



From Theory to Practice: The Effectiveness of Flipped Classroom in MBA Production Operation Management Course

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ABSTRACT

This study investigates the effectiveness of a flipped classroom with interactive elements such as fishbowl discussions, role plays, and business games in the MBA Production Operation Management (POM) course. While traditional lectures are effective techniques for foundational knowledge, they often encounter enormous challenges in engaging graduate students with real-world complications. Subsequently, the Flipped classroom approach promotes active learning, replacing the passive lecture with engaging activities that use case studies. This study highlighted the Flipped classroom as more effective than the traditional method in applying theoretical knowledge to real-world settings and developing critical thinking skills. The Scheffe post hoc test confirmed that the Fishbowl discussion and Roleplay are significantly better techniques in teaching POM among MBA students. Within case studies, learners connect theory to practice relevant to the business environment. Students with various learning styles actively participate and engage in a flipped classroom. While challenges exist, the flipped classroom remains a promising approach to preparing future managers.

KEYWORDS: Flipped Classroom, Production Operations Management, MBA, Scheffe post hoc, UN SDG 4.

1. INTRODUCTION

The case analysis method has become a staple in MBA programs, specifically for teaching production operation management. While its effectiveness is debated, strong arguments exist for its value in this context. Advocates claim its effectiveness in real-world applications. Cases expose students to the complexities and nuances of real-world production challenges, even going beyond theoretical frameworks (Merrill, 2017). Students often deal with incoherent data, conflicting information, and incomplete solutions, compel them to develop critical thinking and problem-solving skills applicable to practical scenarios (Kennedy, 2018).

Decision-making under uncertainty is an essential skill presented in case analysis. Specifically, production environments are inherently dynamic, requiring managers to make decisions with incomplete information. Case analysis simulates this uncertainty, promoting the ability to evaluate trade-offs and develop contingency plans (Zhang & Zhu, 2012). Moreover, developing analytical skills is promoted, requiring learners to sharpen their quantitative and qualitative analysis skills critical for production managers. Students must be able to interpret data, assess financial implications, and evaluate operational efficiency, preparing them for data-driven decision-making (Christensen & Eyring, 2011). Regarding human skills, case analysis promotes collaboration and communication involving teamwork and group discussions, encouraging students to develop negotiation skills essential for leading a production team (Wynn-Williams et al., 2008).

Though case analysis effectively teaches production and operations management in the MBA program, it presents challenges and limitations. For instance, case studies typically focus on specific situations, and students struggle to generalize their learning to broader contexts or different production systems (Bigelow & Mc Nair, 2002). Overreliance on instructor guidance presents an enormous challenge since the effectiveness of case analysis hinges strongly on the instructor's facilitation and ability to steer discussions. In the absence of proper guidance, students get lost in details or miss key takeaways (Bonaccio, 2010). Also, the time constraint becomes a challenge. Thorough case analysis requires time and preparation, which is limited in fast-paced MBA programs and compromises the depth of learning and analysis (Phelps, 2013).

Despite its limitations, when combined with other learning methods, case analysis remains a vital tool for teaching production operations in MBA programs (Scavarda et al., 2017). Supplementing cases with lectures, simulations, and industry exposure broadens students' understanding and provides theoretical foundations for applying case learning. Similarly, using diverse cases and promoting active participation addresses scope and instructor dependence concerns (Vos et al., 2010).

The effectiveness of case analysis in teaching production operations is complex. It emphasizes real-world application, decision-making under uncertainty, and skill development, making it a valuable tool for preparing future production managers (Aithal, 2017). Educators can overcome these limitations through a blended learning approach, maximize case analysis's impact, and equip students with the skills and knowledge to succeed. Various studies supported the effectiveness of flipped classrooms in teaching case analysis (Indira, 2015).

A study on the effect of case-based teaching (CBT) and the flipped classroom method compared to the lecture method showed that students' learning and quality of teaching improved in CBT and flipped classrooms (Kolahdouzan et al., 2020). Also, students were more satisfied with these methods. Regarding self-determination and class perception among university students, flipped teaching demonstrates a more significant impact (McWhirter & Shealy, 2020).

This study aims to determine the presence of significant differences in the learning and case analysis performance of MBA students when case-based teaching is combined with the flipped classroom approach as an effective method in learning production operations management. This study focuses on improving educational outcomes and student engagement in MBA POM courses through innovative teaching methodologies such as the Flipped classroom with interactive elements. It emphasizes the effectiveness of active learning approaches, such as Fishbowl discussions, Role plays, and Business games, in promoting critical thinking skills and applying theoretical knowledge to real-world situations. It provides inclusive, equitable, quality education for all aligned to the UN Sustainable Development Goal (SDG) 4, Quality Education.

2. RELATED LITERATURE

The case analysis method in MBA production operation courses faces limitations such as limited scope, dependence on instructor guidance, and time constraints (Gravett et al., 2017). The Flipped classroom approach emerges as a possible solution, where students pre-learn basic concepts outside class (Büchler et al., 2021).

Overcoming limited scope is initiated in the pre-recorded lectures and online modules, delivering core concepts outside of class. The flipped classroom frees up classroom time for deeper dives into specific cases (Kolahdouzan et al., 2020). The professor presents various cases showcasing different production systems, widening students' perspectives beyond individual case studies since the MBA program adopted the hybrid learning environment integrating the interactive online resource (Wut et al., 2022), simulations (Dong et al., 2020), gamified learning modules (Sailer & Sailer, 2021), and virtual factory tours supplement pre-recorded materials, furnishing students with a broader range of learning experiences that surpass the confines of individual cases (Awidi & Paynter, 2019).

The flipped classroom reduces student dependence on the instructor's guidance. Structured pre-class activities and discussion guides provide clear learning objectives, guiding questions, and discussion prompts for students to engage actively with pre-class materials, promoting self-directed learning and reducing dependence on constant instructor intervention (Missildine et al., 2013). Typically, flipped classrooms promote in-class time, facilitating group discussion, collaborative problem-solving, and peer learning, encouraging students to actively apply pre-learned concepts and analyze cases collectively, minimizing dependence on the instructor (Thai et al., 2017).

Addressing constraints is significant for MBA students who are mainly working. The flipped classroom shifts foundational learning outside of class, allowing for deeper case analysis during class sessions. The setup maximizes the value of limited classroom time (Scafuto et al., 2017). It allows for more in-depth exploration of complex production operations scenarios, specifically for asynchronous learning flexibility wherein pre-recorded materials and online resources present flexibility for students with varying styles and schedules, allowing them to learn at their own pace and revisit concepts as needed, potentially enhancing overall learning efficiency (Gillette et al., 2018).

Studies suggest that the flipped classroom improves student engagement, critical thinking, and problem-solving skills in production operations courses (Nugraheni et al., 2022). For instance, Purdue University's School of Industrial Engineering successfully implemented the flipped classroom in their Lean Manufacturing course, reporting increased student engagement and improved exam scores (Cho et al., 2021).

The initial investment in technology and resources assists in developing and delivering high-quality online materials, which requires time and effort from instructors—promoting student engagement and active learning outside of class and participation in pre-class activities. Adapting existing case studies and teaching methods to integrate the flipped classroom effectively requires teaching methods and materials adjustments (Ismail & Abdulla, 2019).

Fishbowl discussions

Traditional case analysis displays limitations in production operations courses, often lacking active engagement, diverse perspectives, and in-depth analysis. The fishbowl discussion, a flipped classroom approach, is a potential solution that promotes deeper learning and overcomes the enumerated challenges (Leslie & Johnson-Leslie, 2023). Unlike passive lectures, the Fishbowl format places students at the center of the discussions. The “inside circle” actively analyzes the case, while the “outside circle” observes and prepares, promoting active participation and engagement from all students. Real-time feedback and iteration are advantages of the Fishbowl, with the in-the-moment feedback from the outside circle encouraging the inside group to consider different perspectives and refine their arguments, initiating deeper understanding and critical thinking (de Sam Lazaro & Riley, 2019). Further, the fishbowl format required clear communication, active listening, and group collaboration, equipping students with valuable soft skills applicable to production operation management (Basiel & Howarth, 2020).

Exposure to varied viewpoints in Fishbowl discussion promotes diverse perspectives and in-depth analysis. The case is presented from different angles with multiple groups, exposing students to broader interpretations and fostering critical analysis of diverse production management approaches (Yung, 2020). The active analysis in the Fishbowl encourages students to question assumptions, explore underlying complexities, and dive deeper into case nuances, resulting in a more comprehensive understanding of production operation challenges. Conversely, the outside circle acts as a critical audience, identifying potential biases and blind spots in the inside group's analysis, promoting intellectual honesty and comprehensive solutions development (Camicia, 2021).

Roleplay

Passive learning, theoretical abstraction, and challenges in applying concepts to real-world scenarios are the limitations of the case analysis method in the MBA production operation courses. Roleplay is an effective type of flipped classroom offering potential solutions by immersing students in simulated situations, advancing active engagement, and bridging the gap between theory and practice (Gómez-Poyato et al., 2020).

Embodied learning and decision-making boost active engagement and motivation. Specific roles within a production scenario facilitate students to actively engage with the case, make decisions, and experience the consequences, leading to deeper understanding and motivation. Also, Roleplay develops communication and interpersonal skills such as negotiating with suppliers, resolving conflicts on the production line, and communicating complex plans to stakeholders to improve essential communication and interpersonal skills valuable in production management (Song et al., 2017). Equally important is the technique that allows students to step into the shoes of different characters and promote empathy for various stakeholders involved in production operations, resulting in more informed and comprehensive decision-making (Canina & Bruno, 2018).

Roleplay provides a safe space for students to apply theoretical concepts learned in pre-class materials to practical scenarios, coagulating their understanding and developing their problem-solving skills. The student actively participates in the simulated production environment and encounters real-world challenges like inventory management, quality control, and supply chain disruptions, ushering them to explore and evaluate potential solutions (Taylor et al., 2015). Also, Roleplay facilitates navigating unforeseen events and adapting to changing scenarios, promoting critical thinking and adaptability skills necessary for success in a dynamic production environment (Angelini, 2016).

Business Game

The Business game is a practical flipped classroom innovation that is a potential solution that immerses students in dynamic simulated environments, promotes active engagement, and equips them with practical decision-making skills. Unlike static case studies, Business games offer more dynamic decision-making, placing students in a competitive environment, making decisions facing the consequences, and adapting strategies in real-time, mirroring the fast-paced production operation (Huang et al., 2022). Besides, games require students to consider long-term goals, allocate resources effectively, and respond to evolving market conditions, enhancing their strategic and tactical thinking skills crucial for production management (Bathula & Lowe, 2015, December). Next, in a safe, simulated environment, students experiment with various strategies to test assumptions and experience the potential consequences of their decisions, enhancing their risk assessment and problem-solving skills (Endress et al., 2023).

Many business games encourage teamwork and collaboration, requiring students to work together, communicate effectively, and negotiate with competitors, developing valuable leadership and team-building skills (Bathula & Lowe, 2015, December). Games often simulate interaction with departments like marketing and fiancé, requiring the students to communicate effectively and align their production strategies with broader business goals. In any case, competitive aspects of games encourage students to practice their negotiation and conflict skills, preparing them for complex interactions in a real-world production environment (Endress et al., 2023).

The flipped classroom technique expects students to read and prepare the case materials before class and proceed to engage in active learning activities during class, such as discussions, debates, simulations, or games (Pitic & Irimiaş, 2023). This technique helps the student develop their critical thinking, problem-solving, and communication skills, including deepen understanding of the concepts and applications of production operation management and increasing their motivation and interest in the subject as they relate the case scenario to real-world situations and challenges (Peterková et al., 2022).

3. METHODS

The Flipped Classroom technique is an innovative pedagogical approach that addresses the constraints and limitations of traditional case analysis methods in teaching production operation management in the MBA program (Prashar, 2015). This technique was used in the MBA Production Operations Management (OPM) (MBA 201) course offered in the Professional Schools for the First Semester and second session of the Academic Year 2023-2024. The study incorporated concepts from POM to enhance the learning experience for students. During the implementation, three business cases (3) were subjected to the flipped classroom, and another three (3) cases were delivered using the traditional lecture and homework components. In the flipped classroom, students engaged in self-paced learning before the class and used class time for collaborative activities and in-depth discussion through the fishbowl discussion, role play, and business games. There were 30 students. The participants were divided into six groups, with five members for each group. For each Saturday, one (1) case was discussed and deliberated.

The instructor leveraged scholarly articles to provide students with the necessary knowledge to implement the flipped classroom approach in teaching production operation methods—for instance, a comprehensive resource covered essential production and operation management concepts (Klimplová, 2020). The instructor-assigned readings before class allowed students to theoretically understand the production operation topics, paving the groundwork for more meaningful discussions during the class sessions (Ahmad & Dias, 2019).

Incorporating insights from assigned articles offers real-world perspectives and the latest research findings. Assigning relevant articles from such journals as pre-class readings enabled students to explore contemporary issues and solutions, promoting a deeper understanding of the challenges in the case. The instructors focus on practical applications and case studies (Wright et al., 2023). The instructor guides discussions on operational challenges, encouraging critical thinking and collaborative problem-solving. Moreover, the flipped classroom model provided an opportunity to address individual students' needs. Instructors use class time to provide personalized feedback, clarification on complex topics, and guidance on applying production operation methods to specific business situations, catering to diverse learning styles and ensuring that students receive the necessary support for mastering the material (Tawfik & Lilly, 2015).

The Analysis Of Variance (ANOVA) with the Scheffe post hoc test was used to determine if significant differences existed in students' academic performance in a flipped classroom. It compared their scores in six cases, with three cases using the traditional lecture and discussion and the flipped classroom in the remaining

three. Another post-hoc test, the Scheffe, was used to determine the effectiveness of the flipped classroom techniques based on student scores compared to the traditional lecture and discussion (Ruxton & Beauchamp, 2008). The test is specifically beneficial in this context due to its control of Type I error rate, allowing for accurate comparison between multiple groups. This is essential when evaluating the effect of the different teaching methods on students. The Scheffe test furnishes flexibility in specifying the nature of the comparisons, allowing for comprehensive analysis of the differences in student scores between the Flipped classroom and traditional teaching method. Also, the test accommodates complex study design, making it suitable for educational research that involves multiple factors and interactions, providing a more nuanced understanding of the effect of teaching methods on student outcomes (Barnett et al., 2022).

4. RESULT AND DISCUSSION

This research intends to determine if using the flipped classroom significantly improves the case analysis performance of MBA students compared to traditional lectures. Summarized in Table 1 is the performance of the various learning activities comparing the four types of activities (fishbowl discussion, role play, business games, and ordinary), considering the total score achieved by all participants in each activity (sum) and the average score per participant. The fishbowl discussion seems to be the most successful activity, with the highest total score (837) and the average score (27.9). Ordinary 1 and role play present similar scores (around 800) and average scores (around 27), suggesting consistent participant performance. The Ordinary 2 and Ordinary 3 resulted in lower total and average scores than other activities, indicating lower overall engagement or effectiveness. Business games show a high variance (94.38) compared to other activities, suggesting a more comprehensive range of individual performance, with some students scoring significantly higher or lower than the average. Moreover, based on the result, the Fishbowl discussion and Roleplay appear engaging and effective learning activities, while Ordinary 2 and Ordinary 3 appear behind simultaneously. The business game is less effective than the first two flipped classroom techniques.

Table 1. Descriptive Statistics of the Six Cases Analysis Scores

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Fishbowl discussion	30	27.9	7.60376	1.38825	25.0607	30.7393	0	30
Ordinary1	30	26.9	7.45261	1.36065	24.1172	29.6828	0	30
Roleplay	30	27	7.47409	1.36458	24.2091	29.7909	0	30
Ordinary2	30	8.7333	3.01643	0.55072	7.607	9.8597	0	10
Business game	30	24.0333	9.71484	1.77368	20.4058	27.6609	0	30
Ordinary3	30	7.1	3.76325	0.68707	5.6948	8.5052	0	10
Total	180	20.2778	11.17762	0.83313	18.6338	21.9218	0	30

The result of the ANOVA depicts very strong evidence that the mean scores of the six case analyses are not equal ($F(5, 174) = 58.75, p < 0.001$), indicating that at least one group has a significantly different mean from the others. In determining which case analysis student scored better, the Scheffe post hoc test was performed, comparing the mean scores of each pair of groups and revealing which ones are significantly different.

The Scheffe test identified several differences in means between pairs of groups, indicating that the learning flipped classroom activity does have a significant effect on the measured outcome. Specific score differences manifested significantly with the Fishbowl discussion, Ordinary 1, and Role Play students' scores outperformed Ordinary 2 and Ordinary 3. These activities significantly show higher mean scores compared to Ordinary 2 and Ordinary 3, suggesting students led to better performance. The business game score outperformed Ordinary 2 but not Ordinary 3. The Business game had a significantly higher mean score than Ordinary 2, though its mean score was not significantly different from Ordinary 3. There were no significant differences among scores in Fishbowl discussion, Ordinary 1, and Role play. These three activities had similar means, indicating comparable levels of performance or engagement. Further, the large mean score difference between Fishbowl discussion and Ordinary 2 (19.17) implies that Fishbowl discussions are specifically effective compared to Ordinary 2-type activities. Similarly, the negative mean score difference between Ordinary 2 and Business game (-15.30)

signifies that Business games generally outperformed Ordinary 2 activities. The Scheffe results present that the choice of flipped classroom activities significantly contributes to MBA student learning in case analysis, specifically the Fishbowl discussion, Roleplay, and Business game generally leading to better results than Ordinary 2 and Ordinary 3.

Table 2. Significance Difference and Post hoc test between Flipped Classroom and Traditional Teaching

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	14045.18	5	2809.036	58.75419	1.35E-35	2.266062
Within Groups	8318.933	174	47.80996			
Total	22364.11	179				

Multiple Comparisons (Scheffe)						
(I) VAR00001	(J) VAR00001	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Fishbowl discussion	Ordinary2	19.16667*	1.78531	0	13.1572	25.1761
	Ordinary3	20.80000*	1.78531	0	14.7906	26.8094
Ordinary1	Ordinary2	18.16667*	1.78531	0	12.1572	24.1761
Ordinary2	Ordinary3	19.80000*	1.78531	0	13.7906	25.8094
Roleplay	Ordinary2	18.26667*	1.78531	0	12.2572	24.2761
	Ordinary3	19.90000*	1.78531	0	13.8906	25.9094
Ordinary2	Business game	-15.30000*	1.78531	0	-21.3094	-9.2906
Business game	Ordinary3	16.93333*	1.78531	0	10.9239	22.9428

* The mean difference is significant at the 0.05 level.

Effectively teaching production operations management (POM) requires aligning theory and practice. Traditional lectures effectively deliver foundational knowledge, but instructors often struggle to engage students with real-world complexities. Flipped classroom strategies, specifically Fishbowl discussions, Role plays, and Business games, effectively address this gap by actively involving MBA students with experience analyzing the POM concept through case studies. The flipped classroom is particularly effective due to active learning and more profound understanding from students who need to prepare by initially reviewing readings or videos before the start of class. With prior exposure, the technique activates prior knowledge and sets the stage for active learning in class.

In a Fishbowl discussion, the student observes their peers engage in a structured discussion, prompting deeper reflection and diverse perspectives on the case. Similarly, in role-play, learners actively participate in the simulation, representing specific roles and presenting empathy, negotiation, and decision-making skills. Equally crucial in business games are teams competing in simulated market environments, experiencing competition, resource allocation, and strategic decision-making in a dynamic setting.

Even more, flipped classrooms replace passive information transfer with engaging activities promoting active participation and student-driven learning. For the same reason, case studies connect theory to practice, making learning more relevant and motivating for students who see its application in the real world. For instance, the fishbowl discussion in a case study on the supply chain allowed students to observe their colleagues discuss mitigation strategies, eliciting deeper reflection on their ideas. Similarly, the Role play is used to simulate production line optimization. Students take on roles like managers and workers, experiencing production challenges and decision-making firsthand. Moreover, Business games require teams to compete in a simulated market for manufacturing products. Students experience allocation, pricing strategies, and competition, applying POM concepts practically. This study claims that Flipped classrooms in higher education significantly improved student engagement and learning outcomes compared to traditional lectures, leading to a sizeable

positive effect on student achievement and significantly increased learners' motivation and learning compared to traditional lectures.

5. CONCLUSION

The evidence presented in this study strongly suggests that the flipped classroom approach, specifically the Fishbowl discussion, role plays, and business games, offers significant advantages in teaching POM within the MBA context. Precisely, the Flipped classroom succeeded in replacing passive information transfer with student-driven activities, advancing deeper understanding and application of POM concepts. At the same time, it links theory and practice, making learning more meaningful and promoting critical thinking, decision-making, and communication skills. The Flipped classroom accommodates diverse learning styles by offering visual, auditory, and kinesthetic components through different activities. Consistently, students demonstrate significant improvements in engagement motivation. Students deal with real-world scenarios, challenging them to suggest practical implications of POM concepts. Activities such as Fishbowl discussions and business games promote collaboration, teamwork, and critical perspective, which are valuable skills for future managers.

Incorporating the Flipped classroom strategies into the MBA POM course, like Fishbowl discussion, Role plays, and Business games using case studies, can significantly enhance learning outcomes, student engagement, and skills development compared to traditional lectures and discussions. Also, specific challenges such as initial time requirements and technology access are manageable through proper planning and resource allocation.

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