

Group Intelligence, Creativity and Learning

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Abstract

The B.Sc. Information Technology Management for Business (ITMB) is a new type of degree designed to meet the needs of major employers in the business-led IT sector. Employers identified the need for graduates who understand IT within a business context and who can work creatively within an ever-changing environment. This report presents the results of the first-year Enquiry-Based Learning (EBL) project reporting on how it assisted in meeting employer objectives of greater student creativity and participation in team work. Students used a Group Intelligence tool called Thinktank¹ which supports brainstorming, prioritisation and group decision making to assist with team productivity; and had mentoring from staff and employers to enhance engagement in and understanding of the subject of enquiry. Evaluation of the EBL project was based on the five key concepts of creativity, participation, productivity, engagement and understanding.

Background

The Manchester B.Sc. IT Management for Business (ITMB) degree was set up to meet the needs of business by providing graduates with both technology capability and business knowledge and understanding. Major IT employers collaborated with the e-Skills UK² to formulate the learning objectives for the degree and Manchester Business School designed the Manchester ITMB degree to meet those objectives. The focus of this report is the Integrative Team Project, a core component of the first year of the degree designed to meet objectives by:

¹ Thinktank is the trademark of Groupsystems, see www.groupsystems.com.

² E-Skills UK is the Sector Skills Council for IT and Telecoms www.e-skills.com.

- Making EBL a core part of the curriculum, through which a real life business problem was set and solved by student business teams. Students take on both business and technical roles and seek to deliver systemic solutions that meet the combined needs of business, people and technology.
- Active participation of business within the curriculum not only through setting problems but also through the participation of business mentors in advising student teams.
- Teamwork supported by professional standard, state-of-the-art group-working systems called ThinkTank. GroupSystems® ThinkTank enables either face-to-face or geographically-dispersed teamwork.
- Actively engaging students in the management of business/IT teams through learning how to run face-to-face and computer-mediated meetings.

The team project is a first-year 20 credits core module for the ITMB degree and runs for two semesters. This new degree had its first intake in academic year 2007/08 and 48 students were enrolled in the degree (no prior knowledge of business or IT was assumed).

Rationale

The rationale behind the EBL project, with teamwork supported by computer-mediated collaborative tools, was to enhance the level of participation, productivity, creativity, engagement and the level of understanding within the student teams.

Participation: one of the issues with teamwork is that, on average, 20% of the members do 80% of the talking (Nunamaker *et al.* 1996). Evidence shows that groupware is able to increase the levels of participation and ensure equal contributions from team members via features of anonymity and a parallel information input function (*ibid*). As a result of the anonymity provided by computer-mediated collaborative tools, members tend to give more honest opinions on ideas, and are more likely to question ideas or comments if they are not understood (Guzzo and Dickson 1996).

Creativity: one of the key advantages of EBL is that learners are given the freedom to create their own ideas/knowledge. By applying a 'learning by doing' approach, learners will be required to think about the research problems and formulate their own solutions; this could leave learners in a much better position to create knowledge/ideas.

Productivity: one of the main issues with traditional face-to-face meetings is productivity loss. Prior research identified three types of productivity loss: namely social pressure (i.e. individual worry about the consequences of giving an idea); social loafing (i.e. one or more members do not contribute owing to, for example, a lack of interest or motivation); and production blocking (i.e. one member is contributing to the team while others are listening and not able to contribute until he or she is finished (Carroll 2003)). Research shows that groups where members are allowed to brainstorm individually provide better ideas than groups that brainstorm collectively (ibid). Productivity can also be enhanced via a computer-mediated collaborative tool, where for instance, a report can be generated automatically after a group session (e.g. saving time and effort for taking notes).

Engagement: keeping students engaged has always been a major issue for higher education. Although working in a group can sometimes increase the level of individual motivation, at other times group work can also undermine it. The reason for this is that when a group is formed norms are established whereby group members will tend to influence those that differ from these norms (ibid). Although there are many concepts that affect a team's motivation, Coch and French (1948) claimed that the group will apply more effort to the task if the members are able to set their own goals rather than the goals being imposed on them by tutors.

Level of understanding: an advantage of EBL over traditional approaches is that EBL aims to guide students into a deeper level of understanding by giving them a practical approach to a problem. This allows students to gain understanding of theory through practices rather than just understanding the theory through a third party (i.e. the tutors).

The expected benefit of the project was to equip students from year one to adopt an EBL mindset that can be carried forward to later years and into their careers. A further benefit is the enhanced relationship with business by showing commitment to engaging students with real business problems.

Approach

The Task and Groups Arrangement

The set problem was to examine the Manchester Business School (MBS) website from the point of view of a business seeking advice, consultancy or access to results from research conducted by MBS staff. It is clear that the MBS website currently focuses on student recruitment rather than on dissemination of business knowledge. Thus, the task was to identify how the MBS site could better serve the needs of business.

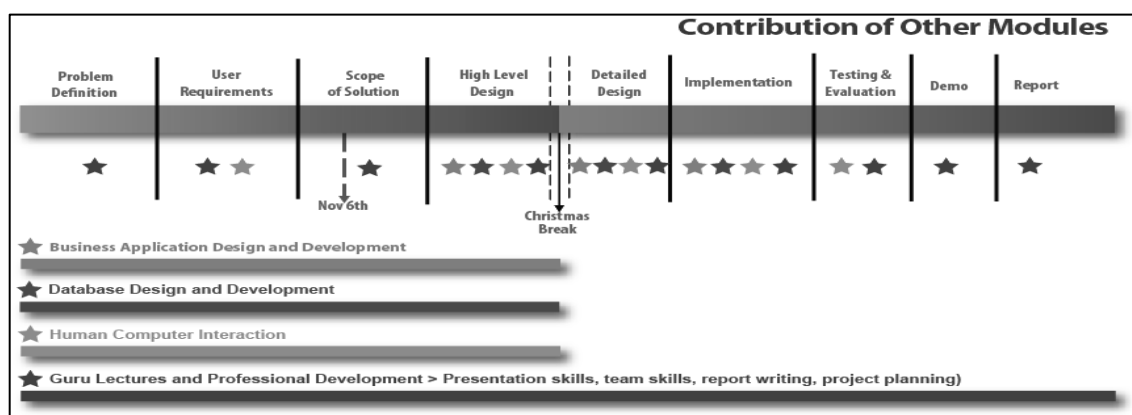


Figure 1 The EBL project timeline and contribution of other modules.

The Integrative Team Project lasted one year, starting in September and ending at the beginning of May. The timeline in Figure 1 shows the key stages of the project and the key points of integration of learning from pre-requisite modules (Human Computer Interactions, Business Applications Design and Development, Database Design and Development and Guru Lectures and Professional Development). The 48 undergraduate students were divided into eight teams of six. Each team had the freedom to arrive at its own solution to the problem by following these stages: problem definition; user requirements; scope of the solution; high-level design; detailed design; implementation; testing and evaluation; and demonstration and documentation.

Group Intelligence Lab and ThinkTank

A computer-mediated collaborative tool GroupSystems® ThinkTank was used to support the teamwork among the student groups. ThinkTank is an interactive, web-based team-space for brainstorming, ideas organisation, prioritising, voting, consensus

building and documentation. With support from e-Skills UK, a Group Intelligence Lab was set up in November 2007 in MBS East.

Structure of the Team Project

The structure of the module was a one-hour lecture and two-hour tutorial sessions each week throughout the whole academic year. The one-hour lecture provided students with information about the team project; prepared them for the week-by-week tasks; introduced theories associated with group and team working skills and group facilitation skills; and introduced techniques for information gathering, interviewing and user and system evaluation.

The aim of the tutorial was to enable and encourage students to adopt an EBL approach (e.g. 'learning by doing'). Students met with tutors to discuss their ideas and used ThinkTank in the first semester for problem definition and requirements gathering; it was used again in the second semester for decision making. A further two two-hour drop-in technical support sessions were arranged in the second semester.

Teamwork Supported by ThinkTank

A ThinkTank session was set up for each group. For example, to get the student teams to 'identify the problems of the existing MBS website', a session called 'Problem Definition' was set up to help brainstorm ideas about the users and to what types of business knowledge they might want access. Figure 2 shows one of the brainstorm activities using ThinkTank. At the end of the one-hour ThinkTank session, a group report was generated in Word for students to download.

The challenge of using ThinkTank within the student teams is that it involves (1) the design of a session; (2) the facilitation of four concurrent sessions at the same time; (3) training and engaging the students to use the tool effectively and efficiently. With the CEEBL funding, we were able to engage postgraduate and final-year students to help.

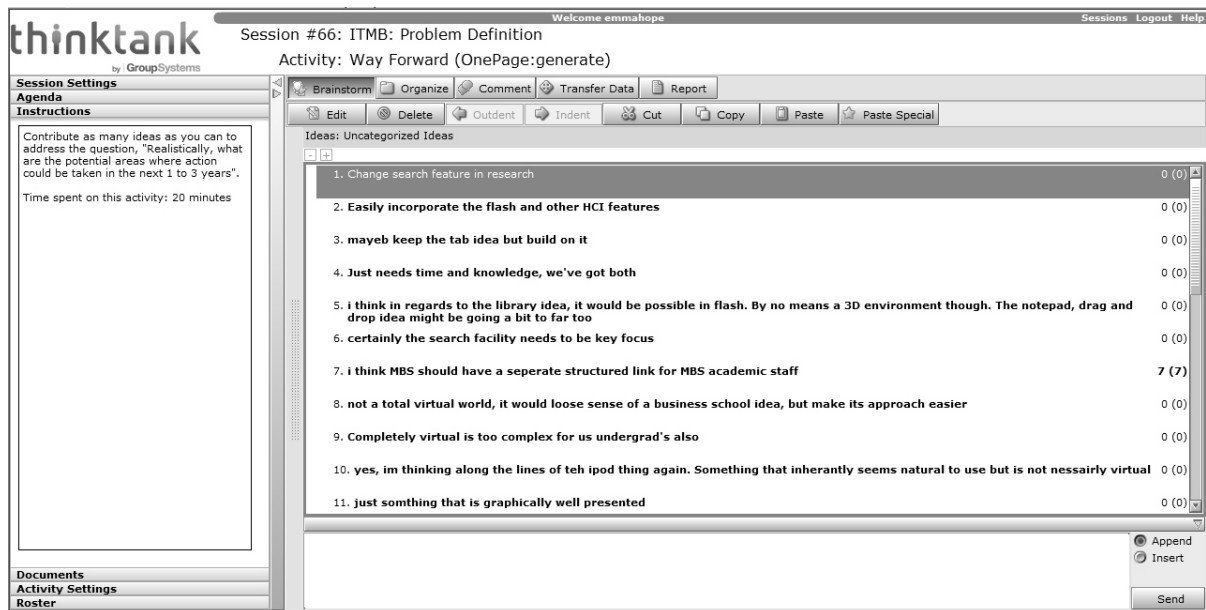


Figure 2 ThinkTank: Typical brainstorm session of problem definition.

Academic Tutors and Employer Mentors

Each team was also assigned an academic tutor and a business mentor. The role of the tutors was to provide support to the student teams regarding their project; to assist them with planning the tasks and managing the team; to help resolve conflicts and help with team building; and to monitor the progress of the team. Tutors also acted as assessors for the group presentations and provided individual assessment of each team member. The student teams met with their tutors on a weekly basis for an hour at the tutorial session.

The business mentors provided extra-curricular support for the teams. Student teams met with their mentors twice a year. The meeting arrangements with the mentors were organised by the student teams. The business mentors in the academic year 2007/08 were from Deloitte, BBC, Procter and Gamble and Unilever.

Outcomes

As a result of the EBL approach and teamwork supported by ThinkTank, six weeks into the team project the student teams were able to produce their interim results (e.g. problems, visions, target users and solutions) with ideas ranging from virtual library to social networking websites. The outcomes were presented at the first ITMB employers'

event which was attended by members of the Manchester ITMB Supporters Club. The Manchester ITMB Supporters Club is a group of employers who support the ITMB programme and meet twice a year to network with students and staff to exchange the latest news and identify future opportunities for interaction.

The first ITMB employers' event was held on the 6th November 2007; the employers attending the event included IBM, Deloitte, Logica CMG, Royal Bank of Scotland, RM, Procter and Gamble, E-Skills UK, SAP, Unilever, edge IPK, BBC, BT and Accenture. At the event, the student teams presented their ideas and answered questions asked by employers. The event received positive feedback from both the students and the employers. Figure 3 shows the students demonstrating some of the key features of ThinkTank to the employers at the ITMB employer event.



Figure 3 Group Intelligence lab: students demonstrating ThinkTank to employers, November 2007.

The semester two ITMB employer event was held on the 29th April 2008; employers attending included IBM, Accenture, LogicaCMG, Unilever, Deloitte, Network Rail, Procter and Gamble, e-SkillsUK, Informed Solutions, RM, BT, and RBS. At this event, the student teams were required to produce posters and demonstrate their final software prototype to employers. An award of the Unilever Prize for best group poster and demonstration was presented at the end of the event. The judging of the group posters/demonstrations was carried out by a panel of employers based on the four concepts: creativity (e.g. idea, originality and novelty); the level of participation and engagement of the team members; productivity (e.g. completeness of the product); and the level of understanding demonstrated by applying theory to practice. Figure 4 shows student teams presenting their posters and prototypes to the employers at the ITMB employers' event.



Figure 4 ITMB employers' event: Students demonstrate prototype solutions April 2008.

Assessment of Student Coursework

The module was assessed by one group report (35%), one group presentation (35%) and individual evaluation (30%) in each semester.

The group presentation in the first semester was marked against: content, delivery, organisation, response to questions and teamwork. The presentation in the second semester was marked against: delivery and organisation (both posters and website demonstration), quality of the product and team response to questions. The presentations were judged by tutors of the team project. Judges' feedback from the presentation was collected and made available to the students on WebCT and at the lecture.

In the individual evaluation, the score was given by group tutors (moderated by the module leader) informed by the contributions of each student and his/her team members. The individual evaluation was based on the student's contribution to the task

(e.g. preparation of group posters, ITMB employers events, group presentation, report writing, solution designs and implementation, user and system evaluation) and the student's contribution to the team activities (e.g. arranging group meetings, keeping notes, planning tasks and activities). Each student filled in the task and team score sheets, which were handed personally to their tutors at the end of each semester.

Evaluation of Group Intelligence Tools

Final-year student Rico Chow carried out an evaluation of Thinktank on behalf of the project to find out what how students felt about the use of the tool. The evaluation was conducted by means of interviews with the students (video and audio) and questionnaires. The video interviews were designed to collect general feedback of the EBL project. The aim of audio interviews was to collect specific data regarding the EBL projects. The evaluation questionnaires were designed to collect quantitative data on a larger scale. By using a questionnaire, objective views of students can be gathered and analysis of them can be used as additional evidence to support the findings from the interviews. The summary of the findings of the EBL project in terms of participation, creativity, productivity, engagement and level of understanding are as below:

Participation: the majority of the students agreed that the feature of anonymity in ThinkTank allowed them to participate more freely when compared to traditional face-to-face meetings; nevertheless, 50% of the students indicated that they would have liked the level of their input to be recognised when using computer-mediated collaborative tools.

Productivity: most of the students agreed that the feature of parallel input in ThinkTank increased their productivity during a brainstorm session. Although more ideas meant that the quality of ideas might have been lowered, they also agreed that anonymity reduced social pressure and inputs were more honest.

Creativity: the results showed that students were less likely to be influenced by fellow team members in ThinkTank; therefore, ideas can be freely expressed. However, students have a tendency to read other members' ideas during a brainstorm process, which could lower diversity of ideas owing to time constraints for each activity in ThinkTank.

Engagement: over 80% of the students generally felt that they were able to contribute individually to their team. Findings indicate lower motivation in teamwork when ThinkTank is used; however, students felt the task was more important to them when using ThinkTank compared to a traditional face-to-face meeting.

Level of understanding: most of the students agreed that they were able to directly convert the information/knowledge they gathered/learned into practice. The process of carrying out a ThinkTank session also allowed students to trigger a deeper understanding of their project.

Summary and Future Development

Although some of the students complained of the heavy workload, the majority stated that they gained benefits from the ITMB degree and EBL project. As one of the ITMB first-year students, Thomas Simpson, said:

I chose this degree simply because I did not want the 'techyness' of Computer Science, nor the politics of straight Management or Business degrees. This degree prepares you for the world of work. Not only do you learn the theory, but how to apply it to real-life scenarios.

The team projects will be continued again in the next academic year 2008/09. Further developments will include removing the anonymity element of the Thinktank sessions and giving students more time for team building at the beginning of the year. The project certainly achieved higher levels of creativity among the students: each team produced different ideas and different solutions to the same problem; and presented those ideas with enthusiasm. The employer involvement stimulated active engagement and boosted students' self confidence. It is difficult in any team project to achieve 100% engagement and participation of all team members, and more effort is needed in helping students to understand the needs of the task, team and individual at every stage of the project. The EBL project played an important part in producing an enthused and stimulated group of first-year students, who went on to win first prize in the national ITMB competition hosted by e-Skills UK. The ITMB course team feel that the EBL approach is perfect for this degree and are confident that it will enable us to deliver to the high expectations of the employers.

What makes this degree so exciting from an employer's viewpoint is that it delivers practical business skills from day one - enabling ITMB graduates to progress further and faster than their counterparts.
Tracey Upton (HR Director, Southampton City Council)

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