

Addressing Commercial Realism and Academic Issues In Group-Based IS Undergraduate Project Work

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ABSTRACT

This paper describes an innovative and possibly unique practice in the application of a multi-year, group-based, real world project approach to Information Systems (IS) education among undergraduate students. The Team Project Scheme (TPS) exists within the Information Systems Institute (ISI) at the University of Salford in the UK. Within the framework of 3 year undergraduate degree programmes, students from all years of study come together in groups to solve real-life business problems. This paper provides an outline of the approach along with some discussion of pedagogical, assessment, and other practical issues that have emerged from the work. It demonstrates how, with a considered and critical approach, it is possible to successfully reconcile academic learning objectives with real-life project demands in a diverse range of contexts.

Keywords: Teamwork, Problem-Based Learning, Assessment, Peer Learning

1. INTRODUCTION

Group work with students may be widespread, even common practice – justifications frequently include claims for the development of the kinds of cognitive, communication, personal and interactive skills that are not normally addressed through traditional chalk-and-talk classroom approaches (Livingstone and Lynch, 2000). But while this may be so, there is also little doubt that alongside such possible benefits there is a corresponding downside – specifically, the thorny issues of management and assessment become even more fraught, difficult as they may be even under normal (traditional) circumstances (Reynolds and Trehan, 2000).

In this paper we describe an approach to group working on real world IS projects that may be unique. For example the project ‘teams’ are relatively large (up to 15 strong) containing a (fairly even) mix of first (fresher), second (sophomore) and final year undergraduates each undertaking specific and distinctive roles and responsibilities during the lifecycle of a project.

In the interests of clarity for the international readership, it is worth pointing out that the degree programmes we discuss here are based on the standard UK undergraduate (or Bachelor’s) degree model of 3 years of study, with an optional addition year of assessed professional work

between the second year and the final year (a so-called ‘sandwich course’). Each academic year runs from September to June and is divided into 2 ‘semesters’, each of (usually) 15 weeks duration.

Before venturing further, let us make the point that this contribution is not intended as a ‘research’ paper and therefore it is written in a manner that may not conform to the conventions of such papers. Instead we provide herein a descriptive account of innovative practice in the IS education domain, together with some discussion on the pragmatics and difficulties associated with such an implementation. We hope thereby to communicate some insights and guidance to others who might be interested, or may even be contemplating the implementation of such a model themselves.

This paper begins with an introduction to the group working scheme before discussing issues surrounding the formation of teams and initiation of projects. Assessment methods are then considered before a critical reflection on the scheme as a whole is presented.

2. OVERVIEW OF THE TEAM PROJECT SCHEME

The Team Project Scheme (TPS) is an integral, mandatory part of the Information Systems Institute (ISI) undergraduate degree programmes in ‘Business

Information Systems', 'Business Information Technology' and 'eCommerce Systems'. The overall theme of the degrees (and the TPS within them) aims to develop in the student the capacity to understand the technical, organisational and personal issues associated with the design, development and implementation of information systems in organisational settings. This stands in contrast, as indeed it should, to the study of technology per se. The TPS has been a feature of undergraduate education in the ISI (formerly the ITI) now for almost two decades, although it has constantly evolved to meet changing educational and technical needs over the intervening years.

Each team works on real life, open-ended projects provided by an external organisation (the Client). A project might for example lead to the development and production of a piece of software, or it may be more business-oriented, such as a piece of evaluative research or a recommendation for a new organisational strategy, and Clients range in size from one-person ventures and SMEs, to multi-national corporations.

The aims of the TPS are to:

- develop the necessary skills and experience required for team project work under near-commercial conditions;
- provide students with the necessary associated skills in project management and team working;
- encourage inter-year peer learning;
- provide an opportunity for students to apply and reflect upon the skills and experience gained in academic modules;
- develop the skills of interacting with real clients.

In terms of learning, this real-life experience shifts "the emphasis away from the *transfer* of knowledge [from a tutor], towards the *acquisition* of knowledge, towards deep learning and the development of skills" (Ball, 1995, p. 23).

3. STRUCTURE AND ORGANISATION OF TEAMS

Project teams comprise broadly equal numbers of students from levels 1, 2 and 3 (first, second and final year) of their respective programmes of study – somewhat unusual perhaps in undergraduate group work. With around five students from each year of study, there are then usually 15 students per team, and there are currently 30 teams (the ISI's undergraduate intake is somewhere between 150 and 200 per annum). An allocation of two substantial periods of time (team time) is formally scheduled into their respective timetables over two afternoons each week (Tuesdays and Thursdays, 2.00pm – 5.00pm) during the two 15 week semesters that make up the academic year. Physical space and suitable technical resources are allocated to each team and its members. Attendance at team time is not an option – attendance records inform part of the overall assessment schedule for individuals – the expectation being that all students will participate fully in their respective team activities. While participation in team time events is an essential requirement, there is

nevertheless an expectation that students also work outside of team time in order to bring new resources, knowledge or solutions into the core, team time domain.

Each team has a corresponding Team Tutor – a faculty member assigned to that team – with the role of mentor, facilitator and primary assessor, but not project manager. The appointment of a Team Leader is made from among the final year members of the group (and a second year as Deputy Team Leader); the Team Leader assisted by the deputy then oversees all project management tasks and responsibilities, and interactions between the team and the Client are normally conducted through them. Choices for these appointments are made on the recommendations of faculty members (usually Team Tutors), taking into account the academic and other performances of the individuals concerned.

With the exception of the allocation of Team Leader and deputy, formal team structures and roles are not prescribed. Nevertheless, there is a curious tendency for teams to self-organise along the lines of what might be considered to be traditional structures. This means that they are extremely hierarchical in nature, and they are horizontally divided along traditional lines (see figure 1). We are not entirely sure why this might be, and it would undoubtedly make an interesting research study in its own right, but here we can only speculate. Such organisational structures may once have been encouraged, either intentionally or otherwise. We previously pointed out that project teamwork has been the practice in this institute for almost twenty years, and since the team approach is an ongoing major annual activity, it is possible that these structures became embedded within the system in earlier times. If so, it is possible that these would inevitably continue to reappear annually as students pass down their experiences to new intakes, thus perpetuating the practice, ad infinitum.

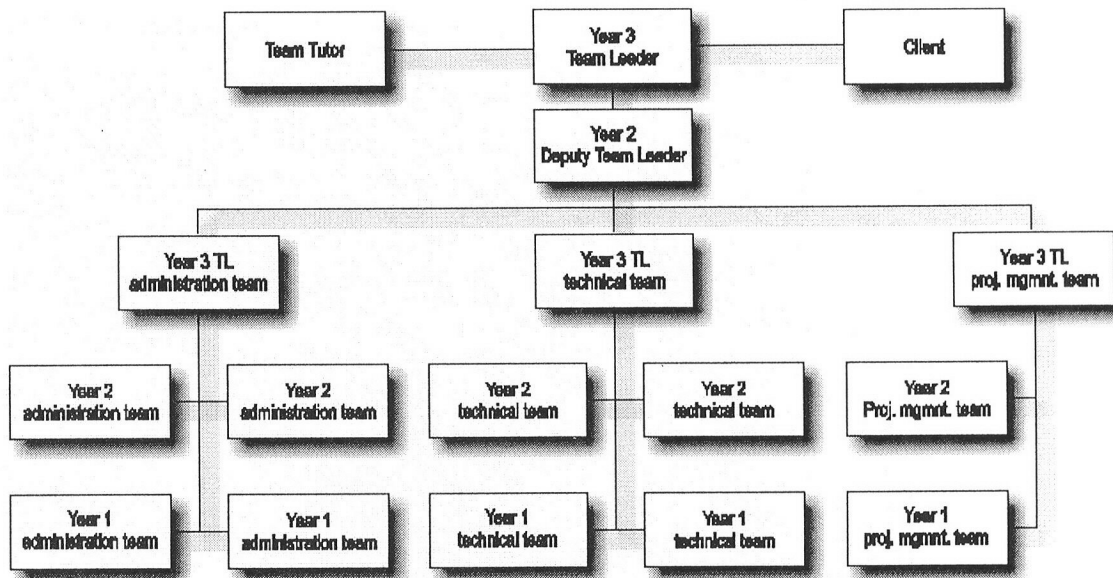
Figure 1 is a recent (and typical) example showing the structure of one particular team. It is hierarchical and horizontally structured into Administration, Technical and Project Management divisions or sub-teams. The diagram also reflects a semester one situation. In semester 2, all Team Leaders along with the other final year students (sub-Team Leaders in this case) leave the team in order to prepare for their final exams and other matters necessary to fulfil their degree requirements. Nevertheless, they still have a role within the team. The Deputy Team Leader takes on the leadership role (and reorganises the group) and the final year students then act as consultants to the group for the remaining few months of the academic year (and life of the project), usually on a rotating basis.

In our example, the objectives for each of these divisions, formulated by the students, included the following:

3.1 Technical

- To supply a database able to generate information in a timely and efficient manner
- Display information graphically

Figure 1 - A Typical Team Structure



- To be usable with little or no training
- Ensure deadlines were met.

3.2 Administrative

- Design, install and implement administrative process for the team
- Document processes and events pertaining to the project
- Ensure quality management
- Provide training for other team members
- Implement planning and control procedures

3.3 Project Management

- Design, install, implement and administer project management processes
- Acquire proficiency in project management tools
- Employ planning and control procedures
- Document progress, timescales and milestones

These objectives are not exhaustive, but provide a feel for the kind of thinking taking place within the teams. In addition, in semester two when the final year students provide consultancy services, agreements are devised by the team and these included:

3.4 Consultancy

- Agree times / dates availability with the team
- Advise in the design, construction and implementation of project modules
- Advise on the design, construction and execution of test plans
- Provide advice, input and assistance in team presentations and documentation

The above are taken from an actual project and, whilst they are indicative of areas of activity, each project will have different objectives.

4. PROJECT INITIATION

Projects come into the ISI via a variety of means: through faculty contacts, occasionally through individual students, and sometimes offered directly by Clients approaching the School. These are coordinated, administered and allocated to the respective teams by the Team Project Scheme Manager, who is a faculty member of the Institute. Prior to the start of each academic year, the TPS Manager agrees a high-level project specification, known as the Project Brief.

A typical brief might be "Smith & Co is a widget manufacturer which would like some help with its internal communications". Unless a Client specifically wishes to be more specific or prescriptive with the project brief, it will be kept deliberately general, since an important part of the project is the determination of its scope and requirements. At the start of each academic year (semester 1), the project teams meet with their respective Team Tutors, and work formally begins on the project.

Project initiation comprises both formal and informal elements. On a formal level, one or more meetings with the Client are arranged and held as soon as possible in order to discuss project requirements. This should result in a two-stage agreement (relating to the two semesters per academic year), each of which describes the work to be carried out and the various deliverables associated with each stage. The meeting(s) may be held at the Client's

premises with team representatives (e.g. Team Leader and Deputy), or better, at the University so that all of the team can participate, or perhaps a combination of both.

Although likely to be present at these meetings, the Team Tutor would not ordinarily intervene too much in the process, but may decide to do so if there is a perception of threat to the success of the work. For example if there is a clear communication problem between the Client and the team, then the tutor might consider it expedient to take a more active mediating role between the Client and the team. Further arrangements for meeting(s) with the Client, for example to provide progress reports, might also be on the agenda at such meetings, as well as arrangements for ad hoc contact should this be necessary.

As described previously, teams are composed of students from all years of study, so they sometimes arrange informal events where members can get to know each other. This might include trips to the cinema, or ten-pin bowling, for example. Informal social activities are important and can be very useful in surfacing the individual talents that members bring to the team. These may be technical skills, particular domain knowledge, leadership potential or other attributes.

Such activities are however declining. In earlier times, the teams used to arrange sports events – football and other competitive activities for example, but now such arrangements are rare. Part of the reason for this may be that recruitment is increasingly from local and regional areas, and therefore a higher number of undergraduate students have lives outside the university that they are able to maintain. In addition, more students these days need to work part-time in order to support themselves and do not therefore have the time they once had. Previously students tended to come from much further afield, so that social contacts and activities tended to draw more on relationships with their university peers, and until recently higher education funding in the UK was such that undergraduate students were not obliged to take part-time work. This general trend is likely to increase as the present government is committed to increased numbers of young people obtaining a university education.

5. ASSESSMENT

Assessment of Team Projects is a complex process involving a variety of components, differing from the assessment of standard (taught) modules in a number of important respects including:

- projects often vary widely in terms of their scope, requirements and perceived difficulty;
- a large number of staff may be involved in the assessment;
- there is a considerable amount of group work;
- the TPS constitutes one of the ISI's unique selling points, and represents the largest single component in a student's overall degree mark.

The assessment strategy centres on the assessment of performance at group and individual levels, based around a portfolio of evidence submitted at the appropriate time, where the onus is on the students (and to a lesser extent the Client) to provide such evidence. There is a strong emphasis on critical reflection on the processes, products and learning, rather than on for example the excellence (or otherwise) of technical artefacts. The assessment criteria reflect this.

The deliverables each semester are:

- **Project Report.** This is produced by the team and presents descriptions of the project, details of meetings with the Client, project requirements and changes, problems encountered, and so forth.
- **Individual Report.** Each team member produces a reflective account of his or her role in the project, the learning that has taken place and other relevant matters.
- **Peer Assessment Report.** Each team member also produces a scored rating (from a pro-forma sheet) on the contribution made by every other member of the team, along with comments.

These documents are not themselves subject to assessment, but they provide evidence of group and individual student competencies, and are additional to any project-specific outputs and products such as software components and other artefacts. In addition to this, teams are required to provide formal presentations of their work, and these in turn have an assessable component.

The Team Tutor uses these reports as supplemental evidence to his or her knowledge of the project, personal observations of the team and the members concerned, to produce final assessments for the group and its individuals. A Reviewer, usually a Team Tutor from another team, then examines the assessment process, and either agrees that the marks are fair, or enters into a dialogue with the Team Tutor (and possibly the TPS Manager if necessary) in order to reach an agreed solution.

5.1 Inconsistencies and Problems

There are, and it is hardly surprising, a number of problems associated with marking and consistency across the TPS scheme. For example each Team has a different Tutor (and therefore primary assessor), and students occasionally complain about the different marking propensities of different Tutors (Dr X is a strict marker, Prof Y is easy to please). However, this is also true across various conventional modules, as it is indeed for any marking regime involving more than one tutor, but it seems to be a particularly resonant issue on this scheme, probably because it involves all students, and there is a 'luck-of-the-draw' element to it that determines who ends up with whom and with which tutor. On conventional obligatory taught modules, they are all experiencing the same tutors' foibles and idiosyncrasies, and not so with optional modules where they have at least some degree of control through choice.

The above is countered to some extent by the use of peer assessment which, as Bok (2000) notes, has a tendency to increase the validity of tutor assessment.

Team Tutors also take different approaches to supervision. While some employ a strong hands-on approach spending several hours a week with their respective teams, others adopt a more *laissez faire*, laid-back approach, perhaps requiring the Team Leader to report periodically, but otherwise letting them get on with it.

There is also a consistency problem across various types of project. For example, consultancy-based projects may be considered by some to be easier than product-development ones. We often hear the view that 'merely writing a report' is not as demanding as developing a piece of software. While not necessarily true, there seems to be such a perception among some staff as well as some students on occasion, therefore it is also possible that assessments may be influenced by these or similar views. On the other hand, projects do vary in their requirements and in the expectations of their stakeholders, and it would be disingenuous to suggest otherwise.

As a result of reflection on these and other problematic issues, an ameliorative process-oriented approach to assessment was devised. Rather than assessing specific artefacts, Team Tutors consider a portfolio of evidence supplied by the Team (and the Client where willing). The Tutor uses the Project Report form, Individual Report form, Peer Assessment Report form, informal Client feedback, and personal knowledge of the project and the team's members, to perform an assessment of group and individual performances. The criteria should be applicable to all types of project.

6. ADDITIONAL COMMENTS

6.1 Benefits of the Scheme

Thomas and Busby (2003) discuss the value of educational partnerships with industry such as this one. As well as providing opportunities for students to practice the knowledge and skills acquired through academic study, the TPS allows them to develop a broad range of transferable skills, initiative and self-confidence. Employers value such qualities, and anecdotal evidence suggests that students generally spend a substantial amount of their time talking about their projects during job interviews. Project Clients have the benefit of having additional resources to carry out work that perhaps may not otherwise have seen the light of day, at little or no monetary cost to themselves.

6.2 Critique of the Approach

Since TPS activities take up a significant amount of student time and are worth 60 credits out of a degree total of 360 credits, they naturally attract a great deal of attention in terms of comments from students, and annual meetings with staff and students are held in order to review and refine the scheme. Two years ago, a major review of the TPS was undertaken, and this resulted in a number of

changes being made. We present here some issues that may be of interest to others considering group-based activities based around real-life problems.

While degrees offered by the Institute aim to cover a wide range of business and technical skills required by IS professionals, they cannot reasonably be expected to cover every new technological innovation in detail. However, the very nature of real-life projects in a variety of organisations means that students are likely to meet unfamiliar technologies not directly covered in their undergraduate courses. Do we then decline projects involving technologies outside of the scope of those formally taught, or should the degrees cover a broader range of technologies? The prevailing view and one shared by many of the more motivated students, is that if opportunities to learn beyond the scope of their training and education present themselves, then this is desirable since skills and job prospect enhancements are likely through the experience.

Conversely, less motivated students suggest that they are disadvantaged – that it is "not fair" for them to be engaged in project work which is not specifically covered in other modules. With a diverse student population, this can be problematic. The Institute's response has been to ensure that we do not teach specific technological skills without covering the fundamentals of such technologies. For example, rather than having a module on "Programming in Java", we have "Object-Oriented Programming" in which the concepts are taught and then these are applied using Java as an example. This approach maximises capability and adaptability.

6.3 Consistency of Academic Level

As we mentioned earlier, some students have expressed concerns regarding perceived differences in the complexity and difficulty of various projects – some are 'hard' and others soft or 'easy'. A hard project might be the construction of a customer relationship management system for a multi-national corporation for example, while a soft one might be to develop a simple, static Web site for a primary school. At the ISI we do not accept the notion of 'hard' and 'easy' projects, as each project has its own unique characteristics and challenges. Where one project poses technical challenges, another might involve the rationalisation of ambiguous requirements.

Nevertheless we do not dismiss these issue without due consideration, and one of the critical roles of the Team Tutor is to assist with the scoping of the project and the determination of specific requirements. If a project seems light on requirements, then more academic objectives (not specifically required by the Client) can be added – for example the evaluation of a number of alternative solutions. If, on the other hand, the project appears too demanding, then a narrower scope can be negotiated with the assistance of the Tutor.

6.4 Organisational Inertia

The challenge of implementing changes to assessment regimes, where there is a history of custom and practice, should not be underestimated. In our case, this was compounded by the multi-year team issue of peer support. There is a clear danger of incorrect, outdated information being 'handed down' by students to their junior colleagues. Similarly, with a large number of individual staff involved in assessment, there is the danger of some not following revised guidelines.

The effects of both of these issues have been reduced by the use of briefing sessions for colleagues and students, and through an extensive intranet-based 'Team Project Resource Centre' which describes the whole Scheme in great detail.

6.5 Managing Client Expectations

Our aim is to provide an educational experience for our students. We are not a consultancy organisation or a software house. It is important that Clients are aware of the risk of not having a fully completed product or service. What can be guaranteed, however, is an exciting mutual learning experience.

7. INSTITUTIONAL ASPECTS

We have discussed an approach which has been running successfully for some time. Here we discuss some of the issues those considering implementing a similar scheme themselves may wish to consider.

Unlike traditional semester-based academic modules, the co-ordination of the TPS is an all-year-round activity. One of the key challenges of working with 'real-world' commercial organisations is that their key objectives and time-scales rarely correspond with those of an academic institution. Therefore, requests for projects tend to come in throughout the year and, frustratingly, many of these have to be rejected as the potential Client is unable to wait until September for the project to be initiated.

The TPS described here has approximately the same number of projects as members of faculty. We do not recommend colleagues supervising more than one such project at once. Mindful of the fact that each project team comprises around 15 students, all of whom may need individual support, multiple team supervision is not recommended.

Whilst 15 is our 'standard' team size (i.e. 5 from each year of study), others may choose to have smaller teams. In fact, smaller teams may reduce the potential for less motivated students to "piggy-back" on more committed students (Thomas and Busby, 2003). In our experience, it is quite rare for us to have equal numbers in every team. This is due to the inevitable withdrawals soon after the beginning of term and also students joining us late, possibly having transferred from another institution. The key requirement is for each project to be scoped

realistically and for the Team Tutor to monitor this throughout the project's life.

Similarly, the numbers of students on our courses mean that it is convenient for us to have around 30 project teams. There is no reason why the benefits of this Scheme would not be transferable to a reduced number of teams – in fact any number from 1 upwards. One should not underestimate the effort and stress involved in finding 30 suitable projects at the appropriate time each year!

Whilst unconventional and often viewed with suspicion (at least in the UK), commercial sponsorship can significantly help the running of a TPS. In the case described in this paper, a large car manufacturing organisation provides training courses for our student Team Leaders and their Deputies, to assist them with required team leadership (Thacker and Yost, 2002) and client management skills, and Web development hosting facilities are provided by an Internet Service Provider (ISP), free of charge. Such partnerships not only reduce the demands on faculty, but they also give additional benefits to students and further opportunities for project sourcing through publicity generated from the partnership.

8. CONCLUSIONS

This paper has introduced the Team Project Scheme at the University of Salford and shown how it is a useful vehicle for students learning about the nature of real-life work in Information Systems. Through reflection on practical experiences with the Scheme, key issues for IS educators involved in group-based or commerce-based project work are discussed. The work demonstrates how subtle changes in emphasis and careful management of assessment processes can successfully reconcile academic and commercial imperatives.

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