



Neil Bramsen explores butterflies while teaching Mathematics and Science...

I am always keen to have my students undertake at least one major project based learning (PBL) experience each year.

In mid-2016 I had my stage two class work on revitalising an overgrown and neglected garden area into a 'Butterfly Garden'. I was inspired by my visit to High Tech High in Chula Vista a few years ago where I saw a comprehensive PBL program in place, with a butterfly component including garden, plant propagation, egg collection and breeding, all supported by student-generated text and a website.

Talk about comprehensive!

Beginnings

Exploring regional butterflies and appropriate feeder plants introduced a strong environmental and biodiversity perspective as students considered the ecology of a butterfly habitat. Over the course of six months it was rewarding to document and reflect on the process that covered a multitude of learning areas, such as measurement and science and information reports, as well as the physical tasks of gardening and assembling materials.

Of course, PBL is a terrific way to 'access' this type of learning, and each student was able to achieve success through various entry and exit points that they could identify with. Key Learning Areas (KLA) such as Mathematics, Science, English and PDHPE came into play and offered a broad scope of learning opportunities.

I have found with any PBL that backward mapping to outcomes is the pragmatic and practical approach. I consider the activities that may be undertaken and then explore the relevant KLA scope and cross reference to the syllabus involved.

Measuring up

There was extensive use of measurement, both through aerial photography via a DJI Phantom Drone and scale and grid tasks that calculated the area of the garden and path. See a photograph below of the original site taken by the drone.



This measurement work then evolved into a volume activity for more capable students, and the depth of mulch and crushed concrete was calculated. It is important to note that while all students had an introduction or refresher to area and square metres for example, I then targeted students that were stretching themselves to explore volume and cubic metres.

The students used websites to source local materials, cost the materials and then ring the landscape company to place the order. They actually used the school credit card under my supervision (I had the CVV number) to ring and talk to the supplier and arrange the delivery. The students mapped access to the area.

Becoming alive

Highlights of the project included in-depth research into local butterflies and suitable host plants. The class explored colour and the types of colour needed to attract butterflies. Interestingly, while we initially focused on local plant species and native butterflies, the monarch butterfly and the need for the milkweed plant to support it were identified. We sourced milkweed, and this aspect has been the most successful, albeit with some winter wind damage to the milkweed. Propagating more milkweed plants would become an ongoing focus.



Importantly, as the image above demonstrates, the project all came together as students physically engaged with and enjoyed the gardening, from clearing weeds and moving barrow loads of mulch to pouring crushed aggregate to make the path. The area came to life as the seedlings and young plants began to mature.



A little organisation

Students also followed a product procedure to assemble timber benches so that the area was a welcoming learning space. A daily watering regime was added to the class task list, and deep saucers were added for birds and to provide water for butterflies.



The photograph above shows that, as the area established, it was then used for nature sketching, quiet time, reading and sensory awareness activities by the class.

Rewards worth working for

By late summer and autumn, we began to see monarch butterflies in the garden, just like the one in the photograph below. With some of the students that participated in the PBL project, we carefully examined the milkweed plants, which act as a host for egg-laying and monarch caterpillars. Not only did we find quite a few eggs on the leaf tips but also fifteen or so caterpillars in varying stages of maturity.





The kids were totally over the moon with the evidence of success and at seeing a natural life cycle occurring in the habitat that they had helped create. We are looking forward to monitoring the health of the garden and the number of monarch butterflies that mature. The garden has continued to be popular with my classes for nature sketching and quiet time and has now been dedicated as a special Year 6 Quiet Area during breaks.

Now, back to the syllabus

The project was an engaging opportunity to introduce teaching points from both the Mathematics and Science syllabuses. Some relevant outcomes are listed below.

Mathematics Stage 2 and Stage 3 outcomes

- selects and uses the appropriate unit and device to measure lengths and distances, calculates perimeters, and converts between units of length MA3-9MG
- measures, records, compares and estimates areas using square centimetres and square metres MA2-10MG
- selects and uses the appropriate unit to calculate areas, including areas of squares, rectangles and triangles MA3-10MG
- selects and uses appropriate mental or written strategies, or technology, to solve problems MA2-2WM
- selects and applies appropriate problem-solving strategies, including the use of digital technologies, in undertaking investigations MA3-2WM
- uses simple maps and grids to represent position and follow routes, including using compass directions MA2-17MG

Science Stage 2 and Stage 3 outcomes

- shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities ST2-1VA
- describes ways that science knowledge helps people understand the effect of their actions on the environment and on the survival of living things ST2-11LW
- investigates their questions and predictions by analysing collected data, suggesting explanations for their findings, and communicating and reflecting on the processes undertaken ST2-4WS
- describes that living things have life cycles, can be distinguished from non-living things and grouped, based on their observable features ST2-10LW
- describes how people interact within built environments and the factors considered in their design and construction ST2-14BE
- describes some physical conditions of the environment and how these affect the growth and survival of living things ST3-11LW



Keys to success



Before attempting your own special learning experience, consider and plan for the following:

- Identify suitable project opportunities in the school grounds or local community;
- Consider the teaching and learning outcomes and prepare to backward map the obvious outcomes while allowing for the unexpected. The opportunities for differentiated learning are extensive and every student can achieve success and growth in some aspect of learning;
- Allocate sufficient time; PBL takes time, usually more time than you might think!;
- Allocate resources and funding if needed;
- Communicate to other classes, teachers and supervisors the aims and progress of the project to generate community and school 'buy in'.

We can nurture many positive blooms through our school garden projects. Once your project has concluded, remember to celebrate the successes and share your experiences and new knowledge with your school and community.

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