# Sustainability Of Teaching Initiatives

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Abstract: In 2002 we first ran an innovative teaching initiative for 1st year students in our School of Mechanical and Manufacturing Engineering. For students it was very successful, but for us the effort involved threatened to become unsustainable. Having operated our project now for four years we are learning about what we need to do to make it sustainable, and we share some of our insights in this paper. We conclude that when embarking upon a new project we should not only consider how to initiate it, but also how to keep it sustainable in the long term. To help us visualize the challenge we have devised a sustainability diagram. But would we really let questions of sustainability stop us if we were passionate about our next idea?

## Introduction

The introduction of a new large innovative teaching project requires a significant investment of time and effort. The rewards we have found are definitely worth this investment, however the long-term sustainability of a project requires more than just the initial push to keep it going.

In the first year of development it is likely that the most time is required - however in the first year it does not seem to matter; you are introducing an exciting new concept, hopefully someone has given you some funding for the idea, maybe you are finally bringing to fruition a project you have wanted to achieve for years. It is easy to find the motivation for the initial running of the project if not the actual time.

However in later years of operating the innovative teaching project, though the excitement may clearly be there for students it will predictably be less for the staff.

We have run an innovative teaching project now for four successive years. We have learnt many lessons along the way and we have realised the importance of considering the long-term sustainability of your brand new project.

In this paper we will first outline our project – First Year Labweek (FYL) – and then discuss the various issues we have encountered and the ways in which we have worked to ensure the sustainability of the project.

## First Year Labweek

The First Year Labweek project[1,2] began with the more experienced of the authors (RF) becoming convinced that there was not enough practical content early in the first-year courses in the School of Mechanical and Manufacturing Engineering, and that what practical content there was did not relate to the other courses students were taking. The project came to life when the second author (TB) joined the School and shared the enthusiasm for the project.

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Conveniently, between them they ran two of the fundamental courses in engineering mechanics, and design and context which would be needed to make the project viable.

First year is common to the five basic programs within the School (Aerospace, Manufacturing, Mechatronic, Mechanical, and Naval Architecture); however, individual student programs do vary because of a wide range of options such as double degrees with arts or science, mid-year entry, and advanced standing. Because of constraints of scheduling and staffing, previous first-year laboratory classes in engineering mechanics had lapsed. First-year classes in engineering hardware were "hands on" but were not integrated with the other activities in which incoming students participated.

There may have been an earlier golden age of engineering education when all students arrived with a thorough grounding in the practicalities and context of engineering, but if that were ever so it is no longer the case. Today many of our students arrive with little practical background in, or knowledge of, the context of engineering, although they are keen to obtain it. Staff would also like students to have this knowledge. For example, laboratory staff, who work closely with the students, worried that first-year students did not have enough practical knowledge and were not being provided with enough once they arrived in the school. Academic staff also felt that subsequent teaching would be easier and more effective if students knew how their theoretical studies related to practical engineering.

**Figure 1 Victa lawnmowers ready for dismembering**

For extra laboratory content to be practicable in first year, we had to solve the problems of scheduling and staffing. We realised that we could add more laboratory work and arrange staffing and scheduling if, instead of spreading practical activities across the session, we concentrated them into just one week. To do this, we proposed using the time that would otherwise be allocated to several regular courses. Labweek was on its way.

We decided that, within this one week, students would engage in the following range of activities:

- dismantling, reassembling, and investigating a two-stroke lawnmower and its engine (in groups of 3, 10 groups at a time for a 3-hour period)

- completing worksheets on the dismantling/reassembling activity
- partic ipating in design discussion, including context and manufacture
- reporting on design discussions
- completing online formative quizzes on names of parts and operating principles
- participating in engineering mechanics tutorials
- completing engineering mechanics worksheets, to relate engineering science to engineering applications
- attending Marking Day (when all their work would be graded and feedback given on the spot)
- attending a barbecue (first two implementations only)

We wanted our students to be involved in interesting, challenging, and fun learning activities associated with engineering. We hoped that the activities would also encourage students in their studies because they would see their relevance. And we wanted our students to work in small groups so that they would develop skills in teamwork and build a spirit of collegiality early in their university career.

Staff involvement

Both of us were enthusiastic and motivated, committed and passionate about the brilliance of the concept.

Our first error was to naïvely assume that colleagues would not only share our assessment but be keen to join in. This did not happen. In year 1 this was disappointing but did not impede the success of First Year Labweek.

Although the project ran very successfully in year 1, the amount of work required for this initial run was not something that either of us could maintain.

After First Year Labweek Year 1 (FYL:Y1) the students were extensively surveyed and though it was clear that we had met our objectives and the brilliant idea was indeed brilliant there were some improvements we could make for FYL:Y2. This meant more work.

For year 2, one of the authors (RF) had taken up a senior administrative position and had very little time available. "No problem" said the other author (TB) who was once again imagining that colleagues would be happy to be a significant part of the project that year. Unfortunately it did not work out that way.

FYL:Y2, from the student viewpoint, was again a wonderful success. However from the staff viewpoint (mainly TB who did most of the work) it was rapidly becoming unsustainable.

> Lesson 1: Just because you believe your project is worth devoting considerable extra time to, don't assume your colleagues agree. And be aware that your enthusiasm might be off-putting.

After FYL:Y2 the administrative responsibility (RF) ceased and FYL:Y3 and FYL:Y4 were again coordinated by the two authors. In these years, Labweek incorporated a third course, and we saw increasing involvement of other academic staff. We are on the lookout for likely successors.

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Resources

We were fortunate to be granted two separate amounts of funding for our project. This allowed us to pay contractors to develop websites and online booking systems, pay extra staff and student demonstrators, and to purchase equipment such as lawnmowers, tools and toolboxes. In the third year we were able to pay someone to create a comprehensive user manual (see section on Documentation below).

In hindsight, contemplating the implementation of the project without first gaining the funding was naïve. We cannot imagine how we could have survived without it.

> Lesson 2: Develop a budget early on and get money: don't let it constrain you, but do be realistic.

For support we did find laboratory staff who encouraged us in our project and were happy to assist. Perhaps in their day-to-day meetings with students they saw first hand the effects of not enough practical work in our courses. We quickly identified one who was knowledgeable in engines and happy to share his knowledge. He assisted with maintenance and also participated in the engine dismantling sessions.

> Lesson 3: Identify staff who share interests with you and get them involved.

> Lesson 4: Delegate. Make use of support staff who are keen to be involved and have useful insights.

For the first three years First Year Labweek ran almost entirely on teaching grant funding. Of course our funding was limited. Although we were proud of making the funds last as long as they did, eventually the project would have to become sustainable within School funding. Fortunately by year three we had proven the success of the project and maintenance funding was provided from laboratory accounts and arrangements were made to pay the student demonstrators from School finances.

> Lesson 5: Teaching grant funding is wonderful, but it will run out.

Documentation

Possibly the best action we took to ensure sustainability of First Year Labweek was to hire a final year undergraduate student to document our work and develop a user manual. We did this in year three and it used up almost all the remaining money.

By FLY:Y3 we found we still had to carefully plan our work leading up to Labweek and spend time locating relevant files and documentation. We gave all our files to our assistant and she organised them into the Labweek Database. We asked her also to document how Labweek worked and what was involved in each task. It was to help ourselves, but we also harboured the idea that one day we might hand it to the colleague who would take over.

We were surprised when the manual expanded beyond 100 pages, but the comprehensive nature and extensive documentation proved a valuable resource for FYL:Y4.

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Having run Labweek without a manual and database for three years, it was at first difficult to adjust to using it (more for RF than TB). However, eventually the ability to just look up what to do next, flick through the documentation and load the files off the CD proved to be a great asset.


**Figure 2 The Labweek Database**

> Lesson 6: Document the project for yourselves and (hopefully) the future managers to make life easier.

Acceptance

FYL:Y1 was innovative. It was unusual. It was not an expected part of a first year program. Our hope was that it would eventually be seen as an integral part of our undergraduate degree, but in its first year it was difficult to imagine when this might be the case.

Our undergraduate degree is four years long and we believe that FYL became an accepted part of the degree when our FYL:Y1 students reached final year - and some became student demonstrators for the project they had been the guinea pigs for.

By this time the authors had become known within the UNSW teaching and learning community as "The lawnmower people", but still, we felt that it was not prominent enough locally.

So for FYL:Y4 we used the very last of our teaching grants to produce two bright yellow banners, 3m x 1m, boldly proclaiming the Labweek equation, as shown in Figure 3. During Labweek these were strung across a bridge linking the office/lecture room building and the laboratory building – quite a symbolic link it seems in retrospect.


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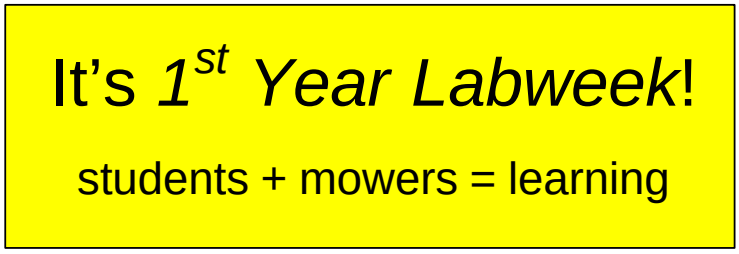


**Figure 3 The Labweek equation**

Lesson 7: Advertise yourself. A well-known idea is more likely to be sustained.

Sustainability Chart

In thinking about how the effort to run a project might vary with repeated implementations we devised the Sustainability Chart, shown in Figure 4. We have shown our trajectory on it. In first year our motivation was high and so was our effort. In second year our effort was nearly as high, but our motivation started to flag. With experience and planning the effort can be reduced, and, as we saw in FYL:Y4, as our effort reduces, our motivation returns. Positions near the right hand bottom corner are highly sustainable (i.e. high motivation and low workload). With the help of the Labweek Database we hope to get there.

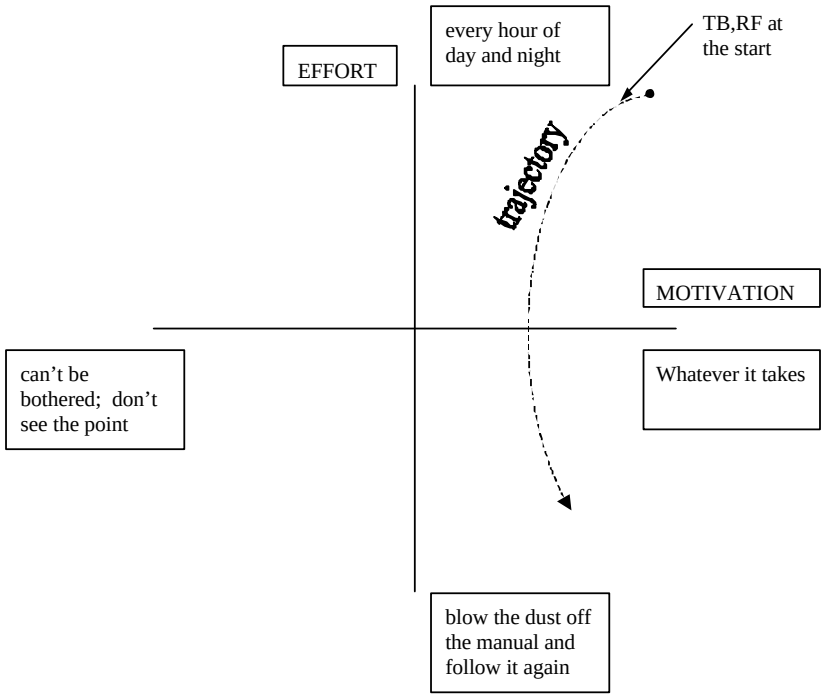


**Figure 4 Sustainability chart**

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Lesson 7: Have goals for sustainability (But would we really let questions of sustainability stop us if we were passionate about our next idea?)

Florentines

A major team project needs a team that works well. We had to find out what worked for us.

For example, we found that one of us (RF) likes GANTT charts, while the other (TB) works better with a list of deadlines (of course our assistant put both in when developing the database).

We found as long as we were having fun and laughing we could find the energy and time to complete the task.

Our best ideas happened over coffee and Florentines.

> Lesson 8: Surround yourself with enthusiastic like-minded team members, and understand how they work best. Don't be afraid to use the force of chocolate.

References

[1] R A Ford & T J Barber "1st Year Labweek: Contextual Learning and an Excitement Activity for First Year Engineering Undergraduates", iNEER Special Volume: Innovations 2003 – World Innovations in Engineering education and Research. Chapter 27.
[2] T Barber & R Ford, "First Year Labweek". UNSW Compendium of Good Practice in Learning and Teaching, Issue 1, June 2004. pp 20-29.

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