

# What Really Matters In Operations Management Learning and Teaching

**John F Bothams**

University of Strathclyde

[j.f.bothams@strath.ac.uk](mailto:j.f.bothams@strath.ac.uk)

## **ABSTRACT**

This paper discusses the issues around the design and delivery of an Operations Management module in an MSc. in Business Information Technology. The course was designed to illustrate experientially what really matters for Operations Managers in the 21st century. It involved 70% of the content being presented face to face by groups of students and this learning aided through the use of electronic means including the use of the internet, intranet, electronic mind-mapping and on-line student created shared resources. The course and its objectives are described together with a description of how it was run. In normal academic results (marks) terms this process can be seen to be successful. Student reaction collected over the two runs in two years of delivery is described and illustrated. Some generalized implications are presented, but key is a holistic design of learning and assessment, with active learning which provides psychological safety and opportunities for personal development as well as content understanding.

## **Keywords**

Experiential learning design, student responsibility for learning, psychological safety.

## **INTRODUCTION**

The MSc. BITS course is designed overall to produce business analysts for IT focused internal or external consultancy. It attracts over 600 applicants each year with 2:1 or 1<sup>st</sup> class Honours from a broad range of undergraduate disciplines to fill 65 places. This means that it is a group of some of the best student 'raw material' available and this is well recognised by employers, who frequently make offers of over £26,000 p.a. as starting salaries. The course covers a broad range of Business and IT subjects and has an IT related Dissertation.

The Business Operations Course is delivered in the first part of the course and commenced during the first week of the programme in both the years discussed in this paper. The main purpose of the course is to ensure all students have an understanding of the historical, present and future roles and responsibilities the operations function within manufacturing and service organisations, so that they can see how IT can enhance the delivery processes. The author took on the teaching two years ago and used the opportunity to 're-engineer' the course so that the students were at the centre of the process, which is a primary principle of modern approaches to designing operations processes. It also fits a learner centred approach to learning design so there were opportunities for synergy. "All concerned in the education sector should recognise the immense value of the learners as a resource. This is an operating system in which the product has the unique and powerful property of being able to improve its own quality. This property of the product should be more fully utilised". Bothams, (1984)

## **The Design and Delivery of the Business Operations Course**

The course runs over a ten week period with face to face sessions of three hours every Friday. There is one exception in the seventh week when the course joins with the MSc. in Business and Management, a multi-cultural group of 30 students, for a self organised set of visits to organisations. The purpose of these visits is to see the reality of operations in action. The course is supported by access to the intranet and the Internet. The intranet provides:

access to most of the management journals in the world and other valuable full text resources

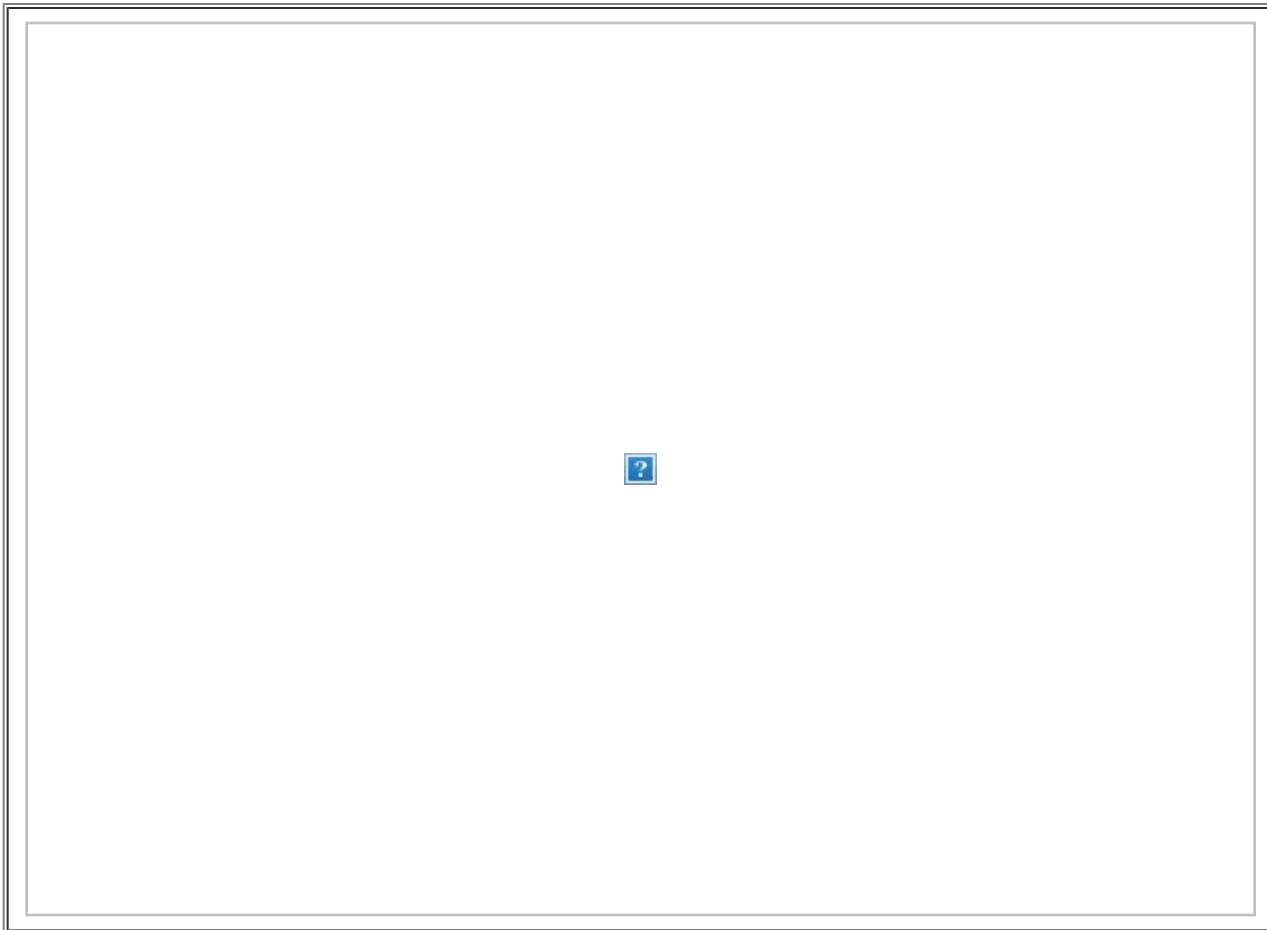
introductory material and links to useful on-line resources and websites

case studies of the use of the internet to support or change organisations operations

posting of all course materials from students and staff (under tutor control) which included:

- notes on assessment and other direction-giving advice
- all presentations and accompanying scripts or speakers notes so that full access was available to content (eventually all shared between MBM and BITS at an appropriate point)
- all individual assignments – shared between MBM and BITS
- new links and resources found

**Fig. 1 A screen view of the intranet**



### **Assessment**

The assessment consists of one group task (25%), one individual assignment on a topic of the student's choice after consultation (by email with the tutor) (25%), and a written examination (50%). Note that the group assignments have an element of peer review where non contribution can be highlighted and be dealt with by the tutor.

### **Content**

The course has a strongly recommended base text book (Operations Management 3<sup>rd</sup> edition by Slack et al – 2000) However no text is available which has the necessary IT focus for this particular course.

The topic content for the course is fairly broad but has an emphasis on the IT aspects including E & M commerce. To illustrate how the content was made experiential for the students the following examples of content from the course are given.

Topic areas made overt within the course were, in order of delivery:

Facility location – recognising that the majority of learning occurs outside the lecture room and leveraging that by encouraging group discussions at lunch and tea breaks, ‘use of on-line resources’ as a virtual location.

Forecasting demand – design of the loading of assignments.

Job design – specialisation, empowerment, job rotation, cellular working, use of self-managing teams to produce the presentations. Rewards (marks) in line with the required behaviour.

Supplier management – through all those suppliers (organisations who gave access to the students) managed on the day out.

Strategic alliances – achieving "inter-course" activity and sharing budget resources for transport.

Productivity – effectiveness in achieving a large range of skill development at the same time as understanding operations.

Quality Management – involving everyone and the continuous improvement from one presentation to the next. Fundamental here is the concurrent development of people and systems. Also "walking the talk".

Operational aspects of E&M commerce – use of the Internet, intranet, e-mail, messaging were all used as resources. The strength and limitations becoming apparent by their use.

Operations and Strategic Planning – these strategies were revealed towards the end of the course showing how the concepts embedded in "what really matters in operations management" were experienced within the course.

The course was introduced on the first day using the course as a key example of an operating system, with the transformation process being the change in "what is in the student's heads" and also their behaviour and feelings. Various models of how the resources (not least the students) could be organised for learning to take place were presented to give an overview of the design choices available to the lecturer. The fact that there are trade-offs to all of the designs was pointed out, and that by using a combination of designs the potential losses of using only one could be overcome.

### **Electronic Presentations**

The main vehicle for the tutors presentations was not Power-Point but MindManagerä from [www.murge.com](http://www.murge.com) which is a very powerful and novel (for many) electronic mind mapping tool, which has hyperlinks and illustrations. (See Fig.2 and 3 as examples) It is particularly suitable to show the holistic overview and then drill down to the detail whilst still being able to see the whole picture.

## **THE GROUP PROCESSES**

Students were divided into working groups of five, by a public random process of drawing a folded cloakroom numbered ticket. This meant that neither the author nor the students could be attributed with power to affect the choice of membership of groups. This is very important for two main reasons:

There are very well known difficulties in group formation if any person has power to guard or promote entry. Anyone interested in this aspect should see the work of the Tavistock Institute and in particular the Tavistock Conference. It is likely that you will remember not being or being chosen to be part of a sports team to get a quick reminder of some of the issues and feelings involved.

All the students were new to the MSc. that week and so this gave a good opportunity for people to get to know four others well. In both years most (if not all) students retired to the Student Union or Campus bar (even non drinking ethnic minorities) for lunch and part of the afternoon. This influenced if not started a community building process.

Tasks were allocated to each of the groups in the first session. In the main, a group would be responsible for the preparation of an hour long learning session around a particular operations topic. Two presentations would be given each week. The groups could choose how to research and deliver the learning themselves. To help them in this, time was made for support during the class and appointments could be made in between to seek help from the tutor. In addition, email support was given by the tutor.

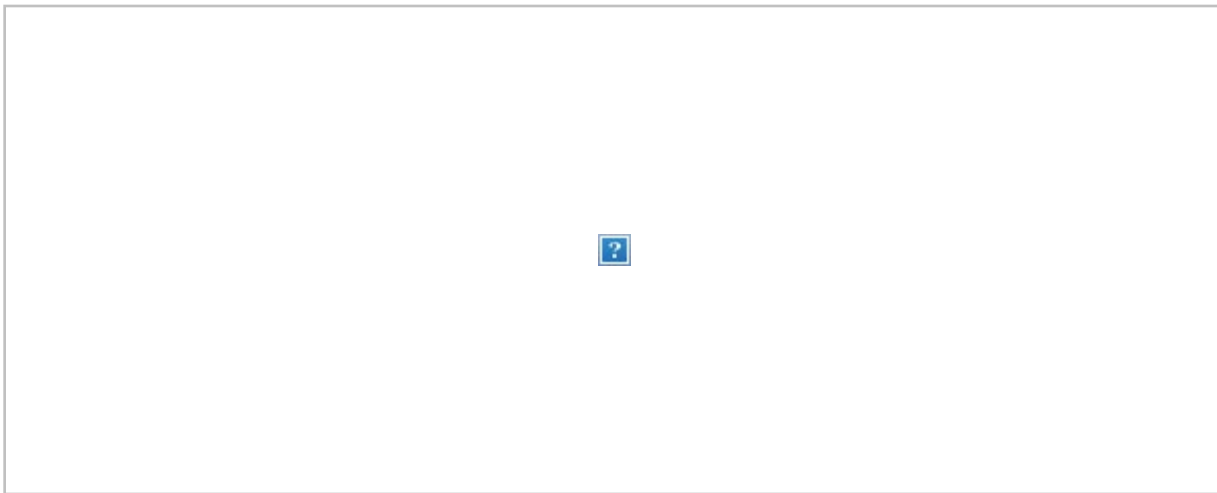
It should be noted that these presentations would only be marked on content, not delivery, by the tutor. After delivery and immediate feedback by the lecturer in class (5 positive points to any negative one) the groups had the option to seek more detailed and constructive feedback before producing a reflective note on the presentation plus additional material, which could easily regain them any marks for shortfalls in content. All groups had the job of giving supportive feedback on style as well as content to one other group so that learning and development could safely take place on presentation skills as well.

One group was assigned the arduous but extremely helpful task to them (for the examination), of providing a revision summary of the whole course on the last Friday. This was in addition to a revision session by the tutor.

Two groups were combined to design and deliver the day out of visits with help from the tutor. It also involved another group from the MBM to ensure it all happened.

In order to ease and illustrate group working the following mind map of the ten components which help to create a thinking environment based on Kline, (1999) was discussed on the first day.

**Fig. 2 Mind Map of Group Support Components**



To move this to an experiential process the groups performed an exercise called broken shapes on the second meeting. They have to create 5 equal area regular shapes (they happen to be squares – but they are not told this) from plastic pieces they have been given. They have to work without talking and with other specific rules. Different groups run into all the difficulties that groups have, in a relatively short time. Their efforts are video recorded, ideally, and played back. Even if not video recorded the groups reflect on their working together and produce a page of bullet points to post on the intranet – thus creating the first community resource because all the groups have different experiences.

## **Assignments and Their Community use**

All presentations were sound recorded on a mini-disk for re-listening to by the author to give feedback. This was particularly helpful to a student with a hearing special need. It would be seen as an advantage to be able to stream this content on the intranet if the facilities were easily available. The group presentations were mainly in the form of PowerPoint presentations at the start, but with more mind mapped towards the end and especially in the revision session. These together with the presenter's scripts and the reflections and additions made as a result of feedback were posted to the intranet within 8 days. The author added materials to the intranet or gave additional input the following week to fill in any gaps. The revision group's session which had undergone detailed joint development by the group with the author was posted within 24 hours together with the lecturer's revision mind maps.

Possibly more important for the community were the ninety individual assignments (BITS & MBM) on many topics and with varied approaches and focus. BITS assignments all had to have some commentary on the effects of IT whereas the MBM were more general in nature; the whole giving a richer than textbook environment. This richness was encouraged by marks being awarded for the criteria for assessment of clarity for colleagues understanding of the topic. Marks were also given pointing out "useless" - sources to avoid, as well as useful links and sources. There were some people who failed to forward assignments for posting

although presenting them through normal channels. There is some suspicion that this was a deliberate avoidance of being read publicly (see (Bothams & Fordyce, 2002)).

## THE RESULTS AND REVIEWS

The course marks for both years (combined coursework and examinations) show above or equal to median marks of other subjects (some still to be taken in 2002). In particular over 60% of the 2002 class got over 67%, and over 60% got over 68% in 2001. However the better students did even better in 2002 in comparison with other subjects. What can safely be concluded is that the normally measured educational outcomes were at least as good as teaching by conventional means.

The standard review of course forms, a tick box approach, revealed that five people did not like the approach in 2001 and 3 did not particularly like it in 2002. In addition, the participants were asked to complete a questionnaire which explored their experience of the course in comparison to traditional approaches. This survey was carried out before the results of examinations were released in 2001 and after their release in 2002. The questionnaire asked scalar questions as below, and also in an open-ended way asked for the source of the difference. Using one example and then a list of just the questions, to save space, the questionnaire is set out below.

### *The example question*

With respect to your knowledge of operations management facts please mark the following scaled questions at 3 points

A Where you would have stood without the course

B Where you now stand in understanding/development after the course

C Where you think you would have been if a more traditional approach was taken





### *The rest of the questionnaire*

The following represent the other statements to which the students were asked to respond. These were presented in the format immediately above.

with respect to your professional understanding of operations management - methods and procedures, customs and practice, relevant legislation etc.

with respect to your continuing sensitivity to events i.e. being able to respond in an appropriate way as situations arise - particularly to soft data, like how people are feeling, as well as to hard data.

with respect to your analytical problem solving and decision making skills

with respect to your social skills and abilities including presentations.

with respect to your emotional resilience - keeping calm in a storm.

with respect to your inclination to respond purposefully to events - seeing the job through, taking responsibility - rather than passing on the problems and issues.

in relation to balanced learning habits - independence of mind, abstract as well as concrete, practical thought, a capacity for observation and reflection, an ability to learn by discovery.

As it was not a full response there is a possibility of a polar response – both those enjoying the approach and those disliking it responding, and those indifferent not responding at all.

Most people gave at least one scalar point advantage to this newer way in each of the areas with the greatest change in the softer developmental areas with scalar differences of four. Some said it gave no advantage and very few (less than 3) preferred traditional approaches. Generally, there appeared to be more advantages than disadvantages to the approach in comparison with the "traditional lecturer-lectures" approach even if not everyone (a maximum of 5 in any year) found the approach worthwhile.

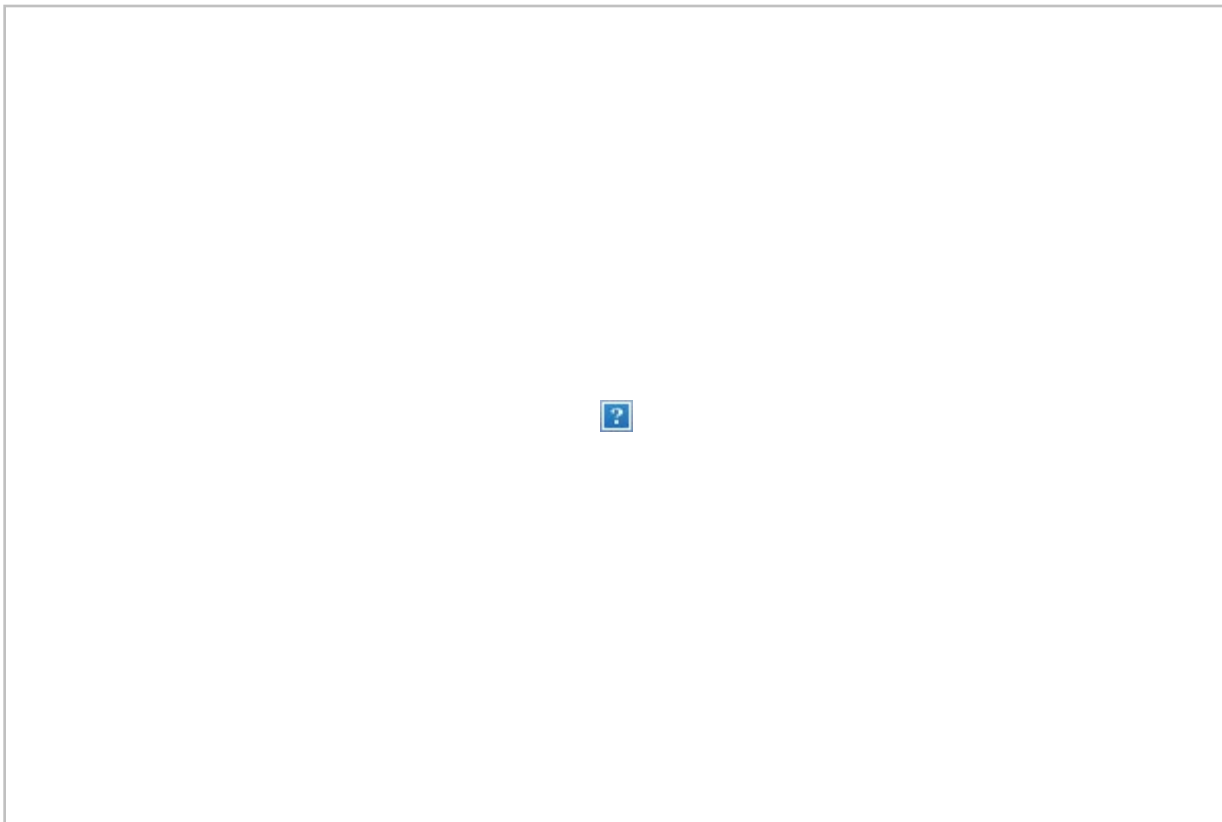
Two key points from the open responses stand out:

Positive response is affected by the quality of the student inputs, which in turn is dependent on the group dynamics.

There is strong demand for more class contribution by the lecturer (author) to the classroom sessions even at the expense of extending the class, because his expertise is perceived as high in comparison to other lecturers on the MSc. course and the examples given are helpful.

This latter point was taken to extremes by one person in 2001, "The University may have saved themselves a lot of money if they had cancelled these lectures - as we effectively taught ourselves - however we learned a lot about operations management from the day out arranged by students." There does not appear to be any such strong criticism this year, hopefully as a result of the improvements made in light of the comments made in 2001.

### **Fig. 3 2001 Student Feedback**



This year (2002) one student whose individual project had been on Business Process Re-engineering (BPR) offered to write up his experience of this course as an example of BPR. One particular comment of his is of value to present in this Networked Learning Conference paper. "Operations Management is actually the only course that makes use of the University's Intranet potential. The course's web-page contains a lot of material for various purposes, and represents a kind of real-time information portal for the course, as new information is added till the exams period. Opportunities for further integration with the learning process exist here."

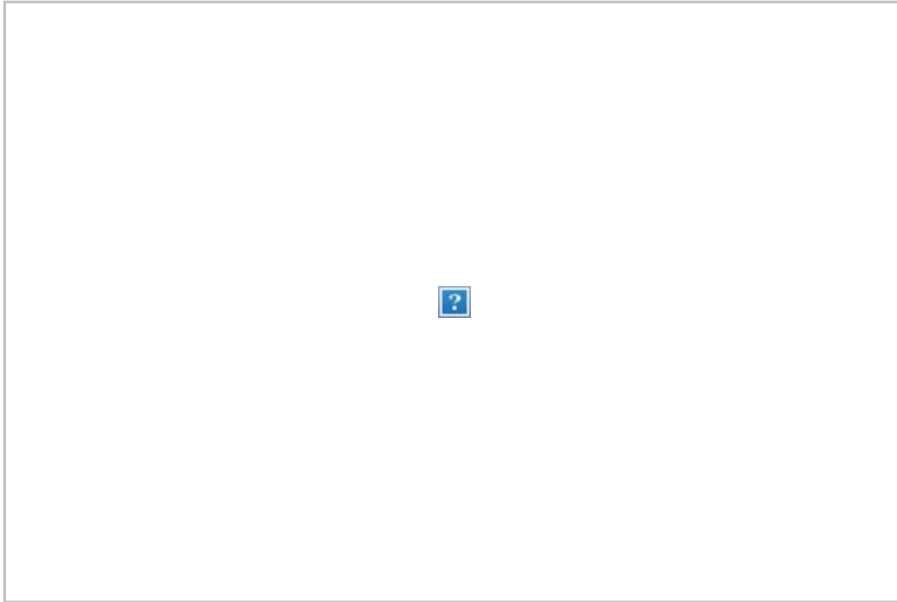
### **General implications from this approach**

This approach was carefully built, including the assessment, around a desire to achieve personal development as well as cognitive learning. This is because there is a need for the concurrent development of people and systems, when trying to achieve high levels of quality in any operating system. It is an underlying principle where success is achieved (Bothams, 1998). It is a subject where the content is amenable to being learned experientially. However, there are many general principles embedded in this course design and delivery which would be useful for all to reflect on, whatever the topic or content they teach. The most important in the context of

the conference is that the electronic support, particularly the intranet, provides opportunities to be closer to all the students and thus to provide entirely new and effective designs. This is still true, as evidenced here, in a traditional face to face programme.

A recent model is helpful in depicting the processes that were embedded in the design.

#### **Fig. 4 Model for Development and Learning**



If we take the course as providing the challenges, then this model indicates we need psychological safety, feedback and reflection for the process to provide learning and development. It also indicates the interactivity of these components.

#### **Challenges**

There is no doubt that for many students, particularly those who had never made a public presentation, this process presents a major challenge with many sub challenges. These could be in: researching; organising; designing the learning steps; preparing slides and support material; and finally but not least actually speaking clearly and maintaining the interest of an audience. Equally challenging (perhaps more so for some) is organising of a day out with all the operations areas coming in to full play e.g. logistics, capacity planning, routing, supplier management etc. In both of these there is also the challenge of using the technology and the on-line facilities to which many are newcomers, but not all. Finding people within the group or in the community who have the necessary skills becomes important for success. Overall the challenges place the students on the edge; having to face up to their responsibilities to the whole community, they become "comrades in adversity" Revans (1998) which is an essential component of action learning.

#### **Psychological Safety**

The author believes psychological safety is critical to the success of the design and, following on from the above, there is an obvious need for it. Here are some, but not all, of the "safety measures" that were put in place within the design:

everyone is in the same position at the outset, has a role in the community and no one is left outside;

nobody has power in forming the group and so there is some equality at the outset;

it is possible to make mistakes, learn from them, and recover lost marks (important for students) – particularly important if there is a "weaker" member in the group as the whole group can compensate;

assessment is on content alone, not performance - performance would put some people in a more exposed position – too exposed for psychological safety;

groups can choose the degree of tutor support they require;

help is a click away, almost 7 x 24 by use of email;

humour (one of the best stress releasers) is encouraged from the outset – the second slide in the introduction to the course being: "To learn with laughter is to remember" a quote from Charles Handy

## Feedback

This is arranged so that the critical (negative) feedback on performance comes from the "comrades in adversity", not the tutor, who wields too much power for it to be successfully assimilated. Note here the inter-linkage with psychological safety.

Public feedback is in the ratio of five to one, positive to negative.

The timing of the feedback on the presentation is always, other than a brief re-assurance, a couple or so days later when the adrenaline has subsided and the tutor has had time to review the content without interference from the perceived level of performance.

There is a great deal of formative feedback e.g. as students discuss the individual assignments with each other.

## Reflection

Groups reflect on and learn from each other's presentations, demonstrated by the continuous improvement in the presentation throughout the course. The formal recognition with rewards (marks) for reflection is a necessary motivator for this mental activity. Part of the reason for the questionnaires is to help the students as well as the author to reflect on the overall learning design and its improvement.

## Conclusions

The use of networked support increases the opportunities for providing effective learning design, particularly by the increased opportunity to provide psychological safety to each and every member of the community. There is a need for even greater care in the design to ensure that it is an holistic approach in which all elements of support, feedback, assessment, content and psychological safety are integrated and where the technological challenges are fully evaluated. If this is done, there is evidence that personal development is achieved concurrently with content understanding.

## ACKNOWLEDGMENTS

The author thanks all the BITS students of 2001 and 2002 who gave him such an enjoyable learning experience which has led to the production of this document.

## REFERENCES

Bothams, J. (1984) Why is it that learners get a deeper level of learning when they interact with each other? *MA Dissertation - MA in Management Learning*, Lancaster University.

Bothams, J. (1998) Approaches to Total Quality Management, USGSB MBA elective class notes.

Bothams, J. and Fordyce, L. (2002) Barriers to online learning - the experience of the Business Development Unit within the Scottish Executive *Networked Learning Conference 2002* Sheffield University 26-28 28th March 2002.

Kline, N. (1999) Time to Think, Ward Lock.

Nielsen, R. (2002) Pedagogical Considerations in a Master's Programme – "Teaching Smart people to Learn" *University of Strathclyde Graduate School of Business Visiting Professor Lecture Series*.

Revans, R. (1998) The ABC of Action Learning, (2<sup>nd</sup> edition), London: Lemos and Crane.

MindManagerä [www.murge.com](http://www.murge.com)