) create high water tables and high salinity.
7. Sediment and silt
 - Soils and silts cause changes to the depth and flow of the water, which in turn affects the temperature and the fishes' ability to breathe.
 - Silt can destroy fish habitats and spawning beds.
8. Stormwater
 - Stormwater systems carry litter and other residential rubbish, which can wash down gutters and drains.
 - Sewerage systems can overload into the stormwater system.
9. Vegetation
 - Trees and plants play a vital role in the health of our waterways.
 - Removing trees allows more water to reach the groundwater system.
10. Water temperature
 - Cold water holds more oxygen.
 - Warm water results in the growth of plants and algae.

Student engagement

Evaluation of the 2007 *MuM* project revealed high engagement.

- 1,000 teams of students from around Australia and overseas
- 67% of surveyed students accessed site at home
- 86% of surveyed teachers accessed site at home
- the web site received 11 million hits in six weeks
- 95% of surveyed teachers want more programs like *MuM*
- 90% of surveyed teachers said *MuM* helps students to carry out investigative research.

The NSW Quality teaching model

Murder under the Microscope 2007 assists teachers to implement the model of pedagogy presented in *Quality teaching in New South Wales public schools* by the NSW Department of Education and Training.

Intellectual quality

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| Deep knowledge | <ul style="list-style-type: none"> • In preparing a management plan, students are challenged to think about how to prevent any chance of the villain striking again and they offer a long-term solution. • <i>MuM</i> requires students to synthesise and evaluate their research data, draw conclusions and present these in a format that the audience will understand. • They work collaboratively in a team and assist each others' knowledge and understanding throughout the project. |
| Deep understanding | <ul style="list-style-type: none"> • In <i>MuM</i>, the students are encouraged to know about the sites, fauna and flora in a detailed way and apply their understanding to solve the eco-crime. |
| Problematic knowledge | <ul style="list-style-type: none"> • When students start <i>MuM</i>, they are immediately confronted with the problem of an eco-crime. • Students become engaged in finding correct answers to questions such as, "what is this site like?", "what was here before?", "what was changed and why?", "what animals lived here and why?" • Students may be confronted with conflicting information. They need to evaluate their findings to draw conclusions. • Some parts of their investigation may appear to be inconclusive but this adds to the excitement. As the date for accusations draws close, the quest to solve the problem gathers momentum. • The <i>MuM</i> website provides a continuous stream of information from a case officer, crime site investigator, forensic scientist, three science experts and the archivist, providing support for multiple ways of knowing. |
| Higher-order thinking | <ul style="list-style-type: none"> • The learning materials support students in applying, analysing, synthesising and evaluating their knowledge. |

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| Metalanguage | <ul style="list-style-type: none"> Students in <i>MuM</i> explicitly name and use the specialist languages of investigation, science and research. |
| Substantive communication | <ul style="list-style-type: none"> <i>MuM</i> continues over a period of eight weeks, thereby providing students with sufficient time to have substantive communication with each other, their teacher and scientific experts. |

Quality learning environment

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| High expectations | <ul style="list-style-type: none"> <i>MuM</i> is designed to deliver targeted curriculum outcomes in such a way that all students are motivated to learn. <i>MuM</i> aims to maximise the enjoyment of learning both in and beyond the classroom. It offers the flexibility for the teacher to make decisions about how to implement the project in a way that is accessible for all their students. |
| Student direction | <ul style="list-style-type: none"> The evaluation of past <i>MuM</i> projects shows that students become engaged and self-directed in their learning. |

Significance

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| Cultural knowledge | <ul style="list-style-type: none"> In solving the eco-crime, students experience a number of different viewpoints about the same event. |
| Knowledge integration | <ul style="list-style-type: none"> <i>MuM</i> provides students with opportunities to integrate their knowledge across the learning areas of science and humanities. Students are supported in learning how to apply their knowledge and understanding of a range of fauna and flora to the conditions of each crime site, so that they can make a correct accusation on all three items, who died, why and where it happened. |
| Connectedness | <ul style="list-style-type: none"> The <i>MuM</i> project provides a rich learning task by making clear connections with contexts outside the classroom. The immediate objective for students participating in the <i>MuM</i> project is to solve an "eco-crime". They take on the role of investigators working together to solve a case. Students must identify three things - who died (victim), why it happened (villain) and the where it happened (crime site). Whilst the eco-crime is a fictitious one, the scenario could happen or may have happened in reality. The scenario is backed by scientific evidence and is heavily scrutinised by real scientists well before the game starts. |
| Narrative | <ul style="list-style-type: none"> The <i>MuM</i> game is based on the narrative of an eco-crime. The eco-crime is a fictitious story of a number of events that lead to environmental destruction. The students use clues and their research findings to develop the narrative of the events that lead to the eco-crime against the environment. |