

MAINTAINING THE RAGE- INVOLVING AND MAINTAINING SECONDARY SCHOOLS IN WATERWATCH

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Waterwatch is used to great effect in primary schools, but how do you make it user friendly for secondary? How do you maintain the interest of both students and teachers? This session explores new practices and a new slant on old programs to promote the use of Waterwatch in environmental and sustainability studies in secondary schools. Problems such as student and teacher interest, curriculum and equipment restraints, and availability of resources are examined with some new strategies to deal with common problems that are encountered.

BACKGROUND

I was employed by the KESAB Patawalonga and Torrens Waterwatch program in Adelaide, South Australia for 12 months to specifically look at secondary programs and how to engage more secondary schools in the program. The KESAB program in the Year of Freshwater in 2003 worked with 65% of the 195 primary schools and 40% of the 64 secondary schools in the catchments of the Torrens and Patawalonga. In 2004, the numbers dropped to 28% of primary schools and 14 % of secondary schools, but more training workshops for teachers were run and more students and community members participated in event based activities. It is hoped to significantly increase those figures by the end of 2005.

I had come across the Waterwatch program in my 10 years of teaching, but found it difficult to see how I was going to manage the water testing program and the students - at the same time- and engage them in a meaningful way. When I joined KESAB I looked forward to investigating the existing program and seeing how I could use it in the classroom. This paper is presented from a practical classroom teacher's viewpoint, and also from a South Australian perspective.

MAKING IT USER FRIENDLY

I focussed on three areas to make the program user friendly:

- Curriculum restraints
- Equipment restraints
- Availability of resources

Curriculum Restraints

In South Australia, the South Australian Curriculum, Standards and Accountability Framework (very similar to other states) directs the teaching at each age or year level. There is great flexibility in the framework and teachers are free to teach different topics as long as the outcomes are reached. The Waterwatch program very neatly fits into the learning areas of Society and Environment and Science.

The outcomes for students which are relevant to Waterwatch are:

Society and Environment

by the end of year 8—the student describes consequences of human modification of features

by the end of year 10- the student describes natural features and identifies factors affecting them

Science

by the end of year 8- the student investigates and explains the functioning of living systems from the microscopic to the macroscopic
by the end of year 10- the student interprets and uses information about the structure and function of living systems and their relationship to survival of ecosystems.

For secondary teachers to pick up the Waterwatch theme, I had to develop a package ready to go, with obvious curriculum links and material ready to hand to students. Using my experience in teaching, and the curriculum, I set about reworking our program for secondary schools. Using similar structure or topics as in the primary programs, I worked on relating each program to specific curriculum needs in the areas of Science and Society and Environment. In doing this I ensured the outcomes as described previously could be reached using topics which were already covered by teachers at secondary level.

For example: our primary session on aquatic macro invertebrates is called “A bug’s life”
For secondary I renamed it: “Habitats, communities and aquatic macro invertebrates.”
This essentially is the same program, but I described it in a way that science teachers teaching the concept of trophic levels and food webs would be able to use this session to explain and reinforce these ideas.

The sessions: “A frog’s life” and “Something fishy” were combined and expanded for secondary schools and called “What’s in our waterways?”. This covered all types of animals as well as aquatic plants, looking at identification, adaptations, effects of pollution and so on. Links to the curriculum were provided as well as pre and post visit classroom material to assist the teacher in providing students with real learning opportunities. I also made sure I wrote expanded lesson plans for all the catchment officers to follow.

These two examples link particularly well to topics that appear in middle school science textbooks and senior science topics in biology/ ecology. When a Waterwatch program is written in a way where secondary teachers can recognise the components of their own programs, more schools and teachers may become involved in the Waterwatch program.

Equipment restraints

Secondary Science teachers are practiced at running experiments with groups of students, where each group has sufficient equipment to carry out the experiments. Teachers would find the equipment provided by Waterwatch in one kit is not enough for all students to be involved. By year 9, students have reasonable laboratory skills and should be able to complete tests independently either in the field or laboratory, if given the instruction sheets in addition to stressing the rinsing of containers and safety factors.

The secondary kit developed contains 6 of each test (6 pH strip boxes, 6 nitrate kits, 6 phosphate kits and 6 turbidity tubes) and 6 instructions (specially written for secondary), but only one salinity meter. This was due to the cost of this meter, and the teacher can also have some control over it - for example by placing it at a station out the front so each group visits it in rotation. This will reduce the waiting time between using the tests that occurred with only one set. Each student is involved in some part of testing and they would all be involved in recording the results and writing conclusions.

While this approach is ideal for introducing students to water quality testing, it is probably not possible at present to give each high school a kit for the year for the 6 water monitoring tests (called “Snapshots” in South Australia) - however, it is something to look at for the future

Availability of Resources

Resources in this instance refers to assignments and worksheets. From my classroom experience to teach a new program I would want resources that are:

1. Providing straightforward information which is not pitched too high or low
2. Not too much to photocopy (most teachers are limited in their photocopying) and is easy to do
3. Ready to use: just photocopy the assignment and hand out
4. Presented in way that all teachers (and students) would recognise (teacher speak)

Using Teacher Speak

When speaking to groups of teachers, it is sometimes beneficial to use language teachers are familiar with in their workplace. I wrote the following to precede some worksheets for teachers. It addresses the outcomes for the students and how Waterwatch fits into the school program.

This program will:

- *examine the student's local natural environment in a realistic and scientific manner using environmental methodology and sampling*
- *analyse ways to work for environmental sustainability and take environmental action*
- *value the student's current and future input in the community while developing hypotheses and writing scientific statements and/or writing critical reports*

Aquatic macro invertebrates are an accessible and valuable tool to develop a wide range of scientific skills and encourage environmental awareness in students at secondary level. The information can be used as a unit of work or provide the framework and flexibility for teachers to encourage student initiated learning opportunities and to promote collaborative work with the community. Biological monitoring can be used to make environmental education in secondary schools more relevant, personal and integrated across the curriculum.

This type of writing is very familiar to teachers, it uses teaching catch phrases and alludes to current trends in teaching (e.g. integrated curriculum) and could be used as a preamble for presenting Waterwatch to teachers.

Developing assignments and worksheets

I developed worksheets and assignments that followed the same procedure science teachers would recognise – in an experimental format, or a worksheet format. I also refined a field trip worksheet using material already developed by other teachers more suited to Society and Environment. You are most welcome to view these worksheets and I am very happy to email them to anyone.

Some valuable points

1. Making up larger assignments. There are many worksheets you can develop for each topic. If you make up a number of these, divide the topic into smaller units –of one or two pages of work per unit which can be used individually or as a set for the topic
2. Keep in mind the wide range of abilities at 13-17 years old. The teacher will be able to decide if a worksheet is too hard or not. You can only provide the options.
3. While some classes are really bright, material must be clearly written, with vocabulary that a 14 year old could understand. I have found that only in year 12, do most students develop a more adult (advanced) form of communication and understanding.
4. Include some “fun” activities like connecting statements, crossword etc. In recent studies on boys and learning, fun activities are a useful tool in gaining boys attention

HOW DO YOU MAINTAIN INTEREST OF STUDENTS AND TEACHERS?

Maintaining the interest of any group is a challenge. Being aware of school curriculum and current methodologies (how it is taught) is important when competing for teaching time. One new initiative is the national sustainable schools project. In South Australia it is about developing partnerships with community groups and government agencies. This program can only assist in encouraging more schools to take up Waterwatch as part of their sustainable focus.

Some Practical Ideas

1. Talk to faculty meetings, especially science and society and environment faculties. In large schools this could be made up of about 15-20 teachers. Don't go into a science meeting and show them how to do water testing (they are scientists and can follow the directions)- talk about your programs and how you can be involved in the school. Offer them the special secondary kit and aquatic macros for food webs or offer them wetland experiences. Encourage the schools to consider environmental education (or sustainability) as a focus.
2. Provide professional, easy to use material.
3. Suggest and support projects such as partnerships in re-vegetation projects of creeks and wetlands. Student owned programs are excellent but are really for the schools to run and manage. Small things like helping plant aquatic plants in a creek or wetland will give the students some ownership and if it is combined with some explicit teaching on wetlands and processes should have a positive learning impact on those students.
4. Organize after school activities and holiday training and development for teachers. This will be most successful if advertised widely or possibly directly to the target teachers.
5. Student forums- this is being used in South Australia's country region around the Murray River very successfully with both junior and senior forums being very well supported by schools and students as well as creating partnerships with other community groups. These were developed and run by the Waterwatch program for the lower and upper Murray in South Australia. Other groups are looking at how they can run something similar.

In a primary classroom, you will often run information sessions by seating the children in a circle in their desks or on the floor, taking them through some concepts and issues around the topic, using items such as pictures or big books, posters etc. This is just not going to work with most secondary students. They will be sitting at desks, and probably will not respond to a question answer type introduction. You are the unknown and they will not be comfortable, not wanting to appear uncool among their peers by answering your questions.

PowerPoint presentations are a valuable tool and should be investigated if you are not already using them for secondary classes. They appear professional while students can read the information and be interested individually without having to interact with other students. As they become more comfortable – they will respond to the odd question or maybe even ask questions themselves. It allows them to engage without appearing to! Boys in particular will respond to a fun interactive activity, all will enjoy hands-on or field activities (pay no attention to grizzlers, they are just being teenagers) and think about the things you remember from high school- what had an impact on you?

Our involvement with secondary schools in the past has some good examples of the way in which our program has interacted and encouraged schools to take up programs.

- One secondary school has taken on board the environmental focus (including water monitoring) for the whole school integrating it over the entire curriculum.
- A teacher who came to one of our teacher training and development days, is now using water quality monitoring as the basis for students completing Laboratory Skills III, a TAFE recognised course.
- We developed an interactive display that we lend to schools. The display has six stations with posters, information and touch trays to cover a range of topics: from local history, changing land use, development and their stakeholders, water quality, pollution sources and types. The school sets up the display for a week with the students looking at all of the stations and completing a worksheet or concentrating on one station using the subject areas of English, Society and Environment and Science. We have had some very positive feedback on this and are looking at extending or expanding this project
- We have been the first port of call for several schools looking for information on local issues. Meeting with groups at schools often can initiate the start of school projects on a local issue or wetland. We have been instrumental in not only providing the initial information, but also providing resources and gathering other groups and community members to provide a meaningful learning experience for students.
- We provide much information and training for student projects, particularly year 12 geography and community studies students. This includes kit training, data from snapshots, resources and technical information.

SUMMARY

Make yourself familiar with secondary programs- an easy way is to look at the textbooks being used. This will give you an idea of text and question level and also the actual topics they cover. Offer programs in a format that teachers will recognise that fit well with their curriculum. Use some teacher speak. Provide some material for lessons which are single or double sided photo-copyable instant lessons. (Teachers aren't lazy, they are just very busy) Visit faculty meetings in schools to promote your program and resources available. If doing presentations to secondary students, use PowerPoint and a hands-on approach (even include worksheets they can complete in the lesson), but make sure your language is still aimed at a lower level. Always explain terms – even if you know they should know it. Consider providing more equipment for a secondary kit. If possible develop partnerships with schools with longer-term projects or inspire the school to develop an environmental or sustainable focus in conjunction with other groups and agencies.

Resources

1. Field trip
2. 6 experiments
3. Snapshot worksheets (water monitoring)
4. Food web
5. Using Blooms Taxonomy
6. What's wrong with my catchment?
7. Integrated middle school program
8. Secondary Programs Guide