Evaluation of students' experiences of developing transferable skills and business skills using a business simulation game

Evaluation of Students' Experiences of Developing Transferable Skills and Business Skills Using A Business Simulation Game

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Abstract - **Developing the business and transferable skills of students is a challenge in the higher education environment. The issue is how to simulate a business environment to give students a realistic experience. If it is possible to give a realistic experience, the next challenge is what are the best ways to measure if the students have actually developed their skills? This paper is about introducing a practice by creating an environment for students to develop their transferable and business skills using a computer simulated environment. The research aspect of this paper is about finding or not finding empirical evidence of students' development of these skills. Finally this research also evaluates the course from students' point of views based on their experience. The research uses both qualitative and quantitative methods to evaluate students' development of these skills and their experience of the module.**

Index Terms – employability skills, transferable skills, learning using simulation, module evaluation

INTRODUCTION

Within pedagogic research the constructivist approach emphasises learning-by-doing where knowledge is created that is meaningful to students. Developing skills beyond the core engineering competencies is a key learning objective in engineering education [2]. This is due to pressure from employers and the prediction that future engineering jobs will change [3].

Therefore the emphasis is placed on providing students with practical skills which they are then able to transfer in their employment. There are two types of skills that are addressed in this research: transferable skills and business skills.

The main transferable skills [1] that are explored in this research are: team working, interpersonal, leadership, self-reliance and communications skills while the business skills are related to solving business problems.

The purpose of this research is to illustrate a case study of a module where computer simulation is used as a vehicle for developing students' business skills and transferable skills.

The second purpose of this research is to gather empirical evidence of these skills based on students' self-assessment of their skills and their reported perceptions on their skills..

Finally the third purpose of this research is to evaluate the course based on students' experience.

CONTEXT OF THIS RESEARCH

I. Background and objective of the module

The Royal Aeronautical Society (RAeS) and the Institution of Mechanical Engineers (IMechE) accredit the Aeronautical and Automotive Engineering degrees at Loughborough University and it is a requirement of the accreditation to teach management skills. A number of modules have been developed and this is one of those modules which is in the final year of the degree programme, the module title is 'Business Model.' In the previous year these students undertook a business plan exercise where they present their ideas in a business environment.

This module was delivered in academic year 2008/2009. Seventy students were registered for this module of which approximately 45% have completed an industrial placement.

The main objective of this module is to develop students' knowledge in setting up a new business and running a business in a simulated environment, including understanding all aspects from financial management to procurement in addition to developing transferable skills.

II. Venture strategy business simulation game

The specific business simulation game is called 'Venture Strategy" developed by Marketplace Business Simulations [4]. It is a web-based exercise where students start a new company that enters the microcomputer industry. In the process students deal with marketing, product development,

accounting, finance and manufacturing, fundamentals, financial analysis, business partner negotiations, human resource management and e-Commerce.

The simulation is designed such that students have limited financial resources but have full financial responsibility.

III. Structure of the team

Each team is provided with investment money to start their business. The investment is used to build a factory, open sales offices/web site and design brands. Each team has a year and a half (6 quarters decision periods). Within this time frame they are to become self-sufficient firm and earning profits.

There were 14 teams in total, in two different markets (simulations) with seven teams in each market. Team members were assigned randomly into groups of five.

The companies are measured based on profitability, customer satisfaction, market share, human resource management, asset management and how well prepared they are for the future.

Students were required to make group decisions on their business in each quarter. Decisions were usually made collaboratively through face-to-face meetings or through e-mails/forums.

An initial orientation meeting was held with the module leader at the beginning. At approximately half way through the module each team met with the module leader to discuss about their business plan (see below) and about how their business was performing in general.

IV. Assessment

There are three main assessment in this module. First is the initial business plan worth 45%. In here students were to write overview of their business strategy and business objectives including development of the product, production, HR issues, marketing, and finance.

The second is the final report worth 45% where students evaluated how their business developed, the decision they made and why. How they responded to the changing market. In this report comparisons are also made against the initial business plan.

The third assessment is a group presentation worth 10% where they present to the "shareholders".

RESEARCH METHODS AND RESEARCH QUESTIONS

I. Skills questionnaire

A 'skills questionnaire' was developed which was completed by the students once at the beginning of the module and again towards the end. Three of the questions related to team working skills, three to leadership, six to interpersonal skills, three to communication and seven to self-reliance skills. Students were asked to express their level of confidence in their ability/skills on a scale from 0 to 4. 0 being not at all confident and 4 being very confident.
This method has been used to provide quantitative evidence of the impact of the transferable and business skills developed through the module through pre- and post-module questionnaires [5]. These were measured because they closely align with the learning objectives of the module.

II. Focus groups

Four focus groups were held towards the end of the course. Specific aspects that were explored were students' views on:

- skills and knowledge gained from the module
- group working experience
- redesign of the module (module improvement)
- simulations as a learning vehicle
- enjoyment, dislikes, and motivations

In addition, quantitative and qualitative feedback was analysed using the module feedback form.

III. Module feedback form

At the end of each module at Loughborough University, students are required to complete a module feedback form. Only data relevant to this research was extracted. They were primarily:

- assessment
- support for the module including resources
- workload in comparison to other modules
- module objective and coursework
- enjoyment
- redesign of the module (module improvement)

All 70 students completed the evaluation form.

RESEARCH RESULTS AND DISCUSSIONS

I. Transferable skills

Three methods of analysis were used to identify if there were any differences in students' confidence levels in the given skills categories.

Firstly, mean differences between confidence levels in the pre- and post-module transferable skills questionnaires were identified. The result shows that, in general, there is a very slight positive tendency. This means that confidence levels are slightly higher in post-module questionnaire with an average increase of 0.09.

The second method was the Wilcoxon–Mann–Whitney non-parametric significance test between the paired pre- and post-module transferable skills questionnaire.

This showed that, for the majority of the items in the pair, there was no significant difference with the exception of three items (Table 1):

TABLE I
SIGNIFICANT DIFFERENCE BETWEEN PRE AND POST MODULE QUESTIONNAIRES

Items	Skills	Significance
Giving constructive feedback to other team members	Interpersonal	0.05
Dealing with criticism of your work	Self reliance	0.03
Having a proactive approach to new situations or tasks	Self reliance	0.02

Finally, the third method was not to see differences in the pre- and post- module confidence level in skills but to see which items students consistently felt least confident about both before and towards the end of the module. The cut off point used was if the mean was below 3 the items were included in this analysis as the mean for pre-module is 2.96 and for post-module is 3.3. This high confidence level is not surprising as these students are in their final undergraduate year at the University.

Results from this third method of analysis show (Table II) that students in general have a low confidence level both from the pre- and post-module questionnaire.

TABLE II
SKILLS THAT SHOWS LOW CONFIDENCE LEVEL

Items	Skills	Average
Influencing others within the team	Interpersonal	2.84
Convincing others that you can see their point of view	Interpersonal	3.00
Being able to persuade others to understand your point of view	Interpersonal	2.99
Providing leadership to the team when required	Leadership	2.94
Motivating other team members to engage in the team activity	Leadership	2.79
Taking responsibility for team's action	Leadership	3.06
Resolving conflict within the group	Interpersonal	2.76
Giving constructive feedback to other team members	Interpersonal	2.89

Of the given transferable skills, students were least confident about leadership (2.93) and interpersonal skills (2.99).

Even though there is no quantitative evidence of increases in students' transferable skills, there is qualitative evidence as to whether students used or did not develop these skills. There were 13 comments on transferable skills, 9 were positive and 4 were negative.

There is evidence that students used transferable skills as shown below:

"I have got teamwork and directional skills because we very much got lost in our team meetings and being able to direct the group back was a good skill to pick up"

Isolating different aspects of the transferable skills was possible using the quantitative methods illustrated above.

II. Business skills

There is evidence that students have developed or used business skills as shown by the comments below.

"Business simulation helped familiarising with elements at a sector which, when taught theoretically, may seem trivial. Marketplace provided a context for the theory gathered the previous year."

"This is a much better module than management. I learnt that business is not really a text book subject. Much better than dragons' den coursework."

There were 29 comments on business skills, 20 showed that this module helped develop their business skills and 9 explicitly expressed that they have **not** developed their business skills as shown by the comment below. It should be noted that the 20 positive comments included what students think the module was intended for e.g. continuation of their previous business modules. In addition, Table III shows that 54% agree or strongly agree that the module developed their understanding of the subject.

TABLE III
PERCEPTION ON UNDERSTANDING OF THE SUBJECT

Items	Agree/Strongly Agree	Neutral	Disagree /Strongly Disagree
The module has developed my understanding of the subject	54%	23%	23%
The module work supported the module objectives	73%	23%	4%

The comment below shows a student's view of not developing business skills.

"…but from the point of view what we learnt personally I don't think we learnt a great deal, we have all seen how to set up a business and do business plans already but I feel the only thing we really learnt was how to actually play the game"

III. Students' general perception of the module (overall)

The reasons students gave for enjoying the module were the independent learning and because it was different from other modules. Some students felt it was not challenging enough, didn't add anything to their degree and was easy to get high marks in. This is supported by the quantitative finding that only 12% (Table IV) of the students agreed or strongly agreed that this module workload was comparable to the other engineering modules.

TABLE IV
PERCEPTION ON WORKLOAD AND SUPPORT

Items	Agree/Strongly Agree	Neutral	Disagree /Strongly Disagree
The module workload was higher compared with other modules	12%	50%	38%
The learning resources for this module were useful	53%	23%	24%*

*includes : 7.14% not applicable.

With respect to distribution of workload, students found that it was too high towards the beginning as the business plan (coursework) was due in week 3, and towards the end as the presentation coincided with deadlines for other modules. Students were not sufficiently challenged in this module compared to their other engineering modules. There were 13 comments in total, all of which were negative with respect to workload.

"In terms of time spent on it it is about the same but in terms of difficulty if I sit down and do a tutorial for a module and its hard and I have to work at it and you have to do it several times over but you get a sense of satisfaction once you have got it right and you have got the marks for it. Whereas this we have spent a lot of time on it but it hasn't felt particularly difficult but that is great for higher marks and keeping your average high in a way I think we are all in this year because we are interested in the subject as opposed to doing the modules that will get us high marks"

Support associated with the modules is mainly through email contact with the module leader. This was mainly positive as their queries were replied to promptly.

IV. Experience of group working

Most groups either chose roles randomly or based them on what tasks individual team members wanted to do.

There were 13 qualitative comments in total on the group working experience of which 8 were positive while 5 were negative. Most positive comments were associated with how this gave them the opportunity to make new friends while many of the negative comments were related to difficulties with arranging time to meet due to different schedules. Small numbers reported conflicts between group members.

V. Assessment and feedback

In the qualitative comments there were, in total, 23 student comments on assessment, of which 20 were related to their dissatisfaction with assessment, the other 3 were positive. This is in contradiction with the quantitative perception, as shown below in Table V which shows that 77% felt the assessment requirements were made clear.

TABLE V
PERCEPTION ON ASSESSMENT

Items	Agree/Strongly Agree	Neutral	Disagree /Strongly Disagree
Assessment requirement of the module were made clear	77%	12%	11%

In the qualitative comments, a small number of comments involved whether the distribution of marks was appropriate and whether what they were being marked on was appropriate.

"I feel it is actually alright the two major things in business are starting and your business plan, your agm and wrap-up reports which is what our presentation is going to be"

On the other hand a large number of comments were that they felt they did not receive appropriate guidance on what was expected of them. As this module was delivered by a non-academic member of staff, there was confusion over what 'report' meant. This is because students were aware that an engineering academic could mark the report differently from a non-engineering academic. Some students felt they should get marks for interacting with the simulation as it occupied a large proportion of their time, while others felt that the mark allocated for the business plan coursework was too high.

"There was guideline for the report but no marking scheme or weighting, it did say no more than 6 pages more like a formal report that we have been doing for over 3 years we all know that relevant figures can't put in references or appendices."

In addition a large proportion of student time was spent on using Marketplace but this effort and being competitive did not provide any incentives in terms of marks as shown by the quote below.

"This module could be improved with more coherence between the Marketplace simulation and the assessment. It felt a bit pointless to be doing work every week (with a fairly high workload - 2 group meetings per week) for none of this in particular to be assessed"

Business plan - Coursework

Students were required to submit a group business plan which was worth 45% of the module mark. Most of the feedback from students was negative on this aspect, 21 out of 23 comments.

"Initial business plan coursework was not clearly presented. Our group felt we produced a high quality business plan that covered all the requested points and more. The feedback suggested this was not the case and asked for points that were not listed."

"…because it was unknown how Marketplace would work - the restrictions on number of sales staff, for example, this meant that a lot of what was said to be done was never going to happen."

Students were not satisfied with the coursework guidelines because they were required to write a business plan which did not reflect the structure of the game.

"Doing business plan before Marketplace as suggested was a total waste of time as so much had to be guessed and approximated."

A large proportion of students perceived a mismatch between the simulation and the coursework they were required to do. This resulted in suggestions for providing some initial orientation of the simulation game before writing the business plan as shown by the quote below.

"*An understanding of how the Marketplace simulation worked from lecturers would have proved highly beneficial, as lack of knowledge detracted from business focus and emphasised focus on predicting how the simulation programme worked instead.*"

There were two main types of feedback each team received for this module. The first was when they have the group meeting with the lecturer where they discussed how they have performed in the business plan coursework and general discussion about their simulated business. The second type of feedback is from the business simulation itself.

In total there were 5 positive comments and 9 negative comments.

All positive comments were about the feedback they received from the module leader, as the feedback reinforced what the students were thinking about their business or enabled them to see the link with business in the real world. This feedback session was the main face-to-face contact with the module leader.

"In terms of feedback that we got from the lecturer we had the tutorial half way through I think he was quite good and one thing which I found really useful was he kept stressing to think of it as a real business and to go away and look historically at what happened to the PC business and to do a bit more research on actual businesses and how it would run"

The feedback from the simulation was not that useful to students as exemplified by the comments below.

"The feedback from Marketplace was you just came up with things and it told you had done something wrong and it didn't really suggest what else you should do and I know obviously it's a simulation and you have to work it out for yourself but it would have been a bit more helpful."

VI. Simulation as a learning vehicle to develop skills

There were a large proportion of comments (16%) with respect to the simulation, which equates to 13 positive and 22 negative comments (Table VI).

The positive comments were associated with the sophistication and capability of the simulation, including the tracking of actions taken, its competitive nature, interactivity, and dynamic aspects.

"The game was actually quite interesting and the competitive element was good."

"*Module was quite fun, enjoyed the web based game format"*

Students who did not appreciate the simulation expressed that the simulation did not reflect the modern business environment. They did not find running the business through the simulation to be stimulating and would have preferred a different business to the one they were given. Finally, they thought that they were constrained to run the business in the way the simulation was designed. This was compounded by the fact that they could not understand what was happening behind the scenes. The evidence of this is shown in the comments below.

"There were quite a lot of gaps... you think if this was the logical reaction is it going to take account of this... you don't know what it is taking account of...there are two, there is playing the game and what you do in reality… frustrating the amount of gaps."

"The simulation wasn't detailed or good enough to truly represent a modern business environment."

"It is a clever simulation but in terms of teaching you about real business there are lapses in it."

VII. Students' views on improving the module

The results in this section are based on students explicitly commenting on how this module can be improved, therefore these suggestions for improvements will inevitably reflect the negative comments illustrated in the previous sections.

There were, in total, 38 suggestions which account for almost 18% of the comments.

The main categories were:

- to provide clear guidelines on coursework (with simulation limitations);
- to increase the complexity of the business as the level was not enough of a challenge;
- to delay the submission of the business plan until after the students have some experience with the simulation;

- to provide an opportunity to receive feedback before submitting the major piece of work;
- more face-to-face contact (lectures, tutorials, discussions) with the module leader to understand more about businesses;
- an interim report on the business;
- running real businesses;
- using a simulated environment more relevant to engineering managers;
- more time to complete the main coursework;
- more specialised business management (e.g. risk management); and
- to provide some incentives for interacting with the simulation (e.g. a prize or marks).

DISCUSSION AND CONCLUSION

One of the main conclusion regarding this module on transferable skills is that students do not perceive that it significantly improved their transferable skills, with the exception of three specific self-reliance skills identified in Table I.

Perhaps this is not surprising as this cohort of students is in the final year of their degree programme. By this stage undergraduate students would have further developed their transferable skills, specifically team working.

One interesting finding is that students perceive their leadership and interpersonal skills remain comparatively low. This needs addressing in any future module (see Table II).

At the same time, there is evidence that students appreciate this module gives opportunities to use business skills (See Table VI) but the means by which this is done could be enhanced or made more challenging.

Finally, even though students enjoyed interacting with the simulation, its suitability for achieving the module objectives needs further research. If this module is delivered in the future, the timing of the coursework, the content of the coursework and the marking schemes will need to be reviewed.

TABLE VI
SUMMARY

	Positive		Negative	
Business skills	20	9%	9	4%
Transferable skills	9	4%	4	2%
Group working	8	4%	5	2%
Assessment	3	1%	20	9%
Feedback	5	2%	9	4%
Business plan(coursework)	2	1%	21	10%
Simulation	13	6%	22	10%
Support	5	2%	2	1%
Workload			13	6%
Module improvement		38		18%
Overall	3	1%	5	2%

Table VI summarises the qualitative findings from the module feedback form and focus group.

In this table it shows provides quantity evidence of development of skills based on students' views. At the same time it shows which aspect of the module students felt positive and negative about with respect to course evaluation.

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