



Citation for published version:

Piercy, N, Brandon-Jones, A, Brandon-Jones, E & Campbell, C 2012, 'Examining the effectiveness of experiential teaching in small and large OM modules', *International Journal of Operations and Production Management*, vol. 32, no. 12, pp. 1473-1492. <https://doi.org/10.1108/01443571211284205>

DOI:

[10.1108/01443571211284205](https://doi.org/10.1108/01443571211284205)

Publication date:

2012

Document Version

Peer reviewed version

[Link to publication](#)

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Examining the effectiveness of experiential teaching methods in small and large OM modules¹

Niall Piercy

School of Management, Cardiff Metropolitan University, Cardiff, UK

Alistair Brandon-Jones

Bath School of Management, University of Bath, Bath, UK

Emma Brandon-Jones

Bath School of Management, University of Bath, Bath, UK

Colin Campbell

Monash University, Australia

Abstract

Purpose – This paper examines the preferences of students towards different teaching methods and the perceived effectiveness of experiential teaching methods in different Operations Management (OM) modules.

Design/methodology/approach – Student perceptions of different teaching methods and various aspects of an experiential teaching method, in the form of a business simulation game, are examined using survey data from 274 respondents in four small post-experience and two large pre-experience OM modules.

Findings – Our analysis suggests that traditional and experiential teaching methods are both popular with OM students, whilst independent teaching methods are less well liked. Analysis also shows that students on both kinds of OM modules perceive most aspects of the experiential teaching method used in this study (The Operations Game) very positively.

Research limitations – This research study was confined to a particular type of experiential teaching method – a business simulation game. There is a need for further research to investigate the perceived effectiveness of other experiential teaching methods, such as role-plays and live cases. Furthermore, the paper does not examine the use of experiential teaching methods that do not require the physical presence of students.

Practical implications – For Operations Management educators, the paper clarifies how they might incorporate experiential teaching methods in different class settings. Whilst experiential teaching methods are typically used for small post-experience modules, our data indicate that the method can also be used on larger pre-experience modules with great success. We also note a number of challenges involved in using experiential teaching methods on both kinds of module.

Originality/value of the paper – This is the first known study to directly examine the perceived effectiveness of an experiential teaching method in both small post-experience and larger pre-experience OM modules.

¹ The authors wish to thank all those who participated in this research project. In addition, they would like to express their gratitude to the editor and two reviewers for the time and effort they gave in reviewing this paper. The feedback provided was extremely useful in improving the work.

Key words – Experiential teaching, Kinaesthetic, Operations Game, survey research

Paper type – Research paper

Introduction

The teaching of Operations Management (OM) on undergraduate, taught MSc, MBA, and executive programmes is well established in most business schools. However, the teaching methods used across OM modules are often very different. For the MBA or executive-education student, close contact with teaching faculty, high levels of interaction, and group working is commonplace. The introduction of experiential teaching methods, such as business simulation games, role-plays, and live cases, on these kinds of modules have delivered significant benefits for the understanding and practice of Operations Management. These include improved student engagement with the subject, the illustration of complex non-mechanistic relationships, and the development of high order skills such as teamwork, interaction, communication, information gathering, conflict resolution, presentation, and decision-making (Elam and Spotts, 2004; Hayes and Reynolds, 2005; O'Malley and Ryan, 2006).

For undergraduate and taught masters students, who numerically outnumber those on higher-level management programmes, the traditional large-lecture format tends to be the dominant teaching method used. Practicality may partly influence the selection of teaching method. With the large groups often seen on undergraduate and taught masters programmes (circa 90-400 students), high levels of student interaction are often considered impractical (Nicholson, 2000). However, whilst the large-lecture format offers convenience from an institutional perspective (i.e. relatively low faculty and facility overheads), it has been argued that this method fails to actively engage students in the learning process (Fish, 2007).

This paper reports the findings of a study exploring the preferences of OM students towards different teaching methods. We then examine the perceived effectiveness of experiential teaching methods for two OM contexts – small post-experience modules, where these methods are most often used; and larger pre-experience modules, where the use of experiential methods is relatively limited. Analysis is based on survey data from 274 students taking part in a business simulation game on six OM modules in a UK university.

The paper is structured as follows. Firstly, literature on traditional teaching methods and experiential teaching methods are reviewed. This gives rise to research questions to examine teaching method preferences and the perceived effectiveness of experiential teaching methods on different OM modules. Secondly, we describe our methodology in detail, followed by analysis of student survey data. Thirdly, we discuss our research questions in light of our analysis. Finally, we draw conclusions based on our study, including its limitations and opportunities for future research.

Conceptual development

Traditional teaching methods

The dominant teaching method in universities over the past century has been the large-lecture format (Fish, 2007). The advantages of this method include the efficient dissemination of subject information; maximised control by an instructor; minimal 'risk' for students; student engagement with the subject through a lecturer's enthusiasm; enhanced understanding for those who learn best by listening (auditory learners); and efficiently closing wide knowledge gaps between a lecturer and their students (Bonwell, 1996; Sadler, 2004; Fleming, 2001). In addition, this approach remains popular partly due to its convenience – the ability to teach large numbers of students with relatively little faculty or facility overheads (Nicholson, 2000).

However, the efficacy of the large-lecture format in maximising student learning is increasingly questioned. Limitations include the failure to provide lecturers with feedback regarding student understanding; the emphasis on auditory learning as opposed to other learning styles, including visual, reading/writing, or kinaesthetic learning; the assumption that all students learn at the same pace and have similar levels of understanding; and the risks of information loss due to the passive nature of many lectures (Fish, 2007). Research indicates that lectures may not actively involve the student in their own learning (Frontczak and Kelly, 2000). This is a significant failing given the evidence that involvement in the learning process significantly improves knowledge retention and the ability to apply that knowledge (Karns, 2005). Furthermore, a number of management academics have argued that teaching should not be restricted to simple dissemination of knowledge but should be focused on “the passing on of knowledge ... such as preparation for working life, learning how to learn, and the internalisation of value systems and culture” (Baruch, 2006, p43). As such, lectures may not be well suited to teaching higher order skills, such as application, analysis, synthesis, or evaluation.

This has led to a re-evaluation of the large-lecture method as a whole (Read and Kleiner, 1996; Baruch, 2006). For Operations Management, and other highly applied subjects, such as Marketing, Organisational Behaviour, and Human Resource Management for example, the impetus for change may be particularly intense. This is due to the fact that students do not simply need to learn about an established body of knowledge, but also how to practically apply new ideas to ‘manage the situation’ (Nicholson, 2000, p45). Attempts to improve student interaction and involvement in large lectures have usually involved the use of film clips and basic cases (Read and Kleiner, 1996; Piercy, 1999; Holman, 2000). These additions to traditional teaching methods have clearly been valuable in many instances. However, research suggests that incorporating experiential teaching methods in OM modules may also be beneficial (Fish, 2007).

Experiential teaching methods

Over the last decade, management education has seen an increased use of experiential teaching methods (Hayes and Reynolds, 2005; Truscheit and Otte, 2004/5). These methods involve activities where students actively engage in an activity or event (Feinstein *et al.*, 2002; O’Malley and Ryan, 2006). Examples include business simulation games, where individuals or groups are given tasks to complete, often in real-time and in competition with others; role-plays, where participants assume the characteristics of other individuals or groups; and live cases, where a real-life or simulated case is examined in depth and often over an extended period of time (Fish, 2007; Merriam *et al.*, 2007). These examples share a key distinguishing feature when compared to traditional teaching methods – they are based on students generating knowledge by experiencing things first-hand, rather than by hearing about other’s experiences (Feinstein *et al.*, 2002).

The leading higher educational theorist, David Kolb, identifies a number of elements that are necessary for students to gain knowledge from an experiential teaching method (Kolb, 1984). Firstly, the student must be actively involved in the experience (Concrete experience). Secondly, they must be able to reflect on the experience (Reflective observation). Thirdly, the student must be able to analyse and conceptualise the experience (Abstract conceptualisation). Finally, they must have the problem-solving skills to use new ideas gained from the experience (Active experimentation). Depending on the nature of the experience, students follow different paths. For example, when learning to ride a bike a person may watch other people riding bikes (Reflective observation); develop a clear understanding of what is involved in riding a bike (Abstract conceptualisation); receive practical advice from an expert (Concrete experience); and then get on a bike and attempt to ride it (Active experimentation).

Conversely, when learning how to coach, a person may practice coaching under the guidance of an experienced coach (Concrete experience); use these taught skills to develop their own coaching style (Active experimentation); observe how others coach (Reflective observation); and read articles on the relative merits of alternative coaching styles (Abstract conceptualisation). Kolb argues that the effectiveness of an experiential teaching method is maximised when there is a balance between the four elements of the learning cycle.

Within management education, the application of experiential teaching methods has become increasingly popular (O'Malley and Ryan, 2006). It is argued that the inherent complexity and non-mechanistic interactions that exist within the discipline may make experiential teaching methods particularly appropriate for student learning (Read and Kleiner, 1996; Holman, 2000; Pfahl *et al.*, 2004). Experiential teaching methods have proven to be very useful in conveying subject information to students and in helping improve their ability to apply business theories into practice (Pfahl *et al.*, 2004).

In addition, there is evidence suggesting that such experiential teaching methods can help develop higher order skills beyond the specific, academic content of the module. For example, teamwork, interaction, communication, information gathering, conflict resolution, presentation, and decision-making may all be facilitated by experiential teaching methods (Zgodavova and Kosc, 2001; Elam and Spotts, 2004; Friedman, 2004; Truscheit and Otte, 2004/5; Hayes and Reynolds, 2005; Slack *et al.*, 2012). Such skills are important for students entering a contemporary business environment that is increasingly based on group-, team-, and network-based models of working (Haferkamp *et al.*, 2000; Riis *et al.*, 2000; Berman and Sharland, 2002; Elam and Spotts, 2004; O'Malley and Ryan, 2006).

Experiential teaching methods such as business simulation games, role-plays, and active cases have been applied in a wide variety of business education settings and have focused on a wide range of issues in both manufacturing and service contexts (Riis *et al.*, 2000). These include simulated candy-stores to teach accounting students about the revenue cycle (Hayes and Reynolds, 2005); using live cases to teach students about environmental sustainability and the impact of company actions (Truscheit and Otte, 2004/5); computer simulations to link OM to financial management concepts (Thorsteinsson, 2000); utilising co-operative role plays to highlight the need for information sharing in quality standards and procedures to managers (Zgodavova and Kosc, 2001); using a business simulation to teach change management (Taskinen and Smeds, 2000); role plays to teach students about customer relationship management (Mummalaneni and Sivakumar, 2006); and simulation games for project management (Cano *et al.*, 2000).

Across the range of settings, experiential teaching methods have predominantly been used in small classes and often at a post-experience level (O'Malley and Ryan, 2006). In the larger teaching settings, commonly found on pre-experience OM modules (i.e. undergraduate and taught-masters), there has been relatively limited application of experiential teaching methods. This may partly be due to concerns regarding the effectiveness of experiential teaching methods for large classes and/or the perceived impracticality of using such methods for large classes, including faculty and facility overheads (Nicholson, 2000).

Research objectives

Within the management education literature, there is a paucity of work assessing the value of experiential teaching methods when applied to different modules. In this study, we examine the preferred teaching methods for OM students and then assess whether experiential teaching methods, in this case a business simulation game, can be applied successfully to both small post-experience and large pre-experience OM modules. The study focuses on the following questions:

- *RQ1: What teaching methods do students on small post-experience and large pre-experience OM modules prefer?*
- *RQ2: What is the perceived effectiveness of experiential teaching methods by students on small post-experience and large pre-experience OM modules?*
- *RQ3: Do students on small post-experience and large pre-experience OM modules perceive experiential teaching methods as equally effective?*

A survey of students in different class types was conducted to examine these questions.

Research methodology

In order to evaluate the preferred teaching methods and perceived effectiveness of experiential teaching methods in different OM settings, we surveyed students on (1) small post-experience OM modules, consisting of no more than twenty students per class; and (2) larger pre-experience modules, with over ninety students per class. To ensure comparability, we examined these perceptions in relation to one specific experiential teaching method – the Operations Game.

The Operations Game

The Operations Game is a business simulation game that was originally developed at the Lean Enterprise Research Centre at Cardiff Business School in the late 1990s. It was intended to connect theoretical material with practical applications for small groups of students who had been out of formal education for some time. Since its creation, it has been used in similar educational settings at institutions around the world, from the University of Cambridge in the UK to West Point Military Academy in the United States of America and Monash University in Australia. The application in this study, not only to small post-experience OM modules but also for much larger pre-experience OM modules, is the first known adaptation of the game for this purpose.

The Operations Game seeks to create the interaction of disciplines and functions seen in industry by creating small teams of students (seven to nine) who act as companies for the duration of the business simulation. In theory, any number of companies can be formed but as the class size increases, so too does the number of faculty required to monitor activities. Each group is chartered as a greeting card production company. They are provided with a starter pack of paper, stencils, a pen, a pencil and an eraser. All of these materials are assigned costs and charged to the company. The job of each company is to try and generate the greatest profit possible. They do this by selecting orders from a market area; sourcing extra supplies and capital goods as required from the supplier; meeting the deadline for delivery; and meeting stated quality requirements that are inspected by the game controllers.

The market is a board at the front of the room where a number of orders are attached. All companies have equal access to this area and must try to get the most favourable orders first. Once an order is issued (by the controller), groups must meet its requirements. Orders vary in value, deadline and complexity. All cards are based on A4 sheets of paper. However, there are six different colours, two different sizes (requiring folding to A5 and A6), different order volumes (varying from four to twelve cards), different order deadlines (from fifteen minutes to open-ended), and many different occasions (for example, Birthday, Christmas, Wedding). Each order requires a verse of a varying number of lines to be composed by students and written into each card.

Companies will require additional raw materials (paper) and may choose to purchase additional capital goods (stencils, pens, pencils, rubbers) from the supplier, which operates a ten minute lead-time to simulate purchasing lead-times. Each company must complete the order requirements and deliver it for inspection by the game controllers who may accept the

order (generating a profit for the company) or reject it for inconsistency or poor quality (generating a loss for the company). In addition, late order fulfilment carries a penalty charge. Students are briefed on the exercise in advance and have preparation time. They are then provided with two ninety-minute trading sessions where activity takes place. At the end of the Operations Game, the game controllers calculate financial results and student experiences are then discussed.

Questionnaire design

A number of constructs pertinent to assessing experiential teaching methods have been established in the literature including (1) *quality* (Thorsteinsson, 2000; Freeman, 2003; Truschleit and Otte, 2004/5; Karns, 2005); (2) *satisfaction* (Elam and Spotts, 2004); and (3) *value*, which is further divided into *value of understanding business context* (Young *et al.*, 2003); *learning performance* (Kerr *et al.*, 2003; Young *et al.*, 2003; Elam and Spotts, 2004); *learning incentive* (Young *et al.*, 2003; Kerr *et al.*, 2003; Elam and Spotts, 2004); *appreciation of diversity* (Sturz and Kleiner, 1996; Ovando *et al.*, 2003); *group work* (Elam and Spotts, 2004); and *behaviour* (Reid and Kliener, 1996; Thorsteinsson, 2000; Young *et al.*, 2003; Elam and Spotts 2004). Items relating to these three constructs used 1-5 Likert scales from 'strongly disagree' to 'strongly agree'. In addition, we examined student preferences for different teaching methods including lectures, films, one-to-one instruction, role-plays, business simulation games, case studies, computer-based training, individual assignments, and group assignments. To help minimise common method bias, these items were measured using a 1-7 Likert scale from 'not at all effective' to 'very effective', instead of a 1-5 scale used for other constructs. Finally, we collected student information in terms of previous business experience and demographic characteristics.

Initially, academic colleagues with knowledge of the literature on teaching methods were asked for feedback on the survey questions, structure and format. Subsequently, 20 students not involved in the main survey were sent the proposed questionnaire and asked to comment on its clarity and ease of use. This feedback helped refine question wording. Measurement items used are shown in Table I.

= = Table I. Constructs used to measure business simulation game effectiveness and preference for different teaching methods = =

Data collection and preparation for analysis

Within this study, the population was defined as all postgraduate students studying Operations Management modules in a single year at the university. Given that the population frame consisted of only 287 students, a census (100% sample) was applied (Brandon-Jones and Silvestro, 2010). Questionnaires were distributed to students by their module lecturers and posted into a box left in the School of Management reception area for a week after running the Operations Game. To comply with the university's ethics procedures, students were guaranteed complete anonymity. This was the first survey at the university to examine preferences for different teaching methods and specifically perceptions of experiential teaching methods. In addition, the survey was restricted in length to encourage a high response rate (Brandon-Jones *et al.*, 2010). As such, students were very willing to engage with the research process. Consequently, we received 192 responses from students on two large pre-experience OM modules and 82 responses from students on four small post-experience OM modules. The total response rate was 95.5%. Table II provides key demographic information for the survey respondents. Our focus here was on the efficacy of using an experiential teaching method in large pre-experience and small post-experience settings. Thus while differences by national grouping are interesting, these were not relevant

for our analysis, and have already been investigated extensively elsewhere (cf. Piercy and Caldwell 2011).

= = Table II Sample Demographics = =

Factor analysis

The first stage of analysis using SPSS involved factor analysis of different teaching methods. The nine survey items describing different methods (*lectures, video-tapes/films, one-on-one instruction, role-plays, games/simulation exercises, case-studies, computer based training, individual assignments, group assignments*) were subjected to exploratory factor analysis and extracted using principal component analysis (PCA) and Varimax rotation. Factors were extracted based on Eigenvalues >1. Total variance extracted is 58.3% and all loadings greater than .40 are considered significant (Hair *et al.*, 2006). Bartlett's Test of Sphericity (.000) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (.735) support the observed structure. Three teaching method factors were extracted, characterised as *independent teaching methods, experiential teaching methods, and traditional teaching methods*. While group-based assignments involve an interactive element, the predominant activity is based around the individual completing work tasks in isolation from the instructor. Of the nine items in the original factor solution, all were retained following purification for non-loading and cross loading. Table III shows the final factor solution for teaching methods with details of factor loadings, variance explained, and eigenvalues.

= = Table III. Factor analysis of teaching methods = =

Given the fact that the research was not longitudinal and there is no alternative construct measure, assessment of reliability focuses on internal consistency (Flynn *et al.*, 1990). Cronbach alphas for the three factors range from .57 to .63. These fall towards the lower end of the recommended cut-off points of .60 and .70 (Nunally, 1978), but were deemed acceptable given the exploratory nature of the research. However, further refinements to these items would be beneficial in future studies.

Findings

Having compiled the main constructs for investigation, the scores of the two types were analysed. Table IV shows the descriptive data for these two groups, including means and mean difference. Three multi-item constructs were used and reliability scores calculated for each: exercise design (Cronbach alpha .708, average item-total correlation .536); value in learning performance (Cronbach alpha .811, average item-total correlation .661); and, value as a learning incentive (Cronbach alpha .673, item-total correlation .508).

= = Table IV. Comparison of student perceptions the OM Game = =

Teaching method preferences for OM students

Based on our data analysis, we see that students in small post-experience OM modules indicate a slight preference for traditional teaching methods. Conversely, students from larger pre-experience OM modules indicate a preference for experiential teaching methods. Both groups of students rank independent teaching methods as their least favourite, suggesting a general trend away from individualised approaches (such as written assignments and computer-based teaching) towards those methods with greater interaction. It is also worth noting that student ratings of the three teaching method factors are relatively similar. This may suggest a preference for a mix of methods on OM modules – something that we will explore further in our discussion.

Student perceptions of experiential teaching methods

Perceptions of the Operations Game for students on small post-experience modules (Group 1) and large pre-experience modules (Group 2) are provided in Table IV. Scores relating to (1) perceptions of quality, (2) satisfaction, and (3) value, are taken as proxies of its effectiveness in improving the students' understanding of OM. The key point to note is the consistently high averages recorded for all aspects of the game for students on both types of OM modules. Considering *quality*, the average rating across all survey respondents is 3.86. This indicates that students feel that the Operations Game is well managed and delivers on key issues including information provision, organisation, and assessment. Overall *satisfaction* with the game is also high, averaging 4.30 across survey respondents.

As noted earlier, the *value* of the Operations Game is divided into a number of sub-constructs. The students' assessment of how much the game aided their understanding of business processes (*value in understanding business*) averages 4.10, whilst their assessment of how much the game has helped them to understand the module objectives and learn from the experience (*value in learning performance*) averages 4.03. The extent to which the game has stimulated students to learn more about Operations Management (*value as a learning incentive*) averages 3.97, whilst the extent to which the integration of different nationalities in the game is perceived as valuable (*value in gaining an appreciation of diversity*) averages 3.93. Students' assessment of whether the game has provided them with a greater appreciation of what it takes to work in a group (*value in supporting group work*) is 3.82. Finally, the average self-assessment of students' own commitment during the game (*value: behaviour*) is 4.20. Overall, these construct scores indicate that this experiential teaching method is perceived to be valuable by the majority of students.

Comparing perceptions of experiential teaching methods between group types

In exploring the perceptions of students in the two group types, we have used independent samples t-tests to determine statistical differences between students on small post-experience OM modules and those on large pre-experience OM modules. There are no significant differences in perceptions of the *quality* of the Operations Game between students on small post-experience modules (3.79) and those on large pre-experience modules (3.89). Considering students' satisfaction with the game, students in the larger pre-experience OM modules actually report significantly higher satisfaction (4.36) than those in the smaller post-experience modules (4.15), further supporting the success in transferring the exercise to such a setting.

Turning to the perceived value of the business simulation game, significant differences are reported across all but one of the value sub-constructs. Students on smaller pre-experience OM modules rate the extent to which the Operations Game has aided their understanding of business processes (*value in understanding business*) at 3.83 whilst those on larger pre-experience modules rate this 4.22. Assessment of how much the game has helped students understand module objectives (*value in learning performance*) is 3.84 for those on the small modules and 4.11 for those on larger modules. The extent to which the game has stimulated students to learn more about Operations Management (*value as a learning incentive*) is also significantly different with students on the smaller OM modules giving lower ratings (3.70) than those on the larger OM modules (4.09). The extent to which the integration of different nationalities in the game is perceived as valuable (*value in gaining an appreciation of diversity*) is just 3.34 for students undertaking the game on small post-experience modules but 4.18 for those on the larger pre-experience modules. Students' assessment of whether the game helps them understand group working (*value in supporting group work*) is also much lower for those in small modules (3.27) compared to those in larger modules (4.06). Finally,

data indicate no significant difference in reported commitment, engagement and behaviour (*value behaviour*) between the two groups.

Discussion

On the basis of our analysis, we can now reflect on the research questions posed earlier.

RQ1: What teaching methods do students on small post-experience and large pre-experience OM modules prefer?

Educational literature suggests that using teaching methods that are well-aligned to student preferences can help to maximise retention of subject knowledge and improve student attitudes, test scores, and higher order skills (Leite *et al.*, 2010). For example, visual learners tend to prefer visual aids such as pictures, diagrams, and handouts; auditory learners tend to prefer lectures, talks, and audio discussions; read/write learners tend to prefer independent activities such as reading articles, writing summaries, and completing reports; and kinaesthetic (or tactile) learners like experiences, so tend to prefer experiments, role-plays, and other activities (Fleming, 2001). For OM lecturers, an important implication is that if a group of students on a particular module have a common learning approach, then teaching methods should be selected to maximise fit. For example, if all students on an OM module were to be identified as auditory learners, a traditional teaching method using lectures, audio clips, and case debriefs would be appropriate. Likewise, if the same module were to have students who were all kinaesthetic learners a very different approach would be suitable, including role-plays, live cases, business simulations games, and field trips to organisations for example.

Our analysis suggests that there are some differences between the preferred teaching methods for students on small post-experience OM modules and those on large pre-experience OM modules. The first group have a slight preference for traditional teaching methods. These students typically have seven or more year's business experience and may therefore be most interested in learning new theories that they can then apply to their work. In addition, the familiarity of traditional teaching methods to the older age bracket of students on post-experience modules may also drive this slight preference. Conversely, students on larger pre-experience modules appear to prefer experiential teaching methods. This may partly be explained by the fact that the simulated environment in business games, role-plays, and live case can act as an alternative to real business experience. Finally, analysis shows that independent teaching methods are the least favourite for students on both types of OM module.

Interestingly, the perceived effectiveness of traditional, experiential, and (albeit a lesser extent) independent teaching methods are close together, suggesting none are strongly favoured by OM students in the two group types. Furthermore, there are a number of students who do not favour the method rated highest by their peers – we see post-experience students on small OM modules who prefer experiential or independent teaching methods over traditional teaching methods; and pre-experience students on large OM modules who prefer traditional or independent teaching methods over experiential teaching methods. This points to a second important implication – that in the majority of situations, a module will include students with different favoured teaching methods. This is especially likely given the increasingly diverse educational backgrounds of students on many OM modules. In addition, some students may not even have a favourite teaching method, but instead prefer to use a mix of senses to gain understanding of a subject. In either of these scenarios, it may be more appropriate to adopt a wide variety of teaching methods on a particular module (Jackson, 2009). The hybrid approach would include many of the methods covered in our survey. In

taking this approach, an instructor is incorporating methods that naturally suit visual, auditory, read/write, and kinaesthetic learners (Sprenger, 2008; Fleming, 2001).

Over the past four years, this hybrid approach has been used with considerable success on a core OM module delivered to pre-experience MSc in Management students at the university. The traditional large-lecture teaching method is still employed as an important element of the module. Whilst these lectures are particularly well suited to auditory learners, they also aid visual learning, through the use of short demonstrations, props, and film clips. In addition, they support kinaesthetic learning through various group activities, such as process mapping, negotiation exercises, and short role-plays. The experiential element of the module is further enhanced through the use of the Operations Game and an applied project requiring students to carry out improvements in a local organisation of their choice. The recent introduction of myomlab, an online virtual environment used in conjunction with the core text (Slack *et al.*, 2011), has added computer-based training to other independent methods already used on the module. The self-paced lab particularly supports those students who learn by reading and writing, and also provides more formative feedback to students.

RQ2: What is the perceived effectiveness of experiential teaching methods by students on small post-experience and large pre-experience OM modules?

Our analysis indicates that student perceptions of this particular experiential teaching method are consistently high across a range of measures. Students taking part in the Operations Game perceive it to be a well-managed exercise that delivers on key issues of information provision, organisation, and assessment. In addition, students feel that the game supports their understanding of business processes and module objectives; stimulates them to learn more about the subject; improves appreciation of group diversity; aids their understanding of group working; and encourages a high level of personal commitment to the module.

As one might expect, perceptions of the Operations Game are highest among students who favour experiential teaching methods (i.e. kinaesthetic learners). However, students who favour traditional or independent teaching methods, also rate the game very positively. This supports the view that experiential teaching methods are suitable for all kinds of student, regardless of their natural learning style. However, it may also be worth considering the likelihood that students who favour traditional and independent teaching methods may only rate an experiential teaching method positively if it is used with, and not instead of, other non-experiential methods on a module.

Reflecting on the extant literature and our study, we note some key strengths and limitations of experiential teaching methods (Table V). These may be useful in guiding how experiential teaching methods should be used in different OM modules.

== Table V. Strengths and limitations of experiential teaching methods ==

RQ3: Do students on small post-experience and large pre-experience OM modules perceive experiential teaching methods as equally effective?

Our data analysis indicates that whilst experiential methods are broadly popular, there are a number of differences between perceptions of the Operations Game from students on small post-experience and those on large pre-experience modules. For constructs relating to the quality of the game and overall satisfaction, students on large pre-experience modules gave slightly higher ratings than those on small post-experience modules, but these are statistically non-significant. However, for the perceived value of the business simulation game, the higher reported ratings by students on large pre-experience modules are statistically significant for five of the six value sub-constructs.

Considering these sub-constructs, students on large pre-experience OM modules have

significantly higher ratings for the way the game has helped them to understand business processes (*value in understanding business context*) and module objectives (*value in learning performance*), as well as having stimulated their interest in the subject (*value as a learning incentive*). The way the game integrates different nationalities (*value in gaining an appreciation of diversity*) is perceived as more valuable for students on large pre-experience modules than for those on the smaller post-experience modules. However, this may in part reflect the makeup of the different groups. For this research, the small OM modules had a much lower ethnic mix than the larger pre-experience modules. In addition, the teams for the Operations Game on the large pre-experience modules were intentionally selected to incorporate ethnic diversity. As such, the different perceptions on students in the two groups may be partly caused by these factors. Student assessment of whether the game helps them understand group working (*value in supporting group work*) is also significantly lower on small modules. This may be because individuals with little work experience studying on the larger OM modules feel they have gained an appreciation of what it takes to work in a group, whereas post-experience students believe they already understand this. Finally, an issue of using experiential teaching methods is the retention of classroom control. Managing a group of nearly one hundred students engaged in frenetic activity is much harder than controlling ten to twenty, often more experienced students. Therefore, it is interesting that we find no significant difference in reported commitment, engagement and behaviour (*value behaviour*) between students on the different kinds of OM modules. This implies that, with additional faculty, it is possible to scale-up the business simulation game for larger OM modules without degradation to engagement.

There are a number of additional explanations for the differences between student perceptions that are worth considering. Firstly, the slightly lower ratings of the Operations Game by students on small post-experience modules may be caused by the fact that they already have real experience and so place less value on a simulated business environment. In addition, these students are typically paying higher fees than those on pre-experience OM modules and may therefore have higher expectations to satisfy. Secondly, the high ratings given by students on the pre-experience modules may partly be due to an upward bias reflecting the novelty of using an experiential teaching method on this kind of module. Only 43 of 192 (22.6%) students on the large pre-experience modules had previously taken part in a business simulation game compared with 59 of 82 (72.8%) students on the small post-experience modules. Thirdly, students seem to thrive on competition. In the small post-experience modules, there were only three teams competing against one another. By contrast, in the large pre-experience modules, there were over 10 teams taking part, thus increasing the feeling of competition during the game.

Reflecting on the extant literature and our study, we note some key advantages and disadvantages of experiential teaching methods for different kinds of OM modules (Table VI). These are in addition to the more general strengths and limitations noted in table V.

= = Table VI. Strengths and limitations of experiential teaching methods for different OM contexts = =

Conclusions

This study has investigated the preferred teaching methods of students on small post-experience and large pre-experience OM modules. It has then examined in detail the perceived effectiveness of a particular experiential teaching method – the Operations Game – by students on these different modules. Based on survey data of 274 students in four small post-experience modules and two large pre-experience modules, we are able to offer a number of conclusions.

Firstly, our research shows that students on small post-experience OM modules appear to have a slight preference for traditional teaching methods, whilst those on large pre-experience module tend to favour experiential teaching methods. Independent teaching methods are the least favourite for students on both types of module. However, it is also clear that the preferences for different teaching methods are clustered relatively closely together and that a number of students do not favour the method rated highest by their peers. The key implication of these findings is that for most OM modules, regardless of size or level of experience, a mix of teaching methods is likely to be more suitable than a focus on one type of method to the exclusion of others. Such a 'hybrid' approach could include lectures, role-plays, films, business simulation games, individual and group assignments, case studies, one-to-one instruction, and computer-based training. As such, the debate as to whether experiential teaching methods are superior to traditional or independent teaching methods may be superseded by a rather more productive view: one that aims to develop a better understanding of how different teaching methods may work together to maximise student learning on OM modules.

Secondly, our research indicates that students on both small post-experience and larger pre-experience modules consider experiential teaching methods to be valuable in their learning. Ratings were consistently high for quality, overall satisfaction, and value of the business simulation game. These positive ratings were similar for all students regardless of their favoured teaching method (i.e. traditional, experiential, or independent), supporting the view that experiential teaching methods are suitable for a variety of students. In our discussion, we have presented a number of strengths of experiential teaching methods such as the Operations Game. These include the active engagement of students in their own learning; the stimulation of interest in the subject; the opportunity to learn how to work in often-diverse groups; the acquisition of higher-order skills; the application of theory to practice; and the chance to try out ideas in a 'safe' environment. We also note a number of challenges for experiential teaching methods including their potentially limited value for auditory learners; their inefficiency in delivering large amounts of information; the potential for individuals to dominate groups; the significant time requirements for students and faculty; and the lack of control when compared to other methods. These may be useful in guiding how experiential teaching methods can be used in OM.

Thirdly, our study shows that experiential methods appear to be effective across a range of OM modules. In fact, our data show that students on larger pre-experience modules actually rate the effectiveness of the Operations Game even higher than those on smaller post-experience modules. These findings indicate that experiential teaching methods, that have predominantly been used with small groups of post-experience students, can be up-scaled for use on large pre-experience OM modules with considerable success. In fact, such methods may be particularly beneficial for these kinds of modules, because students on them may struggle to apply theory to practice when they have little or no business experience. In our discussion, we note a number of advantages and disadvantages of experiential teaching methods for the two types of OM module examined in our study. A key concern often cited in relation to implementing experiential teaching on larger modules is the additional faculty overhead required. In the case of the Operations Game, two academics and one PhD student were used to run the game for the large pre-experience modules. In addition, there is the practical issue of getting a flat room for around 90+ students. In terms of preparation, the game packs have to be assembled, but this is balanced against the fact that there are very few slides required and, unlike lectures, the game does not need updating every time it is played.

To conclude, experiential teaching methods appear to have significant potential to add value to student learning in OM. Whilst their use has typically been limited to small post-experience modules, it appears that business simulations, role-plays and active cases can also

be hugely beneficial to students on larger pre-experience OM modules. However, experiential teaching methods should not be seen as a direct replacement for traditional teaching methods or independent teaching methods. Instead, they represent an additional set of ‘ingredients’ to create better OM modules that incorporate a mix of experiential, traditional, and independent teaching methods within them.

Limitations and future research

There are a number of limitations with our study worth considering. Firstly, the research examined the perceived effectiveness of a business simulation game and did not include an assessment of other experiential methods such as role-plays or live cases. Secondly, to ensure comparability, we examined student perceptions in relation to one specific business simulation game – the Operations Game. As such, we do not have data regarding other OM simulations (for example, the Beer Game, Red-Blue Game, and Lego-game). Thirdly, data were collected from a single university, which creates inevitable biases in the data set. These three limitations raise the opportunity to examine the effectiveness of other experiential teaching methods in the original research setting, and to replicate the assessment of these methods in other contexts. Of particular interest would be to examine perceptions of students on OM modules in different cultural settings. For example, while not a focus of our study, differences across nationalities and between foreign students in European schools versus their own home countries could demonstrate interesting variation. Our data showed that Asian students were very positive towards the Operations Game, but would this be the case for students on an OM module in an Asian university? A further limitation of our work is that we have examined the effectiveness of experiential teaching methods in a physical rather than non-physical setting – i.e. students have to be physically present to take part in the Operations Game. The increasing use of technology on distance learning OM modules raises the possibility of using some experiential teaching methods in situations where students are not physically present. For example, the Beer Game, an experiential teaching method that simulates the Bullwhip Effect, now has both an off-line and on-line version to allow students in disparate locations to take part. Future research could explore the perceived effectiveness of experiential teaching methods that require physical presence and those that do not.

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Table I. Constructs used to measure business simulation game effectiveness and preference for different teaching methods

Classifying Issue	Components	Description
1. Quality of Exercise Design	Exercise Design (4-items)	The students evaluation of whether the exercise was well-managed and delivered on key issues, such as information provision, organisation and assessment (Thorsteinsson, 2000; Freeman, 2003; Truscheit and Otte 2004/5; Karns, 2005)
2. Satisfaction	Overall Satisfaction	Measure of the students overall satisfaction with the business simulation game (Elam and Spotts, 2004)
3. Value	Value in Understanding Business Context	The students own assessment of how much the business simulation game helped them to understand business cross-functional processes (Young <i>et al.</i> , 2003)
	Value in Learning Performance (3-items)	The students evaluation of whether the business simulation game helped students to better understand the module objectives and learn from the experience (Kerr <i>et al.</i> , 2003; Young <i>et al.</i> , 2003; Elam and Spotts 2004)
	Value as a Learning Incentive (2-items)	The students assessment of whether engaging in a practical activity stimulated them to learn more about the subject (generally and relative to normal lecture sessions) (Elam and Spotts 2003, Kerr <i>et al.</i> , 2003; Young <i>et al.</i> , 2003)
	Value in Gaining an Appreciation of Diversity	Assessment of whether the integration of different nationalities was a valuable opportunity in the exercise (Sturz and Kleiner, 1996; Ovando <i>et al.</i> , 2003)
	Value in Supporting Group Work	Assessment of whether the business simulation game provided students with a greater appreciation of what it takes to work in a group (Elam and Spotts, 2004)
	Value Behaviour (3 items)	The students commitment to undertake the game in a serious, engaged manner (Reid and Kliener 1996, Thorsteinsson, 2000; Elam and Spotts, 2004; Young <i>et al.</i> , 2003)
4. Preference for Different Teaching Methods	Nine items describing a range of teaching methods: Lectures, video-tapes/films, one-on-one instruction, role-plays, business simulation games, case-studies, computer-based training, individual assignments, and group assignments	

Table II. Sample demographics

	No.	%
<i>Gender</i>		
Male	124	45.1
Female	150	54.9
<i>Age</i>		
		24 years
<i>Nationality</i>		
British	113	41.2
European	40	14.6
Asia (exc. China)	51	18.7
Chinese	62	22.5
Other	8	3.0

Table III. Factor analysis of teaching methods

	Independent teaching methods	Experiential teaching methods	Traditional teaching methods
Individual written assignments/projects	.796		
One-on-one instruction	.663		
Computer based training	.628		
Group assignments/projects	.528		
Role plays		.809	
Business simulation games		.791	
Lectures			.784
Video-tapes or Films			.689
Case studies			.485
Cronbach Coefficient Alpha	.620	.629	.568
Cumulative Variance explained	33.41	46.19	58.30
Eigenvalues	3.00	1.15	1.09

Table IV. Comparison of student perceptions the OM Game

Construct	Overall mean: All students	Group 1 mean: Students on small post-experience OM modules	Group 2 mean: Students on large pre-experience OM modules	Mean Difference	Significance (2-tailed T-Test)
<i>(i) Preferred teaching methods</i>					
(I) Independent teaching methods	4.89	4.63	5.00	.37	.004
(E) Experiential teaching methods	5.64	5.59	5.66	.07	-
(T) Traditional teaching methods	5.58	5.77	5.50	.27	.002
<i>(ii) Perceived effectiveness of game</i>					
(1) Quality	3.86	3.79	3.89	.10	-
(2) Satisfaction	4.30	4.15	4.36	.22	.039
(3) Value: Understanding Business	4.10	3.83	4.22	.39	.000
(4) Value: Learning Performance	4.03	3.84	4.11	.27	.002
(5) Value: Learning Incentive	3.97	3.70	4.09	.39	.000
(6) Value: Appreciating Diversity	3.93	3.34	4.18	.84	.000
(7) Value: Group Work	3.82	3.27	4.06	.79	.000
(8) Value: Behaviour	4.20	4.22	4.19	.03	-
<i>(iii) Classifying Data</i>					
Experience of Experiential Learning	1.62	1.27	1.77	.57	.000
Level of Business Experience	2.59	2.99	2.42	.45	.000
Age	24.05	25.54	23.42	2.12	.000

Table V. Strengths and limitations of experiential teaching methods

Strengths of experiential teaching methods	Limitations of experiential teaching methods
<ul style="list-style-type: none"> - Learning by doing. The student is actively involved in their own learning, aiding knowledge retention - Stimulates interest in the subject - Opportunity to mix students from different nationalities in groups - Learning to work in groups - Acquisition of higher order skills –interaction, communication, information gathering, conflict resolution, presentation, and decision-making - Application of theory to practice - Chance to try out ideas in a ‘safe’ environment - Very useful for kinaesthetic learners - Good for highly applied subjects such as OM 	<ul style="list-style-type: none"> - Less useful for auditory learners - Inefficient in delivering large amounts of information - Potential for some students to dominate the group - Risk of groups focusing too much on winning the game, rather than learning from it - May require specific room type – e.g. flat layout - Time-consuming for students and faculty - May need support from additional faculty - Less control than traditional teaching methods. - Disorganisation may lead to disengagement

Table VI. Strengths and limitations of experiential teaching methods for different OM contexts

	Experiential teaching methods in small post-experience modules	Experiential teaching methods in large pre-experience modules
ADVANTAGES	<ul style="list-style-type: none"> - Can use previous experience to build learning from the game - More attention per group from the lead instructor - Focus on learning from the game rather than winning - Total faculty requirement is low (1) - Easier to manage 	<ul style="list-style-type: none"> - Creates ‘experience’ for students with little business experience - Increased competition encourages participation - Lower faculty-to-student ratio (1-30), so lower overhead per student
DISADVANTAGES	<ul style="list-style-type: none"> - Lower sense of competition - High faculty-to-student ratio (1-20), so higher overhead per student - May consider game to be disconnected from the ‘real world’ 	<ul style="list-style-type: none"> - Focus on winning the game with increased competition rather than learning - May find it difficult to see how lessons in the game actually apply to real world - Total faculty requirement is higher (3+) - Less attention per group from the lead instructor unless you add additional faculty - Hard to manage. When things go wrong, confusion multiplies