An innovative method for bilingual case teaching of engineering project management

Guodong Cong & Weiwei Xing

Zhejiang Gongshang University
Hangzhou, Zhejiang, People's Republic of China

ABSTRACT: Though being widely applied, the case teaching method is in need of comprehensive examination, particularly in its application to bilingual teaching of engineering project management. Based on a four-layer progressive model, an innovative method is proposed in this article, which introduces a business television programme from the US into a bilingual class of engineering project management, in the hope of improving the teaching. The learning outcome has proved to be very good: for teaching, it is a useful supplement to lectures, so that students can see more clearly the context, the process and the limitations of how theories and methods are used in reality; for students, it is also positive in developing their expertise, vision and personal characteristics, as well as improving their career prospects. The effectiveness of the method was also demonstrated by the comparison with other courses from 2012 to 2013.

INTRODUCTION

In order to better integrate theory and practice, case teaching is being increasingly used in classes of management and has become more popular among students. By improving teaching and the acquisition and application of knowledge [1], case teaching enhances students' capability to solve practical problems in the real world [2]. It accords with students' perceptions of what is significant for project management; namely, transferable skills, interpersonal skills, time management, critical thinking and communications [3].

Consequently, it is appropriate to simulate the real world for students. Teachers have made efforts in this regard in various ways. First, by building mixed project teams, and simulating a real-life development scenario that gives students the possibility of dealing with issues arising from typical project situations [4]. Second, a teaching approach based on *transferable skills* in an e-learning environment may be used for teaching project management [5]. Outcome-based teaching [6] and simulation-based training are other approaches [7].

In bilingual classes, in particular, cultural and lingual differences can have a profound influence on Chinese students. Teaching engineering project management should follow two paradigms; namely, learning is best when working in real-world situations and teach what has been promised [8]. In order to improve the academic performance of international students in project management, teachers should consider the following factors: level of details given in lectures, speed of lectures, Internet sources of information, English language skills, group or individual assessment and the qualitative/quantitative content of assessments [9]. Bilingual case teaching of engineering project management is more interesting and challenging than are other management courses.

However, there are still common problems in the use of case teaching in project management as in other management courses. First, the case should support the close integration of theory and practice, which is not always so. Second, the role of teachers in such classes should be more accurately and scientifically specified [10]. They often just consider themselves a provider of the case and enforcer of the class rules. But often they do not control and lead students to participate, as well as summarise the teaching and provide feedback. Therefore, case teaching has not reached its full potential [11]. Third, in getting used to the convenient and interesting studying methods of on-line videos and audios, students become reluctant to learn in traditional ways.

Noting the above problems, an innovative case teaching method is proposed for engineering project management. Instead of using traditional written materials, a US TV show about commercial competition is offered instead. After two years of practice and observation, the outcome of the use of this method is manifest. It is a useful supplement to lectures, so that students can see more clearly the limitation of how theories and methods are used in reality. Students understand better that the essence of the goal of engineering project management is to use theories and methods to

ensure project success. Therefore, it is important to adjust theories and methods flexibly according to reality. Students treat the course as an interesting interaction with reality instead of just theory and are eager to participate. Hence, the effect of the case teaching is to improve the overall teaching. In a longer term, it widens their vision, enhances their expertise and improves their career prospects.

An integrated four-layer progressive model is used to motivate students and to achieve better teaching control. The model has three major steps, five main experiences, two main activities and achieves one outcome as shown in Figure 1.

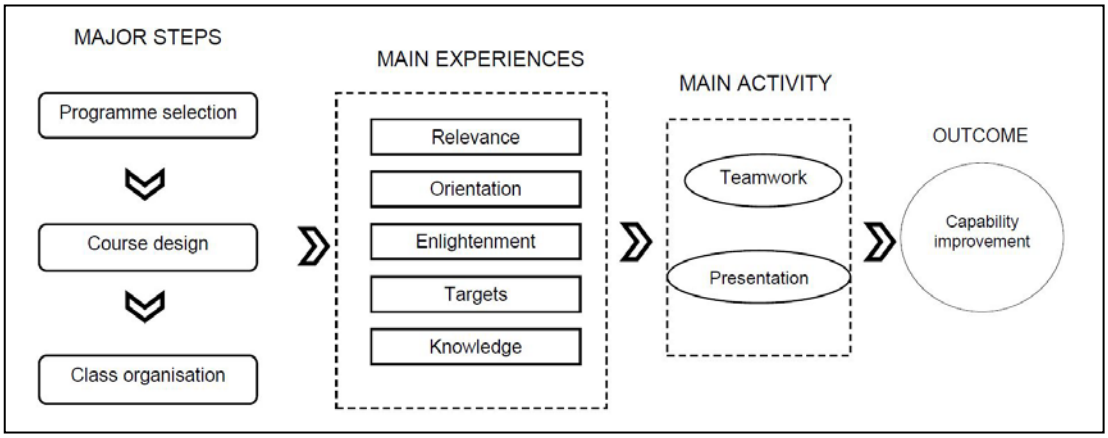

Figure 1: Four-layer progressive model.

MAJOR STEPS

- Programme selection: teaching cases should present a challenge to the student and stimulate their interest in finding out where and how to make use of knowledge. That is why the US TV programme, The Apprentice, produced by NBC, was used. The Apprentice, which has been running for ten seasons, has been regarded as the closest to real business of any show. In each season, 16 contestants, selected from thousands of applicants, are divided into two teams to undertake commercial projects in New York.
  One of the contestants is fired in each episode and, finally, the only *alive* member gets a one-year contract to be an apprentice to Donald Trump. The show provides the audience with insight into the secrets of business success, as well as the cruel competition and complicated personal relationships in the real commercial world. The real-world plots, rapid pace, fierce competition, contradictions and theatrical suspense are much more thrilling than the cases in the course books.
- Course design: since project management encompasses nine areas of knowledge and five process groups, the teaching should include these areas and groups. An ideal way is to intersperse knowledge with engineering project management practice. For example, project planning could include a project schedule, project costing, a project charter, organising a kick-off meeting, creating a project work breakdown structure, constructing a project network diagram, and so on. Such matters are raised in episodes of The Apprentice and are discussed by the students.
- Class organisation: each episode of The Apprentice lasts about 40 minutes, with a prologue and an epilogue and, hence, is suitable to be used in class. Each engineering project management class lasts three class hours. The first class hour is usually used to explain theory and method. The first 30 minutes or so of the second hour is for watching the show and the rest is for discussion. The first half an hour of the third hour is for team presentations and the rest is for the teacher to comment and summarise.

MAIN EXPERIENCES

To achieve the desired results the adopted method has five aspects or settings, viz:

- Relevance: there is a close correspondence between the selected TV programme and the teaching content. In fact, the core elements of every project in The Apprentice are mainly about leadership, team work, communications and innovation. For example, in the process of teaching decision making, team-building and communications in project management, only relevant matching programmes should be watched to ensure the best teaching, otherwise the students will fail to master the essence of the material.
- Orientation: the guiding role of the teacher should be brought into full play in class discussion. Students have varying needs but there are two types of guidance. The first relates to a teacher raising questions. The question should be closely linked to theory. The students should be led to think deeply and analytically about the question, the relevant theory and possible answers. The second is about guiding a student's exposition in discussion. The teacher reinforces and encourages further exploration of the positive ideas and concepts put forward by the student.
- Enlightenment: first and foremost, innovation should be encouraged. Apart from students learning how to improve by studying the project managers and team members in The Apprentice, the students are often provided with background so that they come up with more insightful questions. Second, critical thinking should be developed.

By assuming the role of project manager or even Donald Trump, the students advance their opinions on the behaviour of teams in The Apprentice. They even consider how to fairly and reasonably judge the projects.

- Targets: Two major areas of students' ability should be targeted and developed. The first target is public speaking. This is addressed on the course by appointing three teams, such that each of the teams must defend one of the three contestants in the final part of the elimination on the show. The students pool their knowledge, choose appropriate tactics and refine their speech that argues in favour of their contestant. The heated debate that often ensues enhances the students' oral expression and sharpens their reactions to debate. This highly motivates the students. The second target is about teamwork. The students learn how to sustain their own personalities and independent thinking while still striving for the team goals.
- Knowledge: in the teaching, the related knowledge should be properly accumulated according to the content of the TV programmes. For example, due to the repeated emergence of race, religion and ethnicity as issues, teachers could provide some relevant basic knowledge or recommend some supplementary reading. Or in viewing some plots and scenes, the students could be taught some basic manners. Furthermore, attention could be paid to the use of language. In doing so, the students could get access to more lively knowledge and improve overall.

MAIN ACTIVITY

The core of this method is to improve students' capabilities via two main activities; namely, team work and presentation. The activities are organised in three ways.

First, the students concentrate on watching the show. This is partly because of the attraction of the show itself and partly because of their desire to gain more real business experience. Second, as a reality show, The Apprentice seems like real business competition, making students eager to watch their friends in contest against each other. They pay not only attention, but also respond emotionally to the show. Third, their speeches become more targeted. Arguments among different groups display great knowledge. Thus, the course not only improves their learning, but also provides a good opportunity to exercise eloquence. The goals of the case are, thus, fully realised.

LEARNING OUTCOME

To further illustrate the effectiveness of this method, the differences in learning outcomes between this method and other teaching methods were investigated. The teaching administration system of Zhejiang Gongshang University requires students to evaluate every course. This provides an opportunity to compare the learning outcome between courses.

In 2013, for example, after the course Engineering Project Management (EPM) was completed, the University Administration asked the 52 students majoring in engineering to evaluate the course. The table was designed with reference to Mengel [7] and Divjak and Kukec [8]. The criteria were as follows: excellent (grade 5), very good (grade 4), good (grade 3), medium (grade 2) and poor (grade 1). The evaluation results are shown in Table 1.

Table 1: Evaluation of EPM in 2013.

Learning outcome	Description	Highest Grade	Lowest Grade	Average
Enthusiasm (E)	Invest much effort (E1)	5	4	4.73
	Move from know-how to know-why (E2)	5	3	4.21
Creativity (C)	Reflect and think creatively (non-linear) (C1)	5	3	4.05
	Present a creative case study (C2)	5	4	4.62
Teamwork (T)	Development of team work skills, but also development of leadership skills (T1)	5	4	4.47
Knowledge grasping (KG)	Comprehension of the role and techniques of project approach (KG1)	5	4	4.82
Knowledge expansion (KE)	Explore and master knowledge out of classroom (KE1)	5	4	4.43
	Synthesis, design and presentation of the case study (mostly in English) (KE2)	4	2	3.84
Practice achievement (PA)	Understanding and application of project management methods for real projects (PA1)	5	4	4.36
	Be used to making decisions in uncertain environments (PA2)	4	3	3.79
Thinking pattern (TP)	Engage in and facilitate double-loop thinking (TP1)	5	4	4.46

The results from the students are positive, in particular for the index KG1, Comprehension of the role and techniques of the project approach (highest grade 5, lowest grade 4 and average grade 4.82); E1, Invest much effort (highest grade 5, lowest grade 4 and average grade 4.73) and C2, Present a creative case study (highest grade 5, lowest grade 4 and average grade 4.62). It is consistent with teachers' observation and the nature of Chinese students majoring in engineering, i.e. they study very hard to understand the theory and, then, try to develop some new perspective by which to present the case study.

On the other hand, the students were less positive about KE1, Synthesis, design and presentation of the case study (mostly in English), (highest grade 4, lowest grade 2 and average grade 3.84) and PA2, Be used to making decisions in uncertain environments (highest grade 4, lowest grade 3 and average grade 3.79). This demonstrates their deficiency in language skills and decision-making capability.

In order to better determine the effectiveness of the method, in 2013, the research team also surveyed 166 students from three classes across five courses besides EPM. These other courses were Engineering Structure (ES), Civil Engineering Introduction (CEI), Engineering Economics (EE), Management Information Systems (MIS), and Quality Management (QM). Some descriptor indices are not appropriate for certain courses and this is indicated by '--' representing data missing. The result is shown in Table 2 and in Figure 2.

Similarly, results for 2012 are presented, showing the percentage by which the EPM values are greater than the other courses. This is shown as INC (increment). The results are shown in Table 3.

Table 2: Learning outcome evaluation of six courses in 2013.

Learning outcome	Description	ES	CEI	EE	MIS	QM	EPM
Enthusiasm (E)	E1	4.81	4.85	4.12	4.61	3.74	4.73
	E2	3.75	3.12	3.37	3.33	3.37	4.21
Creativity (C)	C1	2.59	2.84	3.28	3.12	3.16	4.05
	C2	3.74	3.14	4.07	3.51	4.02	4.62
Teamwork (T)	T1	--	--	3.58	3.62	3.89	4.47
Knowledge grasping (KG)	KG1	3.23	3.52	3.95	3.66	3.90	4.82
Knowledge expansion (KE)	KE1	2.66	3.01	3.68	3.50	3.59	4.43
	KE2	--	--	3.15	--	3.15	3.84
Practice achievement (PA)	PA1	3.05	3.10	3.66	3.58	3.79	4.36
	PA2	--	--	3.15	2.99	3.07	3.79
Thinking pattern (TP)	TP1	--	--	3.75	3.70	3.61	4.46

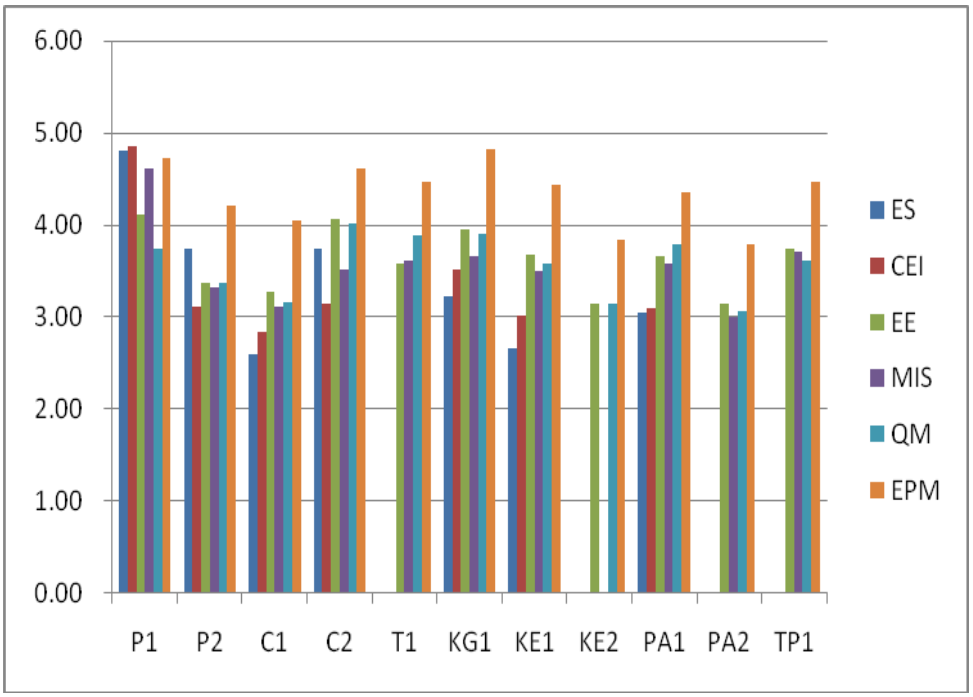

Figure 2: Learning outcome comparison of six courses in 2013.

Table 3: Learning outcome evaluation and comparison of six courses in 2012.

Learning outcome	Description	ES	INC (%)	CEI	INC (%)	EE	INC (%)	MIS	INC (%)	QM	INC (%)	EPM
Enthusiasm (E)	E1	4.83	-3.31	4.85	-3.71	4.21	10.93	4.47	4.48	3.65	27.95	4.67
	E2	3.82	11.78	3.09	38.19	3.38	26.33	3.37	26.71	3.34	27.84	4.27
Creativity (C)	C1	2.61	57.47	2.81	46.26	3.32	23.80	3.07	33.88	3.18	29.25	4.11
	C2	3.72	25.00	3.18	46.23	3.96	17.42	3.53	31.73	4.09	13.69	4.65
Teamwork (T)	T1	--	--	--	--	3.58	24.86	3.62	23.48	3.89	14.91	4.47
Knowledge grasping (KG)	KG1	3.31	44.41	3.56	34.27	4.06	17.73	3.72	28.49	4.04	18.32	4.78
Knowledge expansion (KE)	KE1	2.69	61.71	3.07	41.69	3.86	12.69	3.57	21.85	3.71	17.25	4.35
	KE2	--	--	--	--	3.25	17.23	--	--	3.32	14.76	3.81
Practice achievement (PA)	PA1	3.12	36.86	3.31	29.00	3.69	15.72	3.83	11.49	3.71	15.09	4.27
	PA2	--	--	--	--	3.11	22.51	3.12	22.12	3.16	20.57	3.81
Thinking pattern (TP)	TP1	--	--	--	--	3.71	18.33	3.63	20.94	3.85	14.03	4.39

From Table 2, Table 3 and Figure 2, it can be seen that most of the learning outcome indices of EPM are better than for the other five courses. As can be seen from Table 3, compared to Engineering Structure, and Civil Engineering Introduction, in which traditional teaching methods are mainly adopted, the learning outcomes indices of EPM are significantly better (the biggest increment is 61.71% and the least 11.78%), except for E1.

Even compared with the three management courses; namely, Engineering Economics, Management Information Systems and Quality Management, in which case teaching is also used, EPM is still significantly better (the biggest increment is 33.88%). With this innovative method, the biggest improvements are: Thinking pattern, Creativity and Teamwork, showing an obvious advantage over other methods. These three learning outcomes are called *soft skills* in project management and are known to benefit students' career development. Hence, the effectiveness of the proposed method is demonstrated.

It is also exciting to know students' comments on what they have achieved from the EPM course. One of the students put in his learning report that he learned a lot about double-loop learning in the course, as he had been used to self-learning ever since birth. The course teamwork showed him that he should try his best to understand other opinions in order to contribute to a team, which was an excellent experience not only for his study, but also for his life. Another positive remark in several reports was that some students used to plan to be a *pure* engineer, but had changed their mind and wished to be a project manager. They said that they felt that being a project manager would be more challenging and satisfying than being an engineer. Actually, even without the evaluation results, their improvement was apparent from their efforts and work in every class.

CONCLUSION

This case teaching method is popular among students and is obviously effective. The Engineering Project Management course itself is a promising course for students. The bilingual teaching of the course makes it more of a challenge but also increases the benefits. Because it is challenging, there is a need for continuous exploration of teaching options and innovation. Case teaching using a TV show in the course is an efficient and effective way to aid students to improve their capabilities in a popular and inspiring way. Additionally, it helps teachers enhance their insight and understanding of business theory and practice. Case teaching is a highly artistic and challenging part of teaching and requires a long-term commitment and persistence by the teachers.

The future study and practice of case teaching must take into account that there are few TV programmes that will meet the teaching requirements. More effort should be made to expand case libraries, as well as to identify appropriate TV programmes covering a larger scope of course material. More research is expected on how to further combine the TV programmes to promote the quality of teaching. It is hoped this will lead to a continuous improvement in teaching techniques and the quality of teaching.

ACKNOWLEDGEMENT

This research is supported by Humanity and Sociology Foundation of Ministry of Education of China (Grant No. 10YJC630034), Zhejiang Provincial Natural Science Foundation of China (No. Y6110539), Higher Education Scientific Research Project of Zhejiang Gongshang University 2012: bilingual case teaching method based on the theory of the cross-cultural theory (No. xgy12067).

REFERENCES

1. Merseth, K.K., *Case in Educational Administration.* New York: AddisonWesley Publisher (1997).
2. Volpe, G., *Case Studies: The Handbook for Economics Lecturers*. Bristol: University of Bristol (2002).
3. Ojiako, U., Ashleigh, M., Chipulu, M. and Maguire, S., Learning and teaching challenges in project management. *Inter. J. of Project Manage.*, 29, **3**, 268-278 (2011).
4. Bavota, G., De Lucia, A., Fasano, F., Oliveto, R. and Zottoli, C., Teaching software engineering and software project management: an integrated and practical approach. *Proc. 2012 Inter. Conf. on Software Engng.*, IEEE Press, 1155-1164 (2012).
5. Ashleigh, M., Ojiako, U., Chipulu, M. and Wang, J.K., Critical learning themes in project management education: implications for blended learning. *Inter. J. of Project Manage.*, 30, **2**, 153-161 (2012).
6. Zwikael, O., Shtub, A. and Chih, Y.Y., On the use of simulation-based training for project management education: mind the gap, as one size does not fit all. *J. of Manage. in Engng.*, 26-38 (2013).
7. Mengel, T., Outcome-based project management education for emerging leaders - a case study of teaching and learning project management. *Inter. J. of Project Manage.*, 26, **3**, 275-285 (2008).
8. Divjak, B. and Kukec, S.K., Teaching methods for international R&D project management. *Inter. J. of Project Manage.*, 26, **3**, 251-257 (2008).
9. Lebcir, R.M., Wells, H. and Bond, A., Factors affecting academic performance of international students in project management courses: a case study from a British Post 92 University. *Inter. J. of Project Manage.*, 26, **3**, 268-274 (2008).
10. Wang, S.J. and Hu, F., Case development: status quo and standardization of teaching cases - summary of the second China business management case-sharing international forum (2011). *J. of Manage. Case Studies*, 2, 92-101 (2011).
11. Chen, L.Q., Zhao H.H. and Liu, L., An empirical study on difficulty applicability in management case teaching. *J. of Manage. Case Studies*, 9, 19-26 (2011).