Benefits of self-selected projects from students' workplace as a pedagogical tool in graduate operations management classes

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Abstract: Project-based pedagogies are well recognised and widely adopted in business education. In this paper we present lessons from a project-based pedagogy specifically designed for Master of Business Administration (MBA) students: self-selected operations projects from their workplaces. We introduced this approach in two sections of our core MBA Operations Management course during the Spring 2014 semester, and then interviewed thirty-seven students to discover students' perceptions of the benefits of this pedagogy. Our analysis revealed that, from MBA students' perspective, self-selected projects from students' workplaces provided significant benefits to the students' workplace performance, professional and career development, project management experience, and course material learning. We conclude with the limitations of the study, implications for instructors, and suggestions for future research.

Keywords: effectiveness; self-selected; projects; workplace projects; pedagogical tool; operations management; graduate class; experiential learning; Master of Business Administration; MBA; perceived benefits.

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1 Introduction

Despite its fundamentally applied nature, business education is often criticised for being too theoretical while not addressing practical, real-world issues (Alvarstein and Johannesen, 2001; Van Hoek, 2001), or for having little relevance to real-world practice (Pal, 2007). It has been a major challenge for business educators to find the balance between theoretical knowledge and real-world practice (Bennis and O'Toole, 2005; Wren et al., 2007). Many in academia make the case for alternative pedagogical techniques by suggesting that management education in the USA tends to be too structured around case analysis, scenarios, simulations, strategy games, 'best practices', and linear summaries of relevant research, and hence should be supplemented by the use of other techniques, such as serious play (Burgi et al., 2005; Statler, 2005; Roos, 2006), biographical writing (Jacobs, 2007; Learmonth, 2007) or evidence-based instruction (Rousseau and McCarthy, 2007; Klimoski, 2007). Experiential learning is one of the alternative options for pedagogy in business courses. This has led to project-based learning approaches taking place in many business courses. In particular, operations management, a required business core course at many business schools, is difficult to teach because many students

do not readily comprehend the application of operations principles and strategies (Sampson, 2000; Wright and Ammar, 1997). Moreover, many students, such as those in accounting, finance, or marketing and those looking toward non-manufacturing careers, do not perceive operations management as a course that is relevant to them (Polito et al., 2004). A key question remains as to how best to transform operations management courses from merely teaching formulaic and algorithmic approaches to solving problems to an approach that helps students become able to define operational problems and select and apply the most appropriate from among the arsenal of concepts, tools and techniques they have learned in the course.

Consequentially, operations management instructors have been adopting experiential learning pedagogies to increase student interest in and their perceived relevance of the course material. Experiential learning is a process by which knowledge is created through the transformation of experience (Kolb, 1984). Experiential learning techniques such as projects, case studies, simulations, games, non-fiction plays, and research reviews involve the students in relevant, personal, real-world experiences (Sherrell and Burns, 1982), which encourage students' learning (Kolb, 1984). They enhance students' critical thinking skills (Bredemier and Greenblatt, 1981) and result in a lasting and effective means of developing comprehension of and appreciation for concepts, as well as new knowledge creation (Hendry, 1996; Mockler, 1997; Walters and Mark, 1981).

However, although some experiential learning techniques such as case studies and simulations are effective in many ways (see e.g., Polito et al., 2004; Sower, 1997), they have limitations. In general, they are still not 'real' enough. For instance, traditional case studies are often outdated, static, one dimensional, and are inadequate simulations of real world issues (Burns, 1990), and usually fall short of capturing the nuances of immersion into an actual business environment (Faria, 2001; McCarthy and McCarthy, 2006).

On the other hand, client-sponsored (or client-based) projects involve students working on a 'live, real-world' problem for a real business client. As McEwen (1994) points out, the most effective method for improving critical thinking skills in business education involves practical task completion. Client-sponsored projects are recognised as a powerful pedagogical tool, and the benefits of them are many (Lopez and Lee, 2005). They provide a bridge between theoretical and applied perspectives, and students are more interested in learning (de los Santos and Jensen, 1985; Richardson and Raveed, 1980), because they perceive the projects as being relevant to their careers (Razzouk et al., 2003). In operations management, instructors have been adopting client-sponsored consulting projects and found positive learning outcomes (e.g., Gorman, 2011; Heriot et al., 2008). However, instructors have difficulties using this pedagogy. The clients may not be fully attentive and responsive, students are not able to get regular feedback from clients, or data may not be available for applying particular analytic techniques (Gorman, 2010). Students may be overwhelmed by the ambiguity of client-sponsored projects (Kennedy et al., 2001), the projects could be over time-consuming (de los Santos and Jensen, 1985), and it could be difficult for the instructors to find appropriate projects that meet students' needs and the course requirement (Goodell and Kraft, 1991; Parsons and Lepkowska-White, 2009; Razzouk et al., 2003).

In an effort to overcome the shortcomings of the above pedagogical tools, and to better fit today's graduate business students' background and needs, we designed a related but distinct learning technique: self-selected projects from students' workplaces, specifically for our MBA Operations Management course.

The goal of this study was to investigate students' perceptions of their experience with this project-based pedagogy using an intensive interview method after course completion.

The structure of this paper is organised as follows. First, we provide a literature review on the relevant project-based learning literature. Then we provide background on this course and the profile of the students and explain the design of and rationale for this experiential project-based pedagogy, followed by a summary of the students' project outcomes. We then provide an explanation of the methodology that transforms the interviews into theoretical and thematic findings. Next, the results in terms of students' perceived benefits of this project are presented and discussed. A conclusion outlines the implications of this study for researchers and educators.

2 Project-based learning

Project-based learning is a student-driven, active learning experience that organises learning around projects (Thomas, 2000). Projects are defined as complex tasks based on challenging questions or problems engaging the students in design, problem solving, decision making, or investigative activities. Projects give the students the opportunities to work relatively autonomously over extended periods of time, and culminate in realistic operations improvements or presentations recommending specific improvement initiatives (Jones et al., 1997; Thomas et al., 1999). Project-based learning accommodates different learning styles and provides students with greater control and ownership for their projects (Lou and MacGregor, 2004), and thus is more enjoyable, more memorable, and more motivating than other pedagogies. Through projects, the students apply their previously acquired knowledge and available resources (e.g., concepts, tools and techniques) to real world business issues and generate new knowledge (e.g., deeper understanding of the course concepts and/or the business issues) and develop new critical thinking skills from 'applied knowledge'. Meaningful engagement through projects fosters experiential and deeper learning. The students form longer lasting knowledge representation in memory when they are meaningfully engaged (Craik and Lockhart, 1972). Compared to traditional teaching methods, students' learning outcomes (SLOs) are better in both qualitative and quantitative analyses (e.g., O'Sullivan, 2010).

The difference between project-based learning and problem-based learning is somewhat ambiguous, because problem solving is an essential component of project-based learning. Both approaches foster active engagement of students in the learning process. Some regard project-based learning as synonymous with problem-based learning (e.g., Alvarstein and Johannesen, 2001; Hanney, 2005). Problem-based learning (e.g., case study) is an instructional method that drives student learning via addressing the solution of authentic, ill-structured problems (Marra et al., 2014). For instructors, it is essential to create an effective problem that simulates real life, encourages integrations of knowledge and self-directed learning, leads to collaboration, fits in with students' prior knowledge, motivates students, and reflects the course SLOs (Marra et al., 2014). In other words, the problems have to be structured and well defined so as to be directly relevant to the SLOs. Barrows (1986) proposed a taxonomy of six types of problem-based learning methods (e.g., case methods). In problem-based learning, the problem presents a situation that mimics what students are likely to encounter in the real world, often in the workplace, and students may indirectly see the relevance and value (Davidson and Major,

2014). However, problem-based learning techniques often do not involve real-life projects and therefore do not address real-life issues to the same extent as projects directly and actively engaging people from business enterprises. The problems are based on real situations, but the students are not literally 'in the situation'. In any case, structured (defined) problem based learning is less realistic than unstructured (undefined) project-based learning in that the concepts, tools and techniques to use are usually known a-priori in problem-based learning (e.g., this is a linear programming optimisation problem to solve), whereas the concepts, tools and techniques to use are known post-hoc only afterwards in project-based learning wherein problem definition by students is a critical initial task. Compared with common problem-based learning techniques, real-life projects are more realistic, more diverse, more "hands-on", and student-driven to a more significant degree. They incorporate real-life challenges where the focus is on authentic (not simulated) problems or questions and where solutions have the potential to be implemented (Thomas, 2000). Project-based learning projects do not end up at a predetermined outcome or take predetermined paths and they incorporate a good deal more student autonomy, choice, unsupervised work time, and responsibility (Thomas, 2000). One of the most prominent features that distinguishes project-based learning from problem-based learning is that project-based learning culminates in an artefact or end product such as a report to a 'client' (Danford, 2006; Helle et al., 2006).

In operations management education, both problem-based learning (e.g., Adamides, 2007; Arnheiter, 2014; Atwater and Stephens, 2012; Hill and Lam, 2014; Johnson et al., 2009) and projects-based learning (e.g., Alhourani, 2009; Gabriel, 2011; Wicks and Visich, 2006) have been used to effectively enhance student learning.

3 Background

3.1 Course description and student profile

Operations Management is a one-semester, mandatory business core course required for every student in the MBA program at a private university in an urban setting in the US mid-west. The course has a quantitative, analytical focus and covers a broad range of topics such as operations strategy, quality management, lean systems, just-in-time, project management, capacity management, supply chain management, inventory management, process analysis, process strategies, variability and waiting lines. Course pedagogies and requirements include lecture, case studies, reading assignments including a book review, take-home assignments, in-class quizzes, a midterm exam, a final exam, and the operations term project.

Thirty-seven MBA students were enrolled in two evening sections. Among them, 34 were part-time students who have full time positions in for-profit or not-for-profit organisations, and three were full time students. Twelve students were female and 25 were male. The part-time students usually had three to ten years of full time work experience. Twenty-five students held a business degree, and 12 held a non-business degree. They were from a variety of fields including engineering, manufacturing, finance/accounting, operations, supply chain management, sales, healthcare, and human resources.

3.2 Design of the experiential project

The guidelines for the project were given to the students at the beginning of the semester. The students were asked to apply course knowledge to analyse the operations of a community business (if possible their own workplace) that they were familiar with or interested in, identify its operations problems or opportunities for improvement, and make recommendations to improve its operations. The main objectives of the project are

1 to learn how to use the course knowledge to identify and solve real-life operations issues

2 to develop a deeper understanding and/or new knowledge of the course concepts/tools through the project

3 to provide valuable service to the local business community.

The students could choose to work on the project either individually or with one or two other students. The instructor explained the guidelines in detail and answered any questions raised by the students in the first class and periodically thereafter. The students were required to advise the instructor of the nature of their project and their progress on the project on a regular basis, and to make sure that the project was challenging/complex enough and tied back to the course material. They were scheduled to meet with the instructor at least twice to report and discuss their project status in detail. In addition, they frequently exchanged thoughts with the instructor whenever necessary. The students wrapped up the project by giving a 20–30 minute presentation to the class, and submitting a project report summarising the major operations issues they worked on and their recommendations for improvement. The project was worth 20% of students' final grade.

3.3 Rationale for the project design

We designed the course project to increase the depth and richness of the graduate students' learning. Some more specific rationales are:

1 Previous research suggests that there is great value in project-based learning.

2 Due to the broad coverage of this course and the limited amount of time (one semester), an outside project (a project sponsored by an external company) makes synchronisation difficult.

3 Most of our MBA students have a considerable amount of work experience, which has exposed them to various operations issues in their work, their organisation or their industries. In addition, they often also have an extensive network with other professionals. It is feasible for them to find an operations project at their own workplaces or an organisation they already know.

4 MBA students can take advantage of this project opportunity to solve a real operations issue at their work. They are familiar with the general context of the business and the project, which makes them able to do a more in-depth analysis and make more realistic recommendations than for a project in a completely new context.

5 A project of students' own choice that is valuable to them personally is expected to motivate them to put forth their best effort. This may also bring them positive visibility and potentially help their prospects for advancement.

6 For full-time students or those who choose a project form outside their workplace, this term project provides some practical experience to add to their resume.

7 Rich context-specific knowledge that helps in the operations problem definition is already available at the start or becomes available soon after the start of the self-selected project from students' workplaces.

3.4 Outcome of the projects

We had 20 self-selected projects, all from the students' daily jobs or workplaces. All teams did their presentations and submitted their project reports on time. The course concepts covered in the students' projects varied. Two teams focused on just one course concept (lean thinking and bottlenecks), while other teams applied two to six course topics in their projects.

In our study, almost all (18 out of 20, or 90%) of the projects used a combination of qualitative and quantitative methods (and data) and were data intensive and highly quantitative. Two (or 10%) of the projects took a solely qualitative approach. The projects covered almost all of the key course concepts. The projects were complex and the students were sufficiently challenged. The operations issues that the students worked on were import, difficult, complex, and usually those that their organisations had already been struggling with for quite a while. In fact, all of the students had to keep narrowing down their project scope, given the limited timeframe. As their project report, presentations, and discussions with the instructor showed, the students got into both the course concepts and selected operations issues in depth, and demonstrated very good mastery of the course concepts. As the instructor observed and was also indicated by the students in the interviews, they "put a lot of work into it."

4 Research methodology

In the current study, we focused on the students' perception of their project experience. In order to tap their perceptions of the benefits of this project, a discovery-oriented, case-based approach is applied, with semi-structured face-to-face interviews being the primary method of data collection. An interview protocol was developed to guide the interviews, and to maintain a level of consistency between interviews. This research is largely exploratory in that it addresses a type of pedagogy where little research has been undertaken previously. A qualitative approach is therefore appropriate to gain broad insight into this phenomenon (Yin, 1994). Multiple cases are used to increase the methodological rigor of the study through validity and stability of the findings. For this reason we interviewed all 37 students to ensure we understand the phenomenon thoroughly and to achieve generalisability of our findings.

The protocol we used was focused on one main research question:

- What are the students' perceived benefits of this project, if any?

The respondent can say as little or as much as he or she desires in answer to this question. Thirty-seven face-to-face interviews were carried out, lasting approximately 30 to 60 minutes each. The interviews are taped and then transcribed. We then coded a transcription of the respondent's answer into a commentary that captures the gist of what was said. One sentence at a time, we ask what is the message that is being delivered here, and what is the key theme embedded in the message. The messages that comprise a case are organised into categories based on the thematic content. Within each category, the messages are arranged into subcategories.

5 Perceived benefits of the project

Students' responses were extremely positive about this project-based learning experience. All but one students stated that the project was "not easy", "challenging", "very challenging", "definitely challenging", "complex", "very complex", "tough", or "hard". Only one student said the project "could've been harder". All of the 37 responders (100%) indicated that the project was very valuable. Students made such comments as "I think there is huge value in this project. There is a lot of benefit in it"; "It's definitely beneficial"; "Absolutely beneficial. I got a lot out of it"; "Very valuable"; "It was a good project". Many students expressed enjoyment of the experience, without being asked. Besides these general comments, students also elaborated on specific benefits of the project in four categories: benefits to the workplace, benefits to professional development and career path, benefits to project management experience, and benefits to course material learning, described next with quotes and summarised in Table 1.

Table 1 Benefits of operations projects from students' workplace

Benefits to workplace	• Value adding solutions/recommendations
	• Extensive examination of workplace operations
	• In-depth operations analysis
	• Learning events at workplace
Benefits to professional development and career path	• Better understanding of workplace and other careers
	• Enhanced personal visibility at workplace
Benefits to project management experience	• Motivated project participants
	• Strong leadership and better collaboration
Benefits to effective course material learning	• Demonstrated practical relevance
	• Better learning outcome

5.1 Benefits to the workplace

5.1.1 Value-adding solutions/recommendations

Value-adding solutions for the workplace are a unique and major benefit that other learning techniques cannot offer, according to the students (see Q1 in Table 2). Table 2 provides a sample of quotes from interviews. Students applied course concepts to operations issues at their workplaces that are current, unsolved, challenging, and of significant importance (Q2, Q3, Q4, and Q5). Some of them had already noticed or encountered challenging operation issues at their workplaces before they took this course, while some others began to search for such operations issues at their workplaces for this term project. They expected the project to have real impact, and so they "tailored" the project to their workplaces, to "kill two birds with one stone" (Q6 and Q7). They were highly motivated and putting forth great effort, because of the potential impact of the project (Q8). In fact, as the quotes indicate, how to bring the greatest benefit to their organisations is one of the most important factors the students considered when choosing their projects. The application of course knowledge to workplace operations problems promotes deeper engagement of students. Applying course concepts to genuine employment-related issues means that students have a desire to learn and are more likely to apply complex as opposed to simple techniques (Entwistle and Waterson, 1988).

Table 2 Sample quotes for value-adding solutions/recommendations

Quote number	*Quotes*
Q1	"You can do something that adds value to your workplace. You can take that to your workplace and implement it, or show it to other people you work with and see if it can add value there. This is a large benefit of this project and it being open-ended, you can tailor it to your workplace."
Q2	"I have noticed something that makes my job more difficult because of the bottlenecks. So if we could eliminate them, it will not only help me perform better, but it would also help my company as well."
Q3	"It (the operations issue) is something that I thought was extremely lacking and needed attention, and need somebody to focus on this (operations) process and make it better."
Q4	I've picked this one because it was causing me pain. So why not have a personal benefit rather than just do it as a class exercise? Why not take this and show my boss and say 'Here is what we can do with it.' It actually fits right in with my performance review."
Q5	"It (the operations issue) is important to my job."
Q6	"This project allows me to kill two birds with one stone."
Q7	"As we were given the project assignment, I started to take a more critical look at our business, because I wanted something that could benefit my company as well as me personally. Where can I maximize the value of the project for my company? That (the project) was one of those items that seem to pop up as something that could be a mutual benefit."
Q8	"I will tell you that I take it (this project) very seriously because I want to use it for my portfolio of work."

5.1.2 Extensive examination of workplace operations

Although their projects could not cover every aspect of the operations at their workplace, the students did extensive, in-depth research before coming up with their projects. Samples quotes listed in Table 3 substantiate our inferences. The students usually broadly reviewed the operations at their workplaces (Q1, Q2, and Q3), organisations (Q4), and even supply chains (Q5), identified multiple improvement opportunities (Q6), and critically analysed these opportunities before finalising their choice of project (Q7 and Q8). The process of identifying improvement opportunities is very beneficial because it is what the students will be 'tasked with' at their workplaces (Q4) throughout their careers. We believe this process has great value for their workplaces besides broadening their scope of learning. A better understanding of their workplace operations enables the students to identify opportunities for improvement. The operations issues identified but not included in their projects become learning opportunities and new projects to work on in the future.

Table 3 Sample quotes for extensive examination of workplace operations

Quote number	*Quotes*
Q1	"The whole time we were going through (the course material), I was thinking about different things that I have done at my work. What have I seen at work where these pieces of course concepts could apply? How can I fix it?"
Q2	"This project required a lot of self-reflection and regurgitation of my work."
Q3	"It's mainly sitting down and looking at what my work or my group's work may be doing right or wrong. Sometimes you get caught up and day-to-day you just do it because that's the way it's always been done."
Q4	"It's looking at an entire company, trying to figure out where I can add value, what areas I should pick out. But that's a really good experience to have, because that's the real world. You can get into a company and that's what you're tasked with. It's looking at the whole picture and figuring out where we need help."
Q5	"You have to examine the entire supply chain and what they're doing, and identify where the main problem is, and come up with a solution. There are so many things you can do."
Q6	"I have 5 or 6 project ideas from my work, and I had a hard time narrowing it down. But if I do one right, I can do others as well."
Q7	"This project made me actually dig into the details of why we're doing it that way and what we can fix."
Q8	"This project really wasn't easy. You have to delve in. You have to fully understand the subject. You actually have to know about it. I was really thinking hard and observing (the operations process) for a couple of weeks."
Q9	"I didn't realize the way things run in my office until I looked at it from an operations management perspective."

5.1.3 In-depth operational analysis

The students' familiarity with their workplaces, their holistic understanding of the general context of the selected operations issues, and their access to information and other resources (e.g., colleagues) from their organisations allowed effective, efficient, and in-depth operational analysis in their projects. The students had a shorter learning curve

and could focus their energy on the 'key issues and course concepts', which made realistic, viable, and in-depth recommendations possible. Connecting theory to real-life problems led to built-in structure for the projects and also resulted in some intellectual excitement for the students. Some quotes that substantiate these inferences follow in Table 4.

Table 4 Sample quotes for in-depth operations analysis

Quote number	*Quotes*
Q1	"We know how it (the operations problem) came out and how we could affect the outcome."
Q2	"I know the processes just like the back of my hand.
Q3	"I knew I had resources (colleagues) that I could go back to and ask questions, and I would find the answers."
Q4	"You don't have the learning curve of getting up the speed with just the background of what the situation is. That does speed up the (project) process and make the real analysis part more in-depth."
Q5	"The project actually freed me up more to work on the key issues and course concepts. You only have so much energy to work on a project. And I got to spend all the energy on the concepts as supposed to the background information."
Q6	"This project made me actually dig into the details of why we're doing it that way and what we can fix."

5.1.4 Learning events at workplace

This project also turned into a collaborative learning event at the students' workplaces (see Table 5 for sample quotes). All of the students reached out to their colleagues (e.g., co-workers, managers) in their department, company, and even supply chain for information, thoughts, and project ideas (Q1 and Q2). Their colleagues assisted them in deciding on the best topic for this project (Q2 and Q5). Nearly all of them involved their colleagues in operations analysis and recommendations (Q3, Q4, and Q5). The support from their colleagues was critical for a successful project (Q5). Those colleagues shared their knowledge and experience with the students, and the students educated them on course concepts that sometimes even changed their mindsets (Q6, Q7 and Q8). Nearly all students indicated that they were eager to share their project results with their colleagues and discuss how to implement them (Q9, Q10 and Q11). This is another unique benefit of this project over other learning techniques.

Table 5 Sample quotes for learning events at workplace

Quote number	*Quotes*
Q1	"I actually had to go and ask people in my office 'Can you show me how this works?' 'Why do you feel like this is a problem?' 'How have you tried to do this?'"
Q2	"I spoke with a distributor, asking what problems they run into daily. We went through a lot of them and got a list of them. We decided that three major issues among them are the best ones that we came up with solutions and helped make everything better."

Table 5 Sample quotes for learning events at workplace (continued)

Quote number	*Quotes*
Q3	"I contacted with about twenty of my colleagues through a survey and had personal discussions with probably six or so of my colleagues."
Q4	"I got a research and development person to support me on this project. She helped me make sure that I had everything in the Gantt-chart correctly."
Q5	"Had it been just three of us, without his (the student's colleague) help, it probably would've been more difficult to find out where exactly you can improve certain processes."
Q6	"Honestly, nobody has ever done that operations analysis in our company before. Applying those (operations) principles to our business processes was sort of new. I think that's changing some people's mind about how we should look at process improvement for us."
Q7	"It's hard to have or seen an operations mindset in our industry."
Q8	"Most of my colleagues don't think about many of the activities as operations processes."
Q9	"I'll take this project back to my office and say 'Hey, that's what I've found out. Let's dig deeper and see if there is something that you guys would like to go forth with."
Q10	"I plan to discuss with my partners and go through the results, and hopefully make changes in the operation of our business."
Q11	"When I was working on the project, I was always thinking about telling my friends, 'There are so many problems there I never thought about."

5.2 Benefits to professional development and career path

Overwhelmingly the students spoke highly of the project's benefits to their professional development and career path, although they were not part of the instructor's original expected outcomes of this project. They indicated that these benefits motivated them to put forth great effort in learning and applying the course material. Table 1 notes benefits to professional development and career path that are explained next with quotes as substantiation.

5.2.1 Better understanding of workplace and other careers

Through this project, nearly all interviewees reported that they obtained a better understanding of the operations at their job and workplace, in terms of both breadth and depth. We believe this will have a positive impact on their professional development and career path. Sample quotes are listed in Table 6. This project helped strengthen their knowledge in both the operations and their jobs (Q1). They learned more about the processes in their company and industry (Q2, Q3, Q4, and Q5), and thus they were exposed to more potential opportunities to integrate learned course knowledge into the real world business setting in the future.

Table 6 Sample quotes for better understanding of workplace and other careers

Quote number	*Quotes*
Q1	"This project helped me learn a lot more about the work realm that I'm responsible for. It helped strengthen my knowledge in both the operations management and the job that I have at xxx (his company's name)."
Q2	"For us, the benefit is that if we are staying in our jobs or staying in our industry, you get to learn a bit more about your company, and your industry."
Q3	"Before this project, I knew what was going on in the warehouse, but it was a very broad, general overview. For this project, I was actually digging deeper, because I had to actually get the data and all that stuff. I had to understand all the different processes that were going on."
Q4	"It (this project) gives you an overall impression of how your company is doing. How different departments operate from your department operates."
Q5	"The project helps me understand my company better, from a different perspective. And that can lead to growth within my department."
Q6	"I'm just working in the one small little industry and this project involved expanding my knowledge of just what's out there."
Q7	"I enjoyed seeing somebody else present on 'this is my job. This is what I do'. I'm willing to learn about their work. I want to have at least a little bit of knowledge of what other people are doing at their work."
Q8	That's what I was thinking the MBA program was one to be. I thought it as gonna be a lot more sharing of "Here is what I do. Here is how my company does. How does your company do it?" A little more shared learning than the textbook."
Q9	"The more you hear about what the other students do and what their businesses do, the more you think about, 'well, maybe that's the field I might want to go into someday."
Q10	"Because I may look for a career change. I may be in the midst of a career change, having different perspective and knowing what others do is beneficial."

The students also found listening to others' projects to be very beneficial. All of them indicated that presentations by their classmates were 'very interesting' and 'enjoyable', and gave them 'a lot of ideas' for their own jobs. They indicated that it was 'very interesting', 'very helpful', and even 'surprising' to see how the same course concepts/tools/techniques could be interpreted and applied in different ways in other organisations, and that they began to think about whether they could adopt those alternative approaches in their own workplaces. More broadly, it also exposed them to the different types of operations functions in other industries, potential career opportunities, and the 'details' of what their fellow students were doing at their jobs (Q6, Q7, Q8, Q9, and Q10). One student said, "It expands your knowledge of just what's out there". They believed such in-depth sharing should be an integral part of the MBA program (Q8) and there was a lack of it at the moment. We believe all these learnings will have a positive impact on students' professional development and career path.

5.2.2 Enhanced personal visibility at the workplace

Students indicated this project helped enhance their visibility at their workplace when they were reaching out to search for project ideas and data, discussing the project with their colleagues, and sharing their findings with their managers (see Table 7 for sample quotes). This project is also a good 'networking opportunity' (Q5). The students even reached out to the colleagues who 'any other time' they 'would never reach out to'. As mentioned before, nearly all respondents said that they either planned to share the findings with their colleagues, especially their 'boss' or 'manager', or had already done so. Some were planning to use this project for their 'performance review' or 'portfolio of work', or 'as a way to get noticed and promoted'. We are convinced that enhanced visibility at the workplace can have a positive impact on the students' career paths, and is a strong incentive for students to put forth their best effort in learning and applying course knowledge. Educational research suggests that motivation (e.g., interests, beliefs, goals, and aspirations) can direct student learning behaviour (Calver and Scheier, 1998; Kuh et al., 2005), and demonstrating their employment-related skills is a compelling factor in motivating the students (Goodell and Kraft, 1991) to learn.

Table 7 Sample quotes for enhanced personal visibility at workplace

Quote number	*Quotes*
Q1	"It (this project) actually gave the students something to show their employer or perspective employer of what their capabilities are."
Q2	"The value (of this project) I can find for someone is he can utilize this (project) for the management to see that he's trying, he's working, he's trying to help the company and he's utilizing his MBA. That could be a platform in the future for him to be promoted, or just to get noticed."
Q3	"With this project, I was …...then having something I could show people. That was very helpful.
Q4	"I already knew all the managers in my department. It's like (for this project) I wanted to reach out within the company, just get to know a lot of people."
Q5	"Any other time, I would never reach out to those managers. So I think that's valuable in itself, just getting to know people, to reach out and having those people help you with the project and understand the business better."
Q6	"I reached out to the manager. He had to reach out to his manager. That manager had to reach out to the compliance… It's a good networking opportunity."

5.3 Better project management experience

Table 1 notes benefits to better project management experience, which are explained next with quotes as substantiation.

5.3.1 Motivated project participants

Self-selection of projects and demonstrable improvements in their workplaces led to high motivation and engagement in the projects (see Table 8 for sample quotes). Students enjoyed applying course concepts to their workplace. They chose the operations project that they 'wanted to do', 'have desire to do', or were 'naturally interested in'. In the project, they were able to apply the course knowledge to their own workplace 'right

away, rather than a couple of years down the road'. Because of its close relevance (and other benefits of the project discussed earlier), the students were intrinsically 'more invested in the project', and 'enjoyed' it.

Table 8 Sample quotes for motivated project participants

Quote number	*Quotes*
Q1	"That (the project) is just something I have a desire to do. That's what I'm naturally interested in and what actually applies to me."
Q2	"I liked it a lot, because we studied my company. So I found a lot of value. We actually went and found some inefficiencies. So I enjoyed it a lot."
Q3	"You can pick something that you wanted to do. I was more invested in the project because of that. With this project, I was really taking what I was learning, putting it into work, and then having something I could show people. That was very helpful."
Q4	"I had added benefit of being able to use what was taught directly to my field right away, rather than a couple of years down the road. It was very helpful. It was also solidifying what I learned in class. And I was able to use it for a positive effect. That's why I enjoyed it. It was good that it was so related to me."

5.3.2 Strong leadership and better collaboration

During the project execution there were no complaints from the students about their teammates. The project process was smooth and the student groups often self-organised to collaborate (see Table 9 for sample quotes). Respondents made such comments as "best project experience I have ever had", "the easiest team to work with", "everybody is responsive", and "everyone contributed equally" (Q1, Q2, Q3, and Q4).

As the respondents indicated, in each project there was always strong leadership and mutual understanding among the team members (Q5, Q6, and Q7). The team leaders were usually those who initiated the projects for their teams and were most familiar with context of the projects. The projects were also most relevant to their work. In other words, they got a lot of 'personal benefit' from the team project. As 'insiders', they themselves were a good knowledge resource for the rest of the team, and they usually knew where to get additional needed resources (e.g., information, data, technological support, constructive critique, and analytical skills) from the organisations (Q5 and Q6). The respondents indicated, the team leaders 'did a lot of legwork' when collecting information and planning project activities. For example, they 'set up meetings with managers' and 'organised facility tours' for their teams. They were both coordinators and educators. They were willing to lead, because they 'just have more experience' (Q7). They were very understanding, and knew what and how to share with their teammates due to their knowledge of the project context and their teammates' backgrounds (Q7). This made their communication with their teams very effective and efficient. One team leader said, "Just a quick explanation of what's going on and the whole team gets it". Respondents indicated that a lot of communication was via e-mail instead of face-to-face meetings, and it worked very well.

All informants indicated that 'everyone' in their groups contributed 'pretty equally'. Recognising the knowledge gap between themselves and their leaders, team members 'worked hard to get up to the level' of their leaders, so they could 'contribute equally'

(Q7). To sum up, strong leadership and team collaboration made this project successful and enjoyable.

Table 9 Sample quotes for strong leadership and better collaboration

Quote number	*Quotes*
Q1	"This is probably the best project experience I have ever had."
Q2	"The easiest team to work with that I have had."
Q3	"Everybody is responsive to everybody's schedules."
Q4	"Everyone one contributed pretty equally."
Q5	"He (the team leader) was really the organizer of the project. He did a lot of legwork. We just had to follow through and do our part. He interviewed people and set up meetings with the managers, and organized the facility tour for us. But we did the heavy lifting to critique."
Q6	"He (the respondent's teammate) is a huge help. It would have been a lot more difficult if we didn't have somebody like her on the inside of the company. He took us there and we got to walk around and learn about it."
Q7	"I just have more experience than they (his teammate) did. So they let me lead, but everyone is pretty even. They realized they were not up the same speed as I was. They were working hard to get up to that level, so that they could contribute equally and be involved in conversations."

5.4 Effective course material learning

The students stated, "Learning [course concepts from academic studies] is one thing, but application is a different thing" "The connection [of course knowledge] to an actual company is really critical" to their learning, and "there is a lot of value in that connection particularly." They indicated that before this project their knowledge of the course concepts were very broad and, for this project, they were 'actually digging deeper' and they had to 'understand' all those concepts. When asked whether they 'learned something new' about the course material through this project, all of the students gave a positive answer. They made such comments as "yeah, absolutely", "definitely", "yeah, a lot of the stuff", "that's for sure", "I learned a lot", and "I learned quite a bit". Our findings show unequivocally that 'applied knowledge' as demonstrated in project-based learning significantly enhances student learning outcomes.

Table 1 notes benefits to effective course material learning by students realising the practical relevance of the course materials and leading demonstrable improvements in their workplaces. Some quotes that substantiate these inferences are listed in Table 10. As the respondents indicated, while in the classroom or working on assignments at home 'the whole time' they were critically thinking which pieces of course material could be applied to their project, and how. Although they were not able to apply every single course concept, during the project they kept reviewing and trying hard to 'really understand' 'all concepts' in order to apply as much as they could. This project 'forces' the students to learn and truly understand the course material in order to apply it in a real world context. This process 'reinforced everything' they learned and was 'a big review of all the concepts' they learned. The students studied the course concepts individually in class, but such a big project helped 'put all course concepts together into a cohesive thing'. After working on the project, the students gained 'a better grasp of the concepts'

and they were 'getting more in-depth' on what they learned in class. In particular, the concepts and tools they incorporated into their project 'stick out' in their mind. They 'really understood' the course concepts and 'remembered' them after the project.

The students also found listening to others' project presentations to be very helpful. One informant commented, "It's a refresher of everything we talked about this semester." They learned the different ways a course concept would be interpreted and applied in a variety of industries.

Table 10 Sample quotes for effective course material learning

Quote number	*Quotes*
Q1	"You really have to have an understanding of the principles we talked about before being able to put that into the play."
Q2	"To apply a concept to a problem, we had to first review several other concepts to check their relevance to the problem."
Q3	"We were looking at this big list of concepts and trying to use as much stuff as we could."
Q4	"Our project was a big review of the course. It reinforced everything we learned better. It's a big review of all the concepts we learned."
Q5	"I was going back through all my notes…"
Q6	"It's nice to apply course concepts that we learned this semester to a big project. We were trying to apply as much as we could."
Q7	"It helps to really put in all of the material we've learned throughout the course, to diagnose an issue and figure it out for ourselves."
Q8	"Looking at a whole company and putting it (the course concepts) all together in a cohesive thing was very helpful."
Q9	"All that stuff (course materials) really stuck with us. So we really understood it."
Q10	"If I didn't do the project, then I'll not really remember them after class."
Q11	"I went through it (some course concepts) in undergrad, but it still didn't really stick with me. But doing a project like this helps me see how everything I do, especially at work, fits into a lot of the concepts that we went over."

Besides the above four categories of benefits, the students indicated that this project has other major merits when compared with other experiential learning techniques. For example, compared with case studies, this project is more challenging (e.g., more creative, more independent), more 'hands-on' (e.g., more personal, more experiential), more 'real' (e.g., more current, more comprehensive), and more interesting (e.g., more special, more fun). Compared with client-sponsored projects, this project is more tied back to the course material, more focused, more in-depth, more manageable, more controllable, smoother (e.g., less hurdles, more access to the information needed), and more enjoyable (e.g., more satisfying, less frustration). Compared with non-local public company studies, this project is more experiential/tangible, more interesting (e.g., good learning dynamic), and more relevant/personalised.

While operations management courses teach students a broad arsenal of concepts, tools and techniques to make business processes faster, better, cheaper and flexible and applying these tools to pre-specified operational problems, our study shows that self-selected projects begin with problems looking for appropriate concepts, tools and

techniques to use. Critical thinking on the part of students is fine-tuned in matching the self-selected problem to its appropriate tool for resolution or optimisation. That is a significant learning for students that emulates outside reality (where problems present themselves undefined) in stark contrast to structured problem solving in traditional operations management courses.

The 'persistence' effect, as we would like to call it, is the continuation of the belief that concepts, tools and techniques learned in operations courses solve real-life problems with the successful completion of the self-selected projects that actually lead to recognition and commendation in the students' workplaces. We hope and expect that as more real-life problems are solved by students as part of their MBA program, the persistence effect will be beneficial to the students' career advancement.

6 Conclusions, limitations, and implications

We experimented with 'self-selected, workplace operations projects' as a pedagogical tool in an MBA operations management course, and then investigated students' perceptions of its benefits as a first step towards fully understanding this experiential learning technique. Research on this type of pedagogy is very rare in academic journals. Overall, we find 'self-selected, workplace projects' fit the graduate students' needs and course requirements very well. This study is valuable to graduate business education, and operations management in particular. One of exciting findings is that the graduate students are able to come up with meaningful and challenging operations projects on their own from their workplaces. Self-selected operations projects from students' workplaces provide a variety of benefits: benefits to their workplace, benefits to their professional development and career path, benefits to project management experience, and benefits to course material learning. As empowerment leads to engagement, when students self-select projects from their workplaces, student engagement intensifies with a drive to apply learned theories to improve operations.

Instructors can adopt this approach in their operations courses, or modify it to fit their curriculum better. In our course, this project was used as a valuable, dynamic, and manageable addition, not as a replacement, to existing learning techniques such as case studies, and thus the project guidelines were designed to be very open-ended to accommodate students' situations. In the interest of 'equal' learning of the students, other instructors may specify the expected coverage, complexity, difficulty level, and so on, for projects in their courses. For instance, they can require that a list of specific course concepts be covered, and/or certain tools to be applied in the project, and/or certain types of information/data to be used. In our experiment, students tended to choose what they were interested in, but that does not mean instructors cannot enforce their students to work on the concepts that are very valuable to the students' future but they may not appreciate at the moment. Some instructors may want to specify the allocation of the weights for various course concepts in the project, or how quantitatively or qualitatively the projects should be approached. Mapping concepts to problems and vice versa deepens the learning process for students. It is also our hope that this pedagogy may be useful to the instructors who teach other business functions as well. Future research can also conduct comparative analyses of multiple approaches to experiential learning in operations management courses.

It is important to note that this study is limited by the nature of case studies (Yin, 1994), and thus the findings may not always be generalised to other settings (e.g., large, public universities). This pioneering study contributes to the existing literature by systematically exploring the effectiveness and feasibility of self-selected projects from students' workplace. As such, it is also our goal to furnish a springboard for researchers to develop hypotheses and apply additional research methods (e.g., surveys) to further elaborate, expand, and validate the understanding of this pedagogy. For researchers, the benefits and challenges identified in this study suggest a host of independent variables, control variables and covariates that should not be overlooked, and perhaps some salient moderating variables. How do students' perceived benefits (e.g., value-adding solutions, extensive examination of workplace operations, enhanced personal visibility in workplace, and better understanding of workplace) of this project affect their efforts and learning outcome? Should these benefits be seen as part of the main outcomes, or solely as incentives to achieve desired course learning outcome, or both? "In doing, there is learning". But what exactly was happening, in terms of learning, when the students were developing value-adding solutions and conducting extensive examination of their workplace operations? The students indicated that they had to 'really understand' the course materials before applying them to real operations issues, and that during the project, they 'kept going back to' course materials. They 'were digging deeper into' their work and their organisations, and they 'had a better grasp of the course material' and 'truly understand the concepts'. Future research may investigate, in more depth, how these benefits affect students' learning.

One of the concerns regarding this pedagogy is probably how to define 'sufficiently challenging/complex' projects. In our study, the instructor used his own assessment (e.g., how challenging this project is; how much work it would take; whether it has sufficient depth/coverage/details/complexity) and observations as well as the students' own assessment. Future research could look into developing a more structured assessment of 'challenging/complex' projects.

Future research should examine the applicability of this pedagogy in environments where there are students who are not non-traditional/working students. Would this pedagogy be equally applicable in a different environment with traditional students (e.g., full-time MBA students who are not working professionals)? For example, will it be difficult for them to identify challenging enough real-world operations projects? How would they benefit from this project? Will they be as motivated as the non-traditional/working students?

The goal of this article was to measure student perception of the benefits of this pedagogy based on interviews. Building upon the findings of this study, future research could develop meaningful measurements taken before, during, and throughout the project, to further confirm the effectiveness of this pedagogy, for example pre- and post-project surveys, and an end-of-project reflection essay. For example, students could be asked at different points in the project whether they feel the knowledge is applicable to their work and how.

Additional research questions could include any of the following: Which types of the students favour this project more, and why? What types of the students benefit most from this learning technique, and why? How much instructor's involvement is appropriate, and in which way? What can the instructors do to help the students resolve some of the challenges? What are the instructors' perceived benefits? Future research can also use

other data (e.g., students' test scores) to measure the effectiveness of this learning technique, besides students' perceived benefits.

Our experiment described in this paper is in line with the current clarion call to align business school curriculums with real-world problems and issues. We predict that 'self-selected, workplace projects' will become more widely adopted due to the benefits uncovered in our study. They transform scholar-graduates into scholar-practitioners. Jiang and Murphy (2007) dispel the popular myth that business educators are ineffective managers in the real world. Our study can be part of such empirical evidence, helping verify the value of experiential education. This growing body of evidence can in turn drive improvements in pedagogy that can help reestablish the 'lost' confidence in business education.

As Rindova and Kotha (2001) suggest, drawing on existing knowledge (learning-before-doing based on the instructor identified content), continuous improvement (learning-by-doing through actually doing a project), and continuous morphing (attaining an enhanced knowledge level) become normal parts of learning process for the students in any experiential-focused course. The essence of such experiential learning is to develop superior knowledge of the process that can be applied in real-life business situations where problems do not present themselves as well defined ready to be solved. As a reviewer of this paper pointed out, innovative pedagogical methods that bridge the gap between academia and the real world have relevance and application in any business course. Hence our paper has a larger breadth in its implications for future pedagogical reforms in academia.

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