

# Curriculum Design Pattern

Global Learning by Design

Name of Pattern

**A whole program approach to Project based learning in engineering - Online group work and eMakerspaces**

Date

December 2014

Abstract

SAMME have identified project-based learning (PjBL) as a critical focus area that provides outstanding student experience and learning outcomes, which includes developing key skills that are strongly linked to employability. The School has made progress in developing PjBL activities, however, there has not been a clear definition of PjBL, which has meant that there have been variation in interpretations between academics.

Furthermore, the approach to implementing PjBL has not been made with a broader program-wide view that considers scaffolding the development of PjBL skills. The project will aim to define PjBL within the context of engineering, and develop a scaffolded set of skills for each year level of engineering study. This will include guidelines for structuring and managing a PjBL activity, and effective assessment instructions. This will be then used to implement an appropriate PjBL activity in every year level in every SAMME undergraduate onshore engineering program.

The development of PjBL across the engineering programs will be supported with an eMakerspace to connect the staff and students and build a culture of experimentation and new design. The Maker movement or culture is one where individuals join together to tinker and design solutions to known problems or to invent new resources.

## Learning Context

Every year level in undergraduate programs, in both small and large classes.

## Rationale/Aim

To design a coordinated approach regarding the implementation of Project based learning in SAMME that spans the whole program; identifying 'hero' courses as exemplars, producing guidelines for how to implement and assess, and to identify relevant technologies to assist in the delivery of PjBL.

## Learning Design

### Learning outcomes

- To introduce PjBL in undergraduate programs at every year level in SAMME in a coordinated manner
- To develop a set of guidelines for the implementation of PjBL
- To provide a set of resources for teaching staff to assist in the implementation of PjBL

### Process

**Step 1:** Choose one program and do an audit to identify where PjBL already exists in courses within the program.

**Step 2:** Map the chosen courses to ensure there is one PjBL course at each year level; if not, identify appropriate courses and changes made accordingly.

**Step 3 :** Commence the mapping process for each course. Use [the initial mapping matrix](#) to identify what is already happening across the program.

**Step 4 :** [Identify levels of current PjBL](#) and categorise according to existing practice.

**Step 5 :** Once courses have been identified, then conduct a [constructive alignment activity](#) to ensure the design of the activities and assessment of each course aligns with the Learning Outcomes. Ensure there is appropriate scaffolding of skill building here and consistently mapped communication with students to ensure they are on track

**Step 6 :** Use the [PjBL Google Site](#) as a guide for teaching staff to implement PjBL. Staff to work through the site to guide their learning design.

**Step 7 :** Use the [Supporting Employability Skills in PjBL with Technology](#) table to guide both the thought process required on how we are embedding employability skills in the design of the program and also what technologies are available to support each stage of the project.

**Step 8** : If required, seek assistance from the Study and Learning Centre (SLC) or the relevant College Academic Development Group to build assessment rubrics.

**Step 9** : Implement PjBL at course level using these guidelines from the Google Site:

1. The project design is closely aligned with the Learning Outcomes for the course. See the [section on alignment](#).
2. The course design has inbuilt support to assist students learning of skills to successfully complete the project eg. critical thinking, team building, problem solving skills or project management skills. See the [section on building Employability skills](#).
3. The project is designed at a level appropriate to the students' level of learning and caters for student diversity. See the [section on Scaffolding student learning](#).
4. The project is open-ended and allows for alternative solutions which meet the requirements for a correct answer. See the section on Implementation.
5. The project is inspiring for students. See [some examples already in practice](#).
6. The project is designed to be sustainable throughout the semester, allowing appropriate time to reach a successful conclusion and reflect and evaluate at the end.
7. The project is student-centred and centres on students being self-directed. Student inquiry is at the heart of the project and they have a level of independence in solving the problem; they are in command of their time, resources, and final product. Students working with each other is essential to success. See the [section on eMakerspace](#).
8. The project itself is authentic and relates to real world problems and the experiences of practitioners in the field.
9. Reflection is mandatory throughout and at the end of the project.
10. Formative feedback is ongoing throughout the project and is inbuilt into its design. Ongoing feedback must provide opportunities for students to revise as they work through the project. See the [section on Assessing PjBL](#).
11. Students have the opportunity to explain their decisions to their teacher and colleagues. Final products are given the opportunity for wider exposure than just the classroom; this could include related community or industry groups.

12. Students use the project to demonstrate career development learning skills that are considered in the context of the program. See the [site on Career Development Learning](#).

### Step 10

Set up a communication channel for both staff and students alike to inspire experimentation and the growth of ideas. An eMakerspace built in Google Communities provides the online space for these connections. Building a new community you may like to consider these topics in the design of the site:

- General discussion for staff and students to simply share ideas and resources;
- Looking for a project - a space for students to form groups and make connections;
- Interesting articles for Makers;
- Teaching staff involved - a space for teaching staff to introduce themselves and their interests;
- Upcoming events - you could organise maker events for students or could put links to community maker events;
- Mentors - students in higher year levels could be encouraged to mentor younger students, this space will allow them to introduce themselves and connect;
- Photos - a space for staff and students to show what they are working on.

### Step 11

Review projects each year, obtain student feedback and amend where necessary.

### Challenges

This pattern has not yet been implemented, however, the greatest challenge in implementation will be driving the change at Program level. It is important that the topic is persistently tabled at meetings and discussions continue. Selecting someone to monitor and lead the Google Community would be advantageous.

## Conditions

Some initial Professional Development at School level would ensure a coordinated approach to the implementation of this pattern.

## Resources/Technology

### Education resources

- [PjBL Google Site](#) for staff

### Technology resources

- Google Sites
- Google Communities
- YouTube

### Other resources

- [The initial mapping matrix](#)
- [Identify levels of current PjBL](#)
- [Constructive alignment activity](#)
- [Supporting Employability Skills in PjBL with Technology](#)
- The [EMakerspace](#)

## Case Studies

This pattern will be implemented in SAMME in 2016.

## Outcomes

It is expected the embedding of PjBL across the program will have the twofold effect of inspiring and engaging students in their learning while building important employability skills to ensure they are work ready.

## Keywords

#Project based learning #eMakerspaces #technology for groupwork.