

Centralisation of Assessment: Meeting the Challenges of Multi-year Team Projects in Information Systems Education

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ABSTRACT

This paper focuses on the difficulties of assessing multi-year team projects, in which a team of students drawn from all three years of a full-time degree course works on a problem with and for a real-life organization. Although potential solutions to the problem of assessing team projects may be context-dependent, we believe that discussing these in our paper will allow readers to relate to their teaching cases and increase the general appreciation of team project related work. Findings discussed in this paper are based on the first cycle of action research in relation to an existing multi-year team project scheme. Based on the interpretivist perspective, this work draws on data from staff and student focus groups, semi structured interviews and surveys. Team project clients were also asked to comment on their experiences and the way they would like team projects to be improved in the future. Since issues affecting the success of team projects are quite closely inter-related, a systemic view is adopted rather than analysis of a single issue in isolation. Overall there is a feeling that multi-year team projects are a good idea in theory but can be challenging to implement in practice. It is argued that the main areas of concern are the assessment process, the dilemmas and tensions that it can introduce, and the related inconsistencies in stakeholder involvement, which can compromise the learning experience if not handled well. We believe that the assessment process holds the key to a successful learning experience in team project work.

Keywords: Team Project Assessment, Information Systems Education, Information Systems Development, Transferable Skills

1. INTRODUCTION

One of the common examples of constructivist learning in undergraduate information systems related degrees is team project work (Lynch, Heinze et al. 2007). John Dewey (1859-1952) originated the notion of constructivism (Cullen, Hadjivassiliou et al. 2002). Dewey was of the opinion that students should learn problem solving rather than remembering and reciting (Beck 1965). Apart from the pedagogic benefits of team project work allowing students to learn problem solving, it is acknowledged that team work prepares students for the real-life work environment (Humphreys, Greenan et al. 1997; Thomas and Busby 2003; Willcoxson 2006). There are others who believe that student team work reduces the assessment workload, thereby motivating staff to incorporate team work in their teaching (Boud and Falchikov 1989; Willcoxson 2006). Whilst team work is widely used in higher education (Willcoxson 2006), this paper examines a unique multi-year student learning experience where first, second and final year students collaborate on real life consultancy projects. Each team works on an actual, open-ended project developed in consultation with a client organisation, which is arguably the

pinnacle of functions and a constructivist approach to education.

There is a general agreement that in theory team projects are a useful learning experience which prepares graduates for real life:

"Team projects provide students with an opportunity to share ideas, learn new concepts, expose different points of view, and experience the satisfaction and challenges of working with others, while remaining in an academic setting." (Smith and Smarkusky 2005)

However, the challenges of team projects are also widely recognised and include issues such as fairness, consistency and accuracy of assessment (Smith and Smarkusky 2005). Marks are allocated by academic tutors who are not easily able to see the individual's contributions to team dynamics. A means that is sometimes used to address this is to require students to assess themselves and their peers (Gibbs 1992), an exercise that they might not be experienced enough to carry out competently (Willcoxson 2006).

Dewey broke down the learning process into the following five steps so that teachers could engage students in

problem solving: The first stage was the student's realisation of a problem, the second the inspection of the problem, followed by the building of a hypothesis which was then proposed and tested experimentally, then the extension of the hypothesis followed and, finally, learning was concluded by the testing of the hypothesis in practice (Beck 1965). This paper examines a team projects scheme which can be described as follows using Dewey's five steps: A real life client organisation approaches the University of Salford with an actual business problem. This problem description would be passed on to a team of students who would then take ownership of the problem and negotiate with the company the scope and objectives of the project (Step 1). Then working with the client organisation the team would produce a detailed analysis of the problem (Step 2). Based on this analysis a range of solutions would be proposed (Step 3) and one of them selected (Step 4) and tested in real life where appropriate (Step 5). An example problem might be that a client organisation's website has poor search engine rankings. This problem would be analysed by the students and they might identify a number of problems. Their recommendation might be a re-design of the site to include a higher keyword density and increased number of inbound and outbound links. These solutions would be negotiated with the client and implemented in practice. The students would therefore be learning which of their solutions made a higher impact on search engine ranking and increasing their knowledge of the subject of search engine optimisation. Aside from the subject knowledge increase as proposed by Dewey, and the actual product of the project, the team are also benefiting from experiencing the process of team project work and its associated problems.

During the months of May and June 2006, a consultation took place that focused on establishing the staff's, students' and clients' perspectives on the multi-year team projects. An ethical approval was granted by the University of Salford Ethics Committee which allowed data gathering for this research assuring anonymity to the participants involved. Representatives from three main stakeholder groups were asked to complete Team Projects Review questionnaires. The questionnaire comprised 18 questions which were broadly broken down into the following sub-sections: views on this multi-year team project scheme, awareness of the scheme before and after the experience of it, the assessment process within the scheme, the role of stakeholders in relation to the scheme and finally the future of the scheme. A series of open ended and closed questions were used to elicit the perceived strengths and weaknesses of the multi-year team project scheme and identify potential improvements. The analysis of this review was presented to a staff focus group where potential actions were discussed and to a separate student focus group where further actions were also discussed. Actions were planned and implemented in the first semester in the academic year 2006/2007. These have been monitored and one particular aspect concerned with the assessment process is outlined in this paper.

This paper is structured around three main sections. First of all the research setting is outlined in order to contextualise the work being undertaken. Our interpretivist assumptions about knowledge require a rich description of

the research settings and researchers' pre-conceptions at the outset of this work. In the next section the interpretation of action research is discussed and the way the first cycle was implemented. The last section outlines individual issues highlighted by our research, and particularly focuses on the assessment. Assessment related issues, actions, mitigations and observation of the impact are outlined. Finally we discuss the next cycle and plan for assessment improvement.

2. RESEARCH SETTING

The multi-year team project scheme is an integral part of three Bachelor of Science programmes in Salford Business School, United Kingdom. These programmes are in the subjects of Business Information Systems, Business Information Technology and e-Commerce Systems. These are three-year long programmes with an optional industrial placement year.

2.1. Historical background

The team projects were originally created within the Information Technology Institute in 1986, where they formed a key element in supporting its primary objective of creating graduates who were well-suited to a career as an Information Technology professional. They continue to be embedded in the curriculum of Information Systems related programmes in the Salford Business School. Each team works on a real life, open-ended project developed in consultation with a client organisation. Projects lead to a variety of outcomes including, for example, the development of a piece of software, or they may be more business-oriented and focus upon a piece of evaluative research or recommendations for a new organisational strategy. Although project work is popular in general, and there are examples that illustrate similar schemes across the globe (Lynch, Heinze et al. 2007), this scheme is unique in its magnitude and impact on the student learning experience.

A team projects related website provides more up-to-date information on the team projects currently running: www.business.salford.ac.uk/teamprojects/is/

2.2. Team structure

In multi-year teams with students from the first, second and final years of their degree, students have the challenge of group dynamics. It is generally acknowledged that group dynamics pose a challenge for students in university level team work (Brooks and Ammons 2003; Baily, Sass et al. 2005). This is usually related to the issue of team composition – whether students select their own teams or they are allocated randomly (Connerley and Mael 2001). In our case the team composition is based on the decision of the team projects scheme manager – a tutor who oversees the whole process of team projects. The decisions on team memberships are made based on student grades, in subjects that demonstrate their technical and managerial ability and their gender. Generally, the team membership selection is motivated by achieving a balance of technical ability, managerial ability and gender balance.

Overall, students spend nearly 25% of their degree time (60 credits out of 240 for year 2 and year 3) and 19% of their entire course (70 credits out of 360 for year one, two and

three) by being engaged in team projects. Hence team projects play a major part in their degree classification and their overall experience of the degree.

As depicted in Table 1, student roles within the team project vary dependent on their year of study and the semester that they are in. In the first semester students from the first year take on the role of an "apprentice" and are asked to observe the second and the final year students and are therefore not marked for their contribution. In the second semester they are marked for their work and this contributes 10 credits towards their necessary 120 credits for the first academic year.

Team project student roles			
Year:	First	Second	Final
1st Semester	"Apprentice" (0 credits)	Full team member (20 credits)	Full team member (18 credits)
2nd Semester	Full team member (10 credits)	Full team member (20 credits)	"Consultant" (2 credits)

Table 1: Team project student roles

Second year students are assessed in both semesters and receive 20 credits per semester. Usually one of the second year students is assigned to be a deputy team leader, and becomes the team leader in the second semester. The team leader in the first semester is a final year student who has to step down in the second semester. The final year students are assessed in the first semester and have the role of consultants in the second; their contribution is weighted at 20 credits.

The students are seen as progressing through increasingly higher level roles as they move through their degree until, in their final year, they are responsible for the initial liaison with the client, getting to grips with what may be initially quite a fuzzy requirement, agreeing scope and objectives and, supported by the tutor, developing a cohesive team. This progression, in some ways, reflects Perry's model of intellectual development (Perry 1970; Perry 1981) in that students will tend to undertake activities that are fairly clear-cut, and compatible with a dualist outlook, in the beginning, but are encouraged to move on to dealing with issues that require a more pluralistic view, and involve the exercise of judgement, in the later stages.

Table 2 outlines the mapping of student progression based on Perry's model. This highlights the need for multi-year engagement with problems, so that students are able to practice problem solving on all levels of their intellectual maturity. The collaboration with students throughout the year allows knowledge and experience to be shared amongst them. To reach the final level of intellectual development it is necessary to gain experience which would not be possible without engagement in team project work on year one and two. We recognize that Perry's model takes a positivist approach to representing the way students develop and therefore we do not claim that such a development takes place in every student. However, despite its "linear" perception of learners' development, we believe that Perry's

model supports the need for multi-year engagement of students on one project. The three years potentially provide three real life learning opportunities so that students can see similar problems from different perspectives.

Team project student roles – Perry's model assumptions			
Year	Stage of intellectual maturity	Perception of knowledge	Perception to problem solutions
1st	Dualism: concrete thinkers - right/wrong	Knowledge is sets of truth	There is one correct problem solution
2nd	Multiplicity: diversity of thinking, all opinions are valid	Knowledge is an educated opinion	There is no one correct answer, all are equally valid
2nd	Relativism: all knowledge is relative; need for evidence	Knowledge is not universal but context and situation bound	Ambiguity is part of life and individual views on problem solution are evidenced
3rd	Commitment : need to take positions and commit to them	Knowledge is experiential, learned from others and from individual reflection	Each problem has several solutions, some better than others. There is a need to justify personal standpoints based on personal values and analysis

Table 2: Mapping of Perry's model to team projects

2.3. Assessment

Each team project is allocated a team tutor, who also fulfils the role of prime assessor. In addition to the actual development of a problem solution the team produces a number of reports. These reports are not assessed themselves but they provide evidence for assessment (Jones and McMaster 2004). As a group, teams produce a client report which is given to the client at the end of each semester, feedback from the client report is used to inform the academic report, which is used for academic reflection on the team project. As well as contributing towards the group deliverables, each team member has to write an individual report and a peer assessment report where they reflect on their learning and appraise themselves and their peers. In addition to the reports, students also get assessed on a presentation which takes place at the end of each semester.

The team project assessment process in this setting is complex and has been the subject of criticism (Jones and McMaster 2004). A number of issues make team projects different from conventional modules: inconsistencies of problems to be solved, a variety of staff involved with team project tutorship, group work collaboration, a heavy

weighting towards the final degree classification (op. cit: 378). A number of attempts have been made to address these issues in the past, including the move to the process oriented assessment of the team's performance (op. cit: 379). All team project marks are reviewed by another team project tutor. In the case of differences in the marks the reviewer has to contact the initial marker (and where necessary the Team Project Scheme Manager) in order to discuss the marks and reach an agreement.

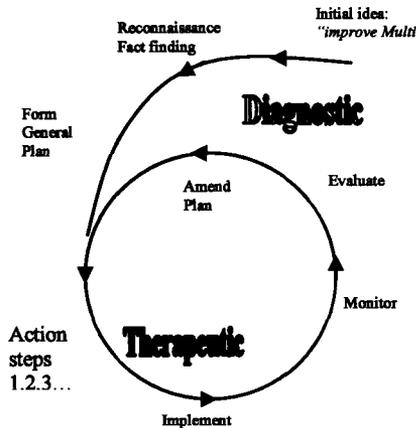


Figure 1: Lewin's cyclic model. After: (Burns 2000).

The above and a number of other issues prompted a debate concerning the future of team projects. One of the options considered was dropping the multi-year scheme and replacing it with a single year project which would involve the second year students only. After a lengthy discussion it was thought that, despite the complexity related to team projects, the benefits, which included the peer-learning support across years that in turn influenced student retention, outweighed the drawbacks. In particular the first year students are given some guidance by their peers and feel part of the team from the day they join their course.

It was also decided that a methodical approach to the development of team projects would be adopted and developments closely monitored. This paper reports some of the main findings.

3. RESEARCH METHOD

Action research was the selected research method for this work. The main reasons for this were a need for balance between practice and theory and the option for intervention:

"No action without research, and no research without action." (Bate 2001)

The research outcomes are practical and theoretical and are highlighted by the following definition of action research:

"Action research simultaneously assists in practical problem-solving and expands scientific knowledge, as well as enhancing the competencies of the respective authors, being performed collaboratively in an

immediate situation using data feedback in a cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change process in social systems and undertaken within a mutually acceptable ethical framework. (Hult and Lennung 1987" (Lau 1997)

A number of scholars have identified that action research lends itself to the study of information systems; in particular the work of Enid Mumford (Mumford and Weir 1979), who was influenced by the action research work at the Tavistock Institute (Mumford Unknown). Trevor Wood-Harper (Wood-Harper 1985) was also one of the earlier scholars to highlight the use of Action Research in Information Systems (Baskerville and Myers 2004).

The action research enquiry can follow the process shown in Figure 1. As can be seen at the top right hand corner, the process starts with the diagnostic stage of research. The initial idea of "improvement of the multi-year team project scheme" is the motivator. The next stage within the diagnostic section is the fact finding. Data collection techniques included interviews, focus groups, and questionnaires. The three main stakeholders: staff, students and clients have been surveyed. Students and clients issued a questionnaire, which included a number of closed and open questions regarding team projects. Telephone interviews with past clients were held where they were asked to comment on their experience and perceptions of team project work. A staff focus group was held to discuss the findings of the survey. In particular emphasis was placed on experience, problems and issues arising and the consideration of possible improvements and actions. Identified actions were agreed by staff present at the session and subsequently implemented across the scheme. This paper discusses some of these and focuses on the monitoring and evaluation section of this ongoing work. The work conducted so far is classed as the first cycle of action research.

All subjects consented to their data being used for this research, and appropriate ethical approval was acquired from the University of Salford Ethics committee.

4. FINDINGS

Team Projects have a complex structure and inherently there will be issues associated with them. The issues discussed are interrelated and are presented as distinct in this discussion only for the purpose of simplification. It is also important to note that the data gathered represents perceptions which, although important, may not necessarily provide accurate assessments of the situation. There are a number of issues that Team Projects could address, for example:

Benefits perceived by students:

- Opportunities to develop skills relevant to current business needs
- To ensure that students leave the course with an understanding of the professional elements of team project work
- To encourage students to develop a broad range of key skills, initiative and self-confidence (highlighting skills such as communication, soft skills, team working and real life learning skills)

Benefits perceived by lecturers

- Facilitation of Personal Development Planning
- Provision of a platform for personal tutoring
- An opportunity to update industrial knowledge

Benefits perceived by clients:

- To enable project clients to benefit from additional resources to carry out work that might otherwise be neglected, at minimum cost
- To enable organisations to benefit from fresh perspectives on their business needs.

Although the focus of this paper is on the assessment challenge in team projects work and the identification of potential improvements, it is important to note that both staff and students do recognise positive aspects and the following quotes from students illustrate some of these:

"So many benefits, such as improving communication skills, relationship with other students, experience from different students for example: students from final years share their experiences with the second and first years."
(2nd year student)

"Provides early insight into what is involved to manage a project. Provides opportunities to build interpersonal, communication skills and leverage existing knowledge with peers of different academic backgrounds."
(3rd year student)

The issues that arose may be grouped into the following categories and their relationships stated with a model to be presented in section 5:

Administration, which relates strongly to the issue of clarity and understanding (depicted in Figure 2). Key questions that arise here are the extent to which a prescriptive approach should be taken, and the trade-off between detailed instructions, which may be difficult to digest and understand, and brief guidance, which may be perceived as vague or may fail to achieve the objective.

Equality and diversity. Team projects provide a social interaction context for students and it is inevitable that there will be misunderstandings and positive as well as negative group dynamics. It is important, therefore, to monitor this area carefully.

Infrastructure. Infrastructure includes access to rooms and equipment and resources that teams would require for their projects. This is an area that is not included in the earlier model, but certainly will have an impact on student motivation.

Team structures and management. There is a tendency for teams to fall into the habit of adopting a particular formal structure and to manage the projects in the same way that they have been managed before. This is an important issue in relation to the peer learning element of the scheme. It is a very good example of the issue regarding the perpetuation of existing cultures, whether good or bad.

Types of projects. There are differing opinions given by staff and students on what makes a good team project. The question of whether the project has matched the skills of the students in the team is very important, and relates to the degree to which students should be expected to learn new

skills in the project and the support that is provided for that. This issue also relates strongly to the factors of client understanding and commitment, represented in the model.

Team composition. As well as the question of skills raised in the previous point, a number of students are of the opinion that they should be able to choose their friends as team members. This is clearly advantageous in some respects, however certain skills like conflict management and conflict resolution will not necessarily be facilitated by such a setup. It is also felt that random teams based on team members' skills and competencies are a good way for students to share and learn from each other.

However, the largest number of issues was associated with the area of assessment:

Assessment. It will be postulated in a model put forth in section 5 (see Figure 2) that this can be expected to occupy a pivotal role within the scheme. The perception of whether individual performance is reflected in marks is the primary indicator for students that their work bears fruit and is therefore a key influencer on their motivation. It also appears to be the main vehicle for effecting change. Because the largest number of issues raised related to assessment, this is the area that will be addressed in depth in this paper. Assessment related issues include "passengers", student motivation and level of staff involvement in tutoring resulting in somewhat "unfair" view of assessment:

Passengers. The student performance factor may be interpreted as overall performance of the team, but also as individual contributions of team members to the team as a whole. A major issue is the extent to which individual assessment marks are perceived by students to reflect the contribution that the individual has made.

Student motivation. This is closely linked to the passenger issue. It is important to note that the assessment or the mark that students get is clearly identified as the prime motivator to engage with a module.

Level of staff involvement in tutoring. Staff have quite heavy workloads, and it can sometimes be difficult to achieve a consistent level of involvement from tutors across the module. Tutors are not supposed to be directly involved in the project, but are expected to provide guidance and advice where appropriate. There is also an important link to assessments in that the level of familiarity with the project needs to be consistent if equity in marking is to be assured.

4.1. Assessment

This paper will focus on assessment as one of the main issues which emerges as a key point when it comes to team project work. This is because team projects are notoriously difficult to assess as identified in the literature and experience. Different projects, different student expectations, different tutors and different clients contribute to a unique situation in each team. Since all projects are different in nature and their client requirements vary, it is difficult to provide a very detailed assessment scheme that would be meaningful to all parties involved. Additionally, assessment of multi-year team project work contributes 25% to the degree classification, meaning that any problems here will have considerable repercussions on final degree classifications awarded.

Team project assessment moderation can result in stressful situations with disputes concerning the team mark

ranges. The reviewer can only judge the project on the documentation produced and may not be aware of the difficulties that the team might have gone through. This message is interpreted by the students as implying that they have to produce a large amount of documentation – a “phone book” which they believe would yield them a good mark. This is also influenced by the fact that historically there was the preference to assess the process rather than the product. For students, knowing that the traceability of the process is important, the perception then becomes that the key to good marks is a thoroughly documented project report. This affects the quality of the product which is not assessed directly and can result in disappointed clients. This in particular was highlighted by a number of clients who were disappointed with their collaboration and hence were not willing to collaborate in the future. The disappointment was

sometimes misused by students and may be treated as a “weapon” against others.

5. SYSTEM DYNAMIC MODEL OF TEAM PROJECTS

Figure 2 shows a model of the issues and relationships in the team projects, based on the causal loop diagrams of systems dynamics (Forrester 1994). Whilst understanding the limitations of the causal loop model for drawing conclusions or making predictions about the precise dynamics of a system, we nevertheless find this a useful way to conceptualize the team project scheme and identify key points of interest. This model was initially based on observation and experience but is being refined, confirmed, and/or corrected through information gathered in the work reported here. In the diagram, the lines represent influences

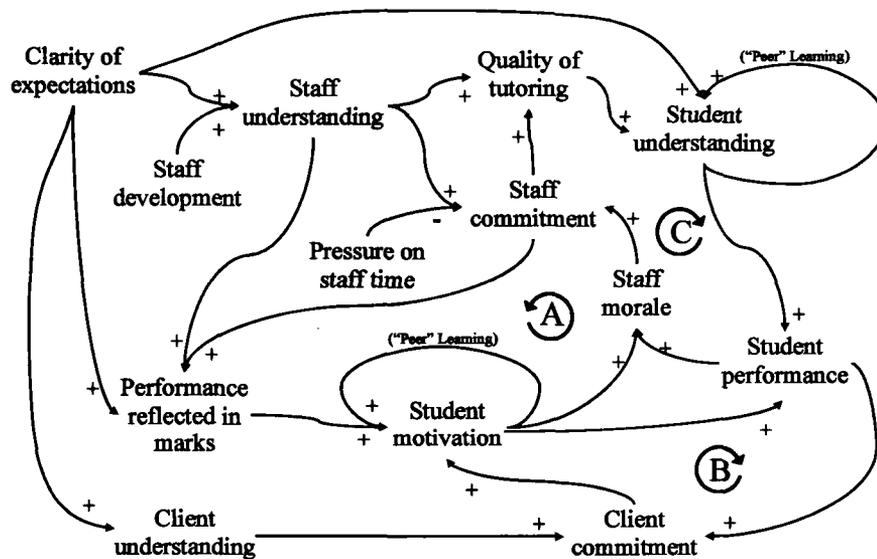


Figure 2. Initial model of the dynamics of the Team Projects scheme.

justified by the clients because they did not feel that the contributions to the product developed by the team were worthy of their own time which they sacrificed as a result of the collaboration. Some clients received reports that were of little use, or software programs and prototypes that were not operational.

Having agreed the team mark, further challenges are posed by the individual mark. To help with the tracking of individual contributions, a detailed deliverables chart is a compulsory part of each team project report. The deliverables chart is intended to illustrate the breakdown of individual contributions towards the individual deliverable. Some staff felt that several assessment tools were invented to add to the administration of Team Projects which detract from the actual project. It was recommended that assessment should take more note of the necessary project documentation. A deliverables chart was not utilised by all teams but has the potential to provide accountability. There is also some evidence to suggest that the peer-assessment is

between factors, with a plus sign (+) indicating a reinforcing influence and a minus sign (-) indicating a reducing influence.

There are three primary stakeholder groups in the team projects scheme: the students, the project clients and the tutoring staff. This model represents a fairly high level view, and yet still indicates a high degree of complexity, which can make the management of the scheme quite difficult.

Of note is the “peer learning” element that results from the multi-year nature of the projects. It is felt that this can provide significant benefits in relation to the experiences of the students on the course as a whole, but it can be a double-edged sword in the projects themselves. Whilst a good, clear understanding of issues and good motivation are likely to be self-perpetuating to some extent, it is also true that problems with the culture and poor practices can be very difficult to break away from, even though great effort may be expended in trying to promulgate specific changes.

In relation to the project clients, it is important to recognize that one of their major roles in the scheme is to

help to educate students. However, they are encouraged to provide real projects for the students to carry out, so it is inevitable that they will often have a significant stake in the outcome of the project itself. It is important to encourage them to maintain a balance between these two interests since, from the point of view of the project itself, failure is seen as a negative outcome whereas, from the point of view of the learning objectives of the scheme, failure of an individual project may provide significant learning opportunities.

The scheme has, at times suffered from a lack of clarity in relation to what is expected of the various participants, and work has been carried out in recent years, focussing on the three elements of "Clarity of expectations", "Staff development" and "Pressure on staff time" to attempt to address this through explicit documentation of some required procedural elements as well as meetings and workshops to help share knowledge and clarify issues.

As well as some key elements of the scheme itself, there are several causal loops (labelled A, B and C) that are of particular interest here, each of which can work in favour of, or against, a successful outcome. Of these, loop B is concerned with the relationship between the team and the external clients, loop C involves the relationship between students and staff in their role as tutors, whilst loop A is concerned with the relationship between students and staff in their role as assessors. It is the assessment that we focus on primarily in this paper as our experience, as well as the results of the survey work itself, suggest that it is the key element in the motivation of students, around which a number of other issues revolve.

6. ACTION PLAN

The above issues were identified as problematic and an action plan was formed and discussed with staff involved with the scheme. Some of the main issues are highlighted below.

Although it was agreed that team projects are about the process as well as the output, it was suggested that a first class mark cannot be given to a team that produced a "poor" output but had a good process. Exceptions can be made if "poor" product was beyond the students' control. Although team project documentation is a deliverable it is not the only one – more emphasis had to be placed on the practical output, for example the quality of the database or the website etc. Further work was planned to be conducted into the improvement of the team project assessment descriptors.

One consideration in assessment is to be primarily concerned with whether the students have achieved the learning outcomes of the modules. This needs to be assessed through evidence drawn from both the process and the products (internal and external deliverables), as well as reflection in the individual report. This adds to the complexity of multiple levels of students collaborating on one project, since all have different learning outcomes to achieve. An implication of this is that ideally there is a need for separate assessment descriptors for each of the modules in the team project work.

There is also an issue surrounding the extent to which staff should have discretion regarding both the approach to tutoring and the manner of assessing individual and team

performance. There is a need for some discretion given the variation in the types of projects that exist, but there is also a need for consistency in the students' support experience.

It was also suggested that a review session is planned for team projects where all team projects tutors had a specific day to review each other's projects. Emphasis had been placed on the value of the comments set out by the students on the peer-review sheet. It is not acceptable to give everyone 100% without clear justification.

It was noted that it is difficult to provide individual student feedback, particularly at the end of the second semester. However, since team tutors are also the personal tutors for the team members it is expected of staff that each student receives at least three individual 'personal tutoring' opportunities.

A deliverables chart is a by-product of a good project Gantt chart and can simply be exported from a tool such as Microsoft Project. The deliverables chart is not intended to be a standalone item, but needs to be drawn from, and to be consistent with, the project Gantt chart. Indeed, if the project Gantt chart is done properly, with every task having a (internal or external) deliverable, presented in a way that is easy for the assessors to assimilate, then strictly speaking there would be no need for the deliverables chart.

6.1. Implementation

The overall team project assessment marking scheme was re-negotiated with team tutors involved and a new scheme was drawn up – see appendix. The main changes were concerned with the improvement of granularity of assessment – marks are now grouped for the majority of the spread in groups of 10. The weighting is suggested to be of equal importance on the actual process as well as the product produced. The client's feedback is also incorporated into this.

Informal sessions for team leaders and deputy team leaders were used to communicate the marking criteria to students and gain feedback. It was thought that student consultation would provide student ownership and understanding of the weighting involved. The academic review session which would allow team tutors to get together and discuss their impressions and marking of team projects was timetabled into the deadlines for team project marking.

6.2. Monitoring

Generally, it was observed that practical deliverables of several team projects had a lot of room for improvement compared to some of the deliverables developed by students in individual modules. For example a team effort can produce a four page static website, which does not incorporate any aspects of software engineering. On the other hand a single student was able to produce a simple but standards-compliant website for a level one module which contributed only 10% towards their module mark. Furthermore, students on a final year software engineering module were able to practice project management, systems analysis and design and practical development of a simple dynamic website. Although the two individual modules compared have fictional clients and fictional requirements – the depth of student engagement and the learning curve are arguably steeper, since the students are accountable for their individual work. In team projects on the other hand the

accountability issue is difficult to trace, allowing less interested students to get away with reasonable marks by only contributing the minimum. The aspect of communication between team members and real client interaction makes the progress in team projects slower.

The review session which was meant to allow staff to discuss their thoughts about marks did not take place since staff simply did not attend it. This is an interesting observation of action research – where an idea was proposed and no objections raised but in reality nothing materialised.

6.3. Evaluation

Although there are some changes on the module descriptor, and attempts to structure the reviewing process, the actual practice was not affected. The theoretical agreement and understanding of the marking criteria was soon proven to be problematic, since all staff involved had their own subjective interpretations of these. There are some projects that produced poor artefacts but gained exceptional team project marks. This highlights again that either the staff did not take notice of the marking criteria, or that the marking criteria are subject to interpretation by the individual tutor and do not provide a clear differentiating tool. A related issue is the number of projects that have been reviewed and the number of reviews that resulted in a change of the marks. The subjectivity is also evident in the level of rigour applied to the assessment process with some staff viewing it as an unnecessary level of bureaucracy.

It appears that assessment is perceived by students as the main motivator. If students don't have faith in fair assessment they understandably become disappointed and de-motivated. In one of the discussions with a student the issue of motivation was raised and the consensus was that "at the end of the day we [students] are chasing marks". Although we have to bear in mind issues raised in the introduction section of this paper outlining why team project work is perceived as a worthwhile process, we have to also be conscious of some of the pragmatic issues from a student's perspective. The primary "influence" that we have over students' learning, apart from making the learning a rewarding experience through relevant and real projects (the "carrot"), is that assessment gives us the "stick" which allows for direction of learning effort. This assumption contradicts the view that the purpose of assessment is there for measuring students' learning against the intended learning outcomes and makes assessment the focus of a student's effort. This is highlighted by a comment from the student who said that "we are chasing the marks". Therefore assessment remains the most difficult challenge, which highlights difficulties in providing an acceptable learning experience.

To minimise the issue of different projects and the varying complexity levels, a number of elements can be considered. The philosophy of "management by objectives" can help to set out a flexible assessment structure. This would have the ability to be adapted for individual projects and individual students. Potentially, teams could be asked to set out their own objectives which could be used for the overall project success management. For example if all 'set out' objectives were achieved then teams would get a "good" mark and if they went beyond expectations and achieved

more objectives then they would be able to get a higher mark. Teams could initially establish their internal strengths and weaknesses then negotiate with clients and tutors on achievable objectives, which could be used as a measure of each project's success. This process is already taking place, however it is informal and is not taken seriously by students as well as some staff – arguably because there are no marks associated with it.

For the individual, student peer assessment remains a useful tool. However, individual reports submitted at the end of the semester do not provide enough evidence to establish a student's individual contribution and their personal development and planning. These objectives could be linked with the module descriptors for individual student level to provide a comparison and transparency of expectations. The individual report comprises currently four pages – providing limited opportunity for the students to document their progress and their personal development planning. A more substantial document which provides a week by week account of students' reflections and planning would be more appropriate to document their learning process and accountability for individual contribution to the project.

Currently, summative assessment is done at the end of semesters, with a number of formative assessments throughout the semester. Formative assessment is done at team level rather than for individual students. It appears that formative assessment is not taken seriously by students and a number of tutors. Deadlines were taken as flexible guidelines rather than a time for work submission. Since the only deadline taken seriously is the one at the end of the semester, some students were negatively surprised that they did not perform to expectations, and this was then too late for any remedial action to take place. One potential option would be to break down one major submission into several sections. For example project appraisal, detailed project specification and project plan which are currently formative could be summative. These can be associated with a mark and carry some weighting toward the final overall project mark. These can be quickly marked and returned back to the team with feedback and where necessary counselling. This approach is also aligned with Dewey's five stages of problem solving and could benefit the learning outcome in a way that the process is more structured and gives a clear progression line. Early summative feedback on an individual's performance could be done in a number of stages. The first stage could be for students to identify objectives that would feed into the module specification and be related to the individual's strengths and weaknesses.

The benefit of such a generic scheme is that all teams can be marked by two tutors independently and the marks discussed and agreed between the two. This means that instead of having one tutor assigned per team there could be two or three tutors overseeing all teams. Ideally the tutors assessing students will not have any particular attachment to individuals, which currently is the case where individual staff are assigned ownership of a team. The assessment would also allow for tutor specialisation. For example, two tutors would be focusing on the project management and organisation of all teams, whilst other tutors would focus on the technical issues – this allows for transparency amongst all team projects and better tutor appreciation of the

individual team complexities and problems faced. The practical implications of such a specialist assessment team would perhaps require separate reports – the team organisation and technical team reports, which would further act as encouragement for a team to split them into two logical subsections. A further limitation of such assessment could potentially distance the student-tutor relationship, since at the moment teams have one tutor for the full duration of their project. However, due to the variety of tutoring patterns where some tutors have a more “hands-off” approach, some students will actually gain from such a process. The gain would be in a harmonisation of subjective views applied across the board on one specific aspect. For example all teams would be able to get the same level of tutor advice on the operation of quality management and team organisation, whereas in the past some teams have been more advantaged by having tutors who were experts in a particular area.

Currently if a team tutor has limited knowledge on the technical or managerial side, the team is disadvantaged and has to rely on informal help from tutors teaching the relevant subject. Although this is common practice, pressure on staff time disadvantages those tutors who make themselves available and hence help others without the credit in terms of workload allocation.

7. CONCLUSIONS

Multi-year team projects of this type are a unique scheme that provides a platform of extremes. Team learning has tremendous potential to provide an exciting learning opportunity for students as well as staff. The student learning progression and their intellectual development are in particular encouraged through a multi-year progression in relation to Perry's model.

Historical developments of associationist and functionalist thinking might seem to influence some of today's thinking about team projects. The need for problem solving is addressed by this kind of learning experience and goes further into current thinking on constructivism.

Our illustration in figure 2 attempts to summarise some of the main systemic issues. The main problem lies in the implementation and execution of the team project related processes, the two key stakeholders of which are staff and students. We are offering a learning experience that at best provides fantastic results and at worst is disastrous.

It is suggested that the three changes of expert assessment, breaking down of assessment into intermediate stages, and improvement of the individual report, will have a potentially positive effect on transparency and offer the learning outcomes intended.

A number of actions are discussed and proposed in this paper, which could, in theory, provide the desired learning experience. However, there is a need for some major change in the assessment process which we believe will direct the energy of students and staff on the main aspects of team project work.

The introduction of specialised assessment team supervision which would focus on specific aspects of the project work is potentially one way of dealing with inconsistencies of marking and related supervision. This also

allows for fairness in staff time allocation, where accountability is clearly placed on the individual responsible for certain aspects of the project work. Keeping project marking in the hands of a single tutor and reviewer per team has a number of benefits, but the problem of perceived inconsistencies in marking and resulting student complaints about mark differences and “unfair” marking outweighs these.

Since personal development planning is embedded in the team project work, it can be further integrated in assessment and used to structure students' achievement of learning outcomes. This can be in the form of weekly logs where students could reflect and plan their learning activities. This could replace the current format of three pages and potentially extend to one page per week to some more comprehensive documentation for example 11 pages of reflection and planning.

Finally and most importantly we have to remind ourselves about the need for relevant skills which will equip our students for life long learning. The transferable skills learned in a team environment are unique, and unless practised, are difficult to learn. Some of these skills are communication with professional clients and the importance of being able to manage complex situations.

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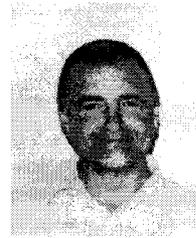
9. REFERENCES

- Baily, J., M. Sass, et al. (2005). "Teaching with and through teams: Student-written, instructor facilitated case writing and the signatory code." *Journal of management education* 29(1): 39-59.
- Baskerville, R. and M. D. Myers (2004). "Special issue on action research in information systems: making is research relevant to practice - foreword." *MIS Quarterly* 28(3): 329 - 335.
- Bate, P. (2001). *Synthesizing Research and Practice: Using the Action Research Approach in Health Care settings. The business of research; issues and policy and practice.* C. J. Finer and G. L. Hundt. Oxford, Blackwell Publishers Ltd.: 478-493.
- Beck, R. H. (1965). *A social History of Education.* London, Prentice Hall.
- Boud, D. and N. Falchikov (1989). "Quantitative studies of student self-assessment in higher education: A critical analysis of findings." *Higher Education* 18: 529-549.
- Brooks, C. and J. Ammons (2003). "Free riding in group projects and the effects of timing, frequency, and specificity of criteria in peer assessments." *Journal of Education for Business* 78(5): 268-272.
- Burns, R. B. (2000). *Introduction to research methods.* London, Sage Publications.

- Connerley, M. and F. Mael (2001). "The importance and the ivasiveness of student team selection criteria." *Journal of management education* 25(5): 471-494.
- Cullen, J., K. Hadjivassiliou, et al. (2002). *Review of current pedagogic research and practice in the fields of post-compulsory education and lifelong learning*. London, The Tavistock Institute.
- Forrester, J. (1994). "System Dynamics, Systems Thinking, and Soft OR." *System Dynamics Review* 10(2).
- Gibbs, G. (1992). *Assessing more students*. Oxford, UK, Polytechniques and Colleges Funding Council.
- Hult, M. and S. Lennung (1987). "Towards the Definition of Action Research: A Note and Bibliography." *Journal of Management Studies* 17(2): 241 - 250.
- Humphreys, P., K. Greenan, et al. (1997). "Developing work based transferable skills in a university environment." *Journal of European Industrial Training* 21(2): 63-69.
- Jones, M. C. and T. McMaster (2004). "Addressing Commercial Realism and Academic Issues In Group-Based IS Undergraduate Project Work." *Journal of Information Systems Education* 15(4): 375 - 381.
- Lau, F. (1997). *A Review on the Use of Action Research in Information Systems Studies*. IFIP 8.2., London, Chapman & Hall.
- Lynch, K., A. Heinze, et al. (2007). "Information technology team projects in higher education: An international viewpoint." *Journal of Information Technology Education* 6: 181-198.
- Mumford, E. (Unknown). *Enid Mumford Biography*, <http://www.enid.u-net.com/Biography.htm>. 2007: Private website.
- Mumford, E. and M. Weir (1979). *Computer Systems Work Design: The ETHICS Method*. London.
- Perry, W., G., Jr. (1981). *Cognitive and Ethical Growth: The Making of Meaning. The Modern American College*. A. W. C. a. Associates, San Francisco: Jossey-Bass: 76 - 116.
- Perry, W. G., Jr. (1970). *Forms of Intellectual and Ethical Development in the College Years: A Scheme*. New York: Holt, Rinehart, and Winston, Reprinted by Jossey-Bass Publishers, 1999.
- Smith, H. H. and D. L. Smarkusky (2005). *Competency Matrices for Peer Assessment of Individuals in Team Projects*. Proceedings of the 6th conference on Information technology education, Newark, NJ, USA.
- Thomas, S. and S. Busby (2003). "Do industry collaborative projects enhance students' learning?" *Education + Training* 45(4/5): 226-235.
- Willcoxson, L. E. (2006). "'It's not fair!' Assessing the dynamics and resourcing of teamwork." *Journal of management education* 30(6): 798-808.
- Wood-Harper, T. (1985). *Research Methods in Information Systems: Using Action Research*. *Research Methods in Information Systems*. E. Mumford, R. Hirschheim, G. Fitzgerald and T. Wood-Harper. North-Holland: Amsterdam: 169-191.

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Appendix: Assessment descriptors for overall team project work (2006/2007):
 Note: These descriptors must be read in conjunction with the Project Procedures Handbook, the module specifications for the team project modules and the overall "levels of performance" defined in the University's AQA Manual:
http://www.academic.salford.ac.uk/aqa/sections/23_code_of_practice_assessment_policies_and_procedures.pdf

Indicative Grades:	90-100	80-89	70-79	60-69	50-59	40-49	0-39
Overall level (indicative – not for grading)	"Shining example" Outstanding	"To professional standard" Excellent	"Went beyond expectations" Very Good	"Fulfilled the requirements" Good	"Need for improvement" Fair	"Just about managed" Adequate	"There is a lot to learn" Unacceptable
Scholarship: Independence of work conducted, research, linking of knowledge from other modules	Outstanding independent scholarly work, showing a high level of synthesis and analysis. Use of high quality sources.	Excellent scholarly work, some synthesis and analysis of peer reviewed publications. Excellent level of independent work.	Very good scholarly work. Some synthesis or analysis. Very good level of independent work	Good evidence of scholarly work Good level of independent work	Fair evidence of scholarly work, with some deficiencies. Project required supervision	Adequate scholarly work conducted; deficiencies in synthesis and independent thought. Project required a lot of supervision	From unsatisfactory to extremely poor scholarly work. 0 is given for no attempt to engage with scholarly activities. Project required high level of supervision
Scholarship: Independence of work conducted, research, linking of knowledge from other modules	Outstanding organization, using all required and supplementary processes with team work practices implemented. Outstanding initiative	Excellent organisation, using all required processes and team working practices. Excellent initiative.	Very good organisation utilising all required processes and team working practices. Very good initiative.	Good organization utilizing appropriate required processes and team working practices	Fair organization utilizing most required processes and team working practices	Adequate organization utilizing some required processes and team working practices	From unsatisfactory to extremely poor organization utilizing very few required processes and team working practices
Scholarship: Independence of work conducted, research, linking of knowledge from other modules	The project output was of outstanding quality and exceeding expectations.	The project output was what was agreed to an excellent quality and exceeding expectations.	The project output was what was agreed to a very good quality and exceeding expectations.	The project output was what was agreed, to a good standard.	The project output has some deficiencies.	The project output has major deficiencies.	The project has failed to meet the minimum of agreed requirements.
Scholarship: Independence of work conducted, research, linking of knowledge from other modules	Outstanding client satisfaction	Excellent client satisfaction	Very good client satisfaction	Good client satisfaction	Fair client satisfaction	Adequate client satisfaction	Disappointed client
	Process (approximately 50% weighting)			Process (approximately 50% weighting)			



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