

Student centred learning in action — a technology management project

Tracy Hall

Lecturer in Software Engineering, Staffordshire Polytechnic

David Whitworth

Principal Lecturer in Engineering Design, Staffordshire Polytechnic

□ Introduction

The notion of a 'Student Centred Learning' approach to education is currently in vogue. Whilst this article will not try to do more selling of the doctrine, it is still useful to briefly outline the main points advocated by this approach.

The idea of adopting a more student centred approach to education, at any level, is certainly not a new one. Enthusiasm for this mode of education stems from the clear belief that everyone learns more effectively by finding things out for themselves rather than simply being told by someone else. Although this assertion, at first glance, appears to be nothing more than a common sense approach to teaching, adopting such a method in higher education calls for a radical re-assessment of how a subject is taught; a re-assessment that some teaching professions simply are not able to come to terms with and are not able to implement.

This article will give an insight into the managing of a student centred project. Although the project in question is based around the integration of design and technology into the business environment, the whole discussion has a wider educational relevance.

Whilst the idea of Student Centred Learning is very well documented (there are many books, articles and papers telling us how beneficial the approach is), there is a startling lack of material describing how to actually do it. This account will address the shortage and attempt, in describing a specific experience, to suggest some useful and prescriptive guidelines for educators wishing to mount similar projects.

□ Educational Objectives

The project in question was run towards the end of the first year of a Technology Management Degree programme. The project had two educational objectives:

- *that the students should have an opportunity to integrate and assimilate the diverse range of subjects which are necessarily studied as part of a Technology Management course*
- *that the students would be faced with a learning environment which would demand of them the use and development of their analytical, problem solving, communication and interpersonal skills.*

□ The Task

Whilst the task is to some extent irrelevant, it must be within the students understanding and must be achievable. In this instance the students were given the task of devising and developing a new multimedia storage system for storing audio cassettes, CD's, video cassettes, etc. The project was to include every aspect of the product development cycle — design, manufacturing, marketing, resourcing and so on — and be performed in a pre-structured environment which utilised as many of the Polytechnic resources as were available. The time allocated for the project was a full three week period dedicated to this activity with no lectures or tutorials.

**SP
TECHNOLOGY
MANAGEMENT**
INTEGRATING ASSIGNMENT
COMMUNICATION BUILDS A BETTER TEAM

PROJECT OUTLINE

*DESIGN BRIEF
SPECIFICATION
TASKS/RESOURCES
TIMETABLE
PEOPLE/MILESTONES
ROOMS*

DO THE RIGHT THINGS, DON'T JUST DO THINGS RIGHT.

□ The Run Up — A Staff View

The intention was to create an adventure game type scenario in which the students could work to achieve set goals over the period of the project, under the control of a project manager. To this end students were given a comprehensive set of documented information to create an environment in which the project could run. This information was of two types:

Task Related Information

- *scenario details including marketing information the fictional organisation of the company for which they were working and its current trading position.*
- *a partial design specification to be completed in negotiation with the project manager.*
- *resource information made up of production information (machines available, capacities, utilisations, efficiencies), company financial structure (cost centre minute cost, salary structure), company employment structure (number of employees, skill levels).*

Project Management Information

- *resource availability including times that staff were available for bookable consultancies, room availability, computer facilities, photocopying availability.*
- *milestone time table and assessment information, where, when, how and by whom.*
- *precise milestone and what was expected for assessment and the criteria that would be used to judge the work, including peer assessment.*

DESIGN

SKETCHING
DESIGN METHOD
MATERIALS
ERGONOMICS
IDEA GENERATION

MANUFACTURING

PROCESS SELECTION
PLANT LAYOUTS
MACHINE CAPACITIES
MACHINE UTILISATIONS

TASK

INFO. SEARCH
TEAM WORK
LETTERS
EXHIBITIONS
MEETINGS
PRESENTATIONS

FAILURE MODES
BS 308
MATERIALS
FASTENERS
STANDARDS
ISOMETRIC DRAWING

INFORMATION TECHNOLOGY
BUSINESS PLAN
COST ESTIMATING
MARKET SURVEY

COMMUNICATION

ENGINEERING DESIGN

BUSINESS

SKILL CHART

PROJECT DESIGN POINTERS.

LOGISTICS

Make sure the students know exactly what is required of them. Students should know, from the beginning, what needs to be handed in and whether they are expected to attend presentations and so on.

TASK ORIENTATION

Include clear, comprehensive assessment information. It is also important to specify assessment criteria against the aspects of the work which are awarded marks. This drives the student towards the standards and content the assessor is looking for. Make the environment competitive by offering a prize for the most successful design.

DOCUMENTATION

The documentation must be of a very high standard being of desk top publishing quality. This will inspire confidence in the project for both staff and students. Commercial training videos can also be used to show production processes if these are not available in the institution.

THE TASK

Possibly the most important aspect of the project from the student view is that the content is interesting, within their knowledge and achievable. Do not expect the students to learn new processes or analysis techniques, only new knowledge.

The most time consuming aspect of running a three week intensive case-study type project is the material preparation. It must be recognised from the outset that it is impossible to develop a scenario of any complexity which has absolutely every fact required by the participants. It is also impossible to devise a scenario in which there are no conflicts of fact or interest. Not including every fact the student would like in the documentation is actually a positive step which will force the student to 'fact-find' for themselves. Likewise with scenario conflicts, deliberately implanted or otherwise, are a constructive part of the scenario forcing the student to question the validity of any information given or found and to learn to work around conflicts. After all when does life not have conflicts muddying the waters!! However, in order to devise a sound basis for a student centred project, good quality perceptive documentation is essential.

☐ The Run Up — Student View

During the course of the year that students were aware that the project was looming. The students also knew that the work was to be carried out in teams of four, and that, although all the teams would be given the same project documentation and an opportunity to attend an initial briefing session, it was every team for themselves after that.

As the project time approached the students grew more and more apprehensive. They demanded to know how the teams were to be selected — this was resolved by a class meeting which voted on the various grouping options. They wanted to know detailed marking plans — who was to assess specific portions of the project, how the assessment was to be derived, was it to be team or individually assessed and so on!! At this

TASK	CRITERIA
PROBLEM AREA IDENTIFICATION	2 - LESS THAN 30% IDENTIFIED 4 - LESS THAN 50% IDENTIFIED 6 - MOST AREAS IDENTIFIED 8 - ALL AREAS IDENTIFIED, BIG AND SMALL
DESIGN ALTERNATIVES	2 - ONE ALTERNATIVE 4 - TWO GOOD ALTERNATIVES 6 - THREE ALTERNATIVES WITH INNOVATIVE FEATURES 8 - 3 ALTERNATIVES WITH INNOVATIVE FEATURES AND ONE ORIGINAL DESIGN
TOTAL	

DESIGN PROPOSAL ASSESSMENT DOCUMENT.
(partial)

SCENE SETTING POINTERS

TIMING

Start early discussions with the students on the general framework of the project

DOCUMENTATION

Only give the design brief to the students 3/4 weeks before the project is due to start.

LOGISTICS

Let the students decide how the teams are to be chosen but only allow 4 students per team.

TASK

Make sure the students understand that the project will only exercise skills and techniques already covered by their course.

stage the project was still weeks away but it was clearly having an effect similar to that caused by imminent examinations.

So as not to lessen the impact of the experience, only the design brief document was given to the students before the start of the three week project period.

□ The Briefing

A briefing lasting approximately 45 minutes was organised on the first morning of the project period. The students and all the staff that would be involved at the various stages of the project were also present. The project was presented in outline as a competitive game scenario in which all legal means could be used to reach the project goal. It was explained that the rules of the game were laid down in the documentation and the way to excel was signposted in the assessment criteria set for each milestone. It must be said that the students appeared totally shell-shocked with not one question being asked! Even more worrying was the fact that during the next two days of the project the students disappeared completely. This was at a time when staff had expected to be overwhelmed by questions. Maybe they had taken an extended Easter holiday? This actually could not have been further from the truth. Indeed the quality of the work that the students subsequently produced, suggested that they spent much more time in learning mode than they would have done had they simply continued with their ordinary coursework — a sort of hot-house learning effect!

	M	T	W	T	F	M	T	W	T	F	M	T	W	T	F	M	T
AM	BRIEFING					PRESENTATION		DW RAP	GH		TECHNICAL REPORT	GH		GH	EXHIBITION SETUP	HOL	BUSINESS/MANAGEMENT REPORT
PM	BG DW	DW		BG DW		BG		DW	BG		PT	PT			EXHIBITION	IDAY	
	AE	TH DL	TH	AE	AE	AE	TH DL	TH	AE	AE	AE	TH DL	TH	AE	AE		

20 minutes **BOOKABLE CONSULTATIONS**

TH - TRACY HALL	RAP - RAY PRESTON
BG - BRIAN GRIFFITHS	DL - DAVE LINK
DW - DAVE WHITWORTH	AE - ALAN EARDLEY
PT - PETER TURNER	
GH - GEOFF HEATH	

CONSULTANCY RESOURCES
DOCUMENT

RUN TIME POINTERS

LOGISTICS

Have one project manager with overall control to handle all operational matters that arise as the project progresses. Make sure that the students and staff know who that manager is.

SPECIALISTS

Use as many subject specialists as possible but alert all staff to the project. The students cast their information net very wide.

ASSESSMENT

Use on line assessment at the milestones and a reflective assessment at the end of the project. If possible use invited industrialist on the assessment panels and video the proceedings to enhance the environment.

FEEDBACK

Require a project debrief form to be returned by the students at the end of the project.

TEAM MANGEMENT

As part of the assessment make a requirement a record of the minutes of meetings the team has held over the period of the project, a telephone log and copies of FAXs /letters sent as part of the information search.

whole. The final milestone assessment was an exhibition at which the teams assessed each others work against criteria of their own devising.

The student motivation during the project was very high and these live milestone assessments were very significant to that motivation. Some of the sessions were videoed without the students being given prior warning, which helped to sharpen their performance.

□ Results

The students, at all times, during the project behaved and presented themselves professionally. The teams mobilised resources that were not expected. This reflects one of the doctrines of the student centred approach — educators must expect high standards from the students and be prepared to give the freedom and responsibility needed for the achievement of such standards. It is interesting to note that in such a learning environment students themselves will determine their own standard which will almost invariably be higher than the standards assigned to them. Certainly the students participating in this project set themselves very high standards.

The quality of the work produced at the end of the project was also very high. Some of the products devised by the teams attracted interest from the commercial firms invited to the exhibition and some were of marketable quality.

□ Project Run Time — Monitoring

A major worry for the designers of this student centred learning exercise was the unpredictability of the staff support time that the live project would require. To accommodate this uncertainty a staff member was made known to the students as the project master. It was her job to sort out any operational problems that might arise.

The target time for staff involvement was no greater than the normal timetabled weekly hours due to this part of the course. In the event the whole task of overseeing the project once it had started was remarkably straightforward. The students needed very little support outside of the bookable consultancy times allowed within the resources document and the assessed milestones at the end of each week. This was partly as a result of good documentation and partly as a result of the initial briefing. The initial briefing made it quite clear that the students had ownership of the project and that there were high expectations of them.

At the end of each week a milestone assessment was made of that week's work. Each of these assessments was done live using three different presentational techniques for the different types of work to be assessed. The first was an audio-visual presentation of each team's conceptual design to invited members of staff only. The second was a formal technical meeting chaired by a team member in which the team outlined how their design was to be progressed through to production and the implications for the business as a

STUDENT FEEDBACK.

I learnt how to cope with pressure.

The importance of management.

How every member of a team is crucial to success.

Delegation is necessary.

Identified own capabilities - some of which I did not realise I had.

How to look for detailed information

Realised at times I had to take the initiative.

Improved communication skills.

Learned about time control and management

Learned to appreciate that communication within the team was vital and that some members had better communication skills than others.

Ability to assert ones' opinions within the team - without resorting to violence.

From the comments of the students on the project debriefing forms, not only were the course taught techniques exercised to good effect but so also were the less easy to measure activities such as personal development and working as part of a team.

An unexpected bonus from the project was the good working relationship developed between teacher and student; relationships which should continue to bear fruit as the students move through the course.

In conclusion, an indication that the project was successful came from the feedback observations from the students. These reflected the educational objectives of the project, even though the students did not fully appreciate these at the outset. Probably this is the most significant reason for adopting less conventional modes of teaching and learning with the additional benefits of being much more fun than ordinary lectures and tutorials and results in the students doing more work than the teacher!

The material for this project can be supplied at cost from: D. Whitworth, MCAE, Staffordshire Polytechnic, Beaconside, Stafford, Staffordshire ST18 0AD.

The material is available in hardcopy form or as .GEM graphic files. Also available is a Lotus Symphony file which can be used to collect and calculate the assessment marks.

progressive series of problem-solving experiences can be planned. Within any defined brief however the child must be allowed to be creative and assessment must centre on close observation of the child's ability to plan, choose materials and above all discuss designs both with peers and with adults. From this basis it should then be possible for adults questioning and intervention to be employed in order further to extend the exploratory experiences and the linguistic skills which are a prerequisite for formal work in later years.

It is especially important with regard to girls that opportunities for developing spatial awareness in using constructional equipment are closely monitored and assessed since it has been well documented that lack of experience at this stage can lead to difficulties later in the school career.

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