Learning by Teaching and Assessing: A Teaching Experience

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Abstract This chapter describes a teaching experience whereby students learnt by teaching and assessing other students. A group of students was tasked with explaining a topic from the course and preparing an exam on that topic. The remaining students in the class completed a questionnaire to measure their satisfaction. They also completed an online test on the topic following the presentation by their peers. Assessment was based on a win-win strategy because the average mark on the test counted towards the final assessment of the students who gave the presentation. The methodology allows students to study content in greater depth level and develop skills like responsibility, critical analysis and empathy. Learning by teaching lets students take individual actions that demonstrate responsibility for the group as a whole Survey results indicated high student satisfaction. Furthermore, social interaction was greater with the learning by teaching method than with the traditional case study approach.

3.1 Introduction

Is it often said that teachers can only truly understand a subject after they have explained it in the classroom. By preparing materials, lectures, and classes and anticipating students' questions, teachers acquire a deeper knowledge of the subject than they would with traditional methods. Teaching a lesson to peers should therefore benefit students. Learning by teaching means not only helping to reinforce course contents, but also building students' sense of responsibility and self-esteem (Frager and Stern 1970). Empirical evidence suggests that learning by teaching helps students to learn better. Cortese (2005) reported that learning by teaching fosters important skills like observation, attention, and experimentation. Giesecke et al. (1993) found that learning from peers positively affects students.

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This chapter describes a teaching experience whereby the student played the role of teacher. Working in teams, students prepared, taught, and evaluated a course module. This method yielded two outcomes. First, students acquired a deeper knowledge of the subject. Second, students built key transversal skills—as defined within the European Higher Education Area (EHEA)—such as teamwork and public speaking. In addition, students had the responsibility of assessing their peers. The entire process took place on the Moodle platform under instructor supervision. The final course assessment included an incentive system that incentivized the evaluation group and the rest of the class.

This chapter describes a practical case of learning by teaching and assessing for a Business Administration undergraduate course, namely 'Business Growth Strategies'. The chapter contributes to a better understanding of peer assessment's benefits. Students were taught the course using two methods: case study and learning by teaching. We prepared and conducted a survey comparing students' satisfaction and learning outcomes for both methods. Students reported high levels of satisfaction, especially in social interaction.

The chapter is organized as follows: Sect. 3.2 describes the teaching method, Sect. 3.3 explains the survey research method, section 3.4 discusses results, and Sect. 3.5 presents conclusions.

3.2 Teaching Methods

The teaching methods described below were used during the academic years 2013–2014 and 2014–2015 to teach the optional course 'Strategies for Business Growth'. The course was part of the Business Administration degree from the Faculty of Economics and Business Administration at the Catholic University of Valencia 'San Vicente Martir'. Erasmus exchange students accounted for a high proportion of the class, so the course was taught in English. Two instructors divided the course into two 3-month periods, with each instructor adopting a different teaching technique.

3.2.1 Case Study Method

During the first half of the semester, the first instructor presented theoretical elements of the subject using basic Microsoft PowerPoint presentations combined with case studies. The case studies were based on real companies or start-ups, some of which are now well known. Students had to read the case study and follow the instructor's directions. After students had read the case study, the instructor placed the students in groups of three or four. As a group, students then answered questions on relevant aspects of the case study.

The case study method is a well-known teaching method in Business Administration education (Herreid 2007). It is also widespread in many other disciplines including sociology, psychology, history, management, planning, social work, and education (Yin 2013). Teachers use realistic or true narratives to encourage students to combine multiple information sources in a real context. Teachers are thus able to engage students with ethical and social problems related to their discipline (Lundeberg and Yadav 2006). The major advantage of case studies is that students solve problems and apply complex decision-making processes to scenarios of uncertainty.

We used the case study method as a benchmark to assess the benefits of learning by teaching, which is described in the next subsection.

3.2.2   Learning by Teaching and Assessing

At the beginning of the second half of the semester, working groups were created automatically using the online teaching platform Moodle. Randomly allocating students to groups often creates controversy in the classroom. Despite not being a prerequisite for the exercise, random allocation is actually beneficial to students. Students leave their comfort zone, learn to work in multicultural environments (because of the presence of Erasmus exchange students), and must confront the realities of professional life (because students will be unable to choose their colleagues in the future).

The groups prepared material to teach the following topics:

- Corporate growth strategies: Internationalisation and diversification;
- The strategy of the multinational company;
- Strategy, technology, and innovation;
- Virtual growth strategies: Internet and social networks.

The optimal group size is three or four, so if the class has more than 16 students, the lecturer splits the subjects into two parts or extends the work to other topics.

Before starting the learning by teaching programme, the teaching team ensures that each group had signed a performance contract to deliver the following documents:

- A report (max. 5000 words). This document describes the chosen topic in detail. The document is assessed for consistency, structure, and suitability of references.
- A relevant case study. At the end of the case study, each student should prepare a few questions for peers to answer. The group should also prepare solutions of the test and keywords for each question;
- A Microsoft PowerPoint presentation;
- A progress test with 20 questions: 15 multiple choice and 5 true or false.

Within each group, students established formal responsibilities for each deliverable set. All students were expected to collaborate on the tasks, but each student took responsibility for delivery in his or her area. Groups were allowed to use the basic manual for the subject written by Calabuig et al. (2009) to prepare the presentation and virtual resources on the online platform. Nevertheless, groups were expected to expand on the information in the manual. Students had approximately 4 weeks to prepare the documents. During this period, the instructor allowed time for students to study in the classroom and ask questions. The last 2 weeks of the semester were dedicated to presentations and assessment.

Throughout the semester, we invited guest speakers to give a practical vision of the subject based on their professional experience. The groups then had to prepare a case study based on the guest speaker's lecture. This exercise combined both methods. Groups described the company/case and prepared a set of questions and solutions. The experience from the first half of the semester helped them to identify key issues when preparing a case study. These case studies could then be used as teaching materials.

At the end of the preparation period, all groups submitted the results of their work. The instructor uploaded the report, presentation, and case study to the virtual platform. As part of the teaching process, the students had to prepare a questionnaire on Moodle based on the questions that each group had already prepared.

3.2.2.1 Assessment Phase

The assessment of the indivual work dedicated to solving the case study questions was based primarily on the instructor's judgment. The instructor assessed the participation of each of group member and compared the answers with those of other teams. The individual assessment phase is a weak part of the learning by teaching method, and it can be improved in the future.

The learning by teaching method used a complex assessment system. Assessment took place in the classroom via the online platform. Internet access (laptop, tablet, smartphone, etc.) was essential for testing. After listening to the presentation (about 30 min), the rest of the class answered an online survey on Moodle. The survey contained the following questions:

- Content: Demonstrates a complete/good/fair/poor understanding of the topic;
- Topic coverage: During the presentation, the subject matter was covered 100 %/75 %/50 %/25 %/0 %;
- Duration of the presentation: Fair (30 min), Excessive (+30 min), Short (−30 min);
- Clarity in speaking: Yes/No, almost all the time;
- Auxiliary material: Adequate use of resources (PowerPoint, video, graphics, etc.);
- Vocabulary: Use of appropriate vocabulary for the audience.

Assessment Test

After the survey, the class took the corresponding progress test via an online midterm questionnaire on the Moodleonline teaching platform. The instructor modified or added new questions to the midterm evaluation to prevent any knowledge sharing among students.

The group's final score had the following weighting:

- Written report: 50 %
- Class' survey for the group: 25 %
- Class' average test rating: 25 %

The instructor assessed the written report. Using the survey, the class members directly assessed each group's presentation performance. The rating scale was calibrated around the class average score. The class took the midterm test immediately after the presentation. Presenting students therefore received immediate feedback on their presentations. The group members knew their survey results immediatelly after their presentation, and the instructor gave the class average midterm score. Bitchener et al. (2005) argue that direct feedback positively affects learning.

The mark obtained by the group constituted 50 % of each student's final mark. The rest of the assessment included the final examination and an average score on progress tests for each topic from the course. Crucially, this assessment step is available only when using the teaching by learning technique. The instructor alone was responsible for assessing the case study.

Notably, the results of the midterm test affected students' marks. Students were marked depending on how well the group presented the most relevant concepts. This approach encouraged collaboration between group members because questions had to reflect the presentation's content to ensure the class obtained a good mark. The group had an incentive to perform well in the presentation, and each other student in the class was personally motivated to perform well in the midterm test (because it was part of the final mark).

3.3   Research Method

The aim of the research survey was to compare the student's satisfaction and learning outcomes of learning by teaching and of the benchmark method (i.e., case study). Student satisfaction corresponds to the student's perception of the university experience and perceived value of the education received at an educational institution (Astin 1993). The instructor is the main predictor of student satisfaction (Williams and Ceci 1997; Bolliger and Martindale 2004).

When evaluating teaching methods, students may provide general ratings based only on some memorable good or bad experience in certain areas, whether or not that experience actually affected their education significantly (Bowden 2011). Nevertheless, all individuals respond to the same set of questions, so the influence

Table 3.1 Constructs and items

Learning objectives
I feel that I learnt many new things during this activity
The activities were selected on the basis of the method's objective
I felt comfortable with the assignments set during this activity
Social interaction
This method is an excellent medium for social interaction
I felt comfortable interacting with other participants during the activity
The activity helped me to make friends and build better friendships
Instructor
This activity was facilitated by the instructor
The type of activity forced me to interact with my instructor
The interaction between the instructor and me was helpful
Individualautonomy
Other participants acknowledged my point of view during this activity
I was able to form different impressions of some course participants during this activity
Overall
The quality of learning for this activity was excellent

of good or bad personal experiences is minimized. Furthermore, using the dependent sample reduces the degrees of freedom of the t-tests used to compare the means of student satisfaction.

The survey instrument used for this study was based on social presence scales by Richardson and Swan (2003) and Sinclaire (2014). For each teaching method activity, students indicated their agreement with each statement using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). Table 3.1 lists the scales.

The following constructs measured student satisfaction: learning objectives, social interaction, instructor guidance, and individual autonomy. Learning objectives were measured through three items capturing student satisfaction with activities, assignments, and subjects. Social interaction was an important construct in both methods. Three constructs assessing how students relate to peers measured social interaction. The instructor's role as a facilitator in the learning process was measured with three items measuring the facilitation, interaction, and helpfulness of the teacher in the learning process. Individual autonomy was measured with two items: individual point of view acknowledgement and impressions. Overall satisfaction was measured by a single item assessing the overall quality of learning. Finally, students answered two open-ended questions about their perceptions of the benefits of course activities in terms of learning and satisfaction. These questions gave students the chance to make comments and suggestions. Each student answered the questionnaire twice: once for the case study method used in the first half of the semester and once for the learning by teaching and assessing methodology used in the second half of the semester.

3.4 Results

We collected 13 valid questionnaires during May 2015. Table 3.2 reports the descriptive statistics for each method. Both methods received high ratings (above 3) in all items.

Figure 3.1 shows a bar graph of the mean results for each construct. Student satisfaction was clearly above the median in all learning areas: subject, social, and individual empowerment.

For overall satisfaction and social interaction, learning by teaching and assessing had a slightly higher rating than the case study method did. These differences, however, were non-significant according to results of the two-tailed t-tests (Table 3.3).

There were no significant differences between the two methods in terms of student satisfaction'. Moreover, there was no significant differences between the two methods in terms of the constructs measured'. Learning by teaching had a similar acceptance to the case study method. In addition, the role of the instructor was similarly important for both methods.

Results highlight some barriers to innovate in teaching methods, particularly institutional policies (Hockings 2005). Higher education regulations in Spain require all students to pass a final written exam worth a minimum of 50 % of the final grade. This constraint might reduce student satisfaction regarding learning by teaching. Student involvement might be hindered because they are ultimately required to sit a traditional exam. Without this barrier, would expect students to be totally involved in the subject preparation with the learning by teaching method.

3.4.1 Qualitative Results

In this section, we report some of the open responses that summarize students' feelings. These qualitative responses highlight some interesting aspects of student satisfaction that the survey did not fully capture. For example, three students highlighted the importance of foreign language learning (i.e., English). Because groups were allocated randomly, all groups contained students from a range of nationalities and

Table 3.2 Summary statistics

	Case study		Learning by teaching	
	Mean	SD	Mean	SD
Learning objectives	3.538	0.46	3.487	0.46
Social interaction	3.435	0.56	3.615	0.59
Instructor	3.667	0.69	3.435	0.64
Individual autonomy	3.769	0.59	3.692	0.75
Overall satisfaction	3.307	0.94	3.461	0.87
Observations	13		13	
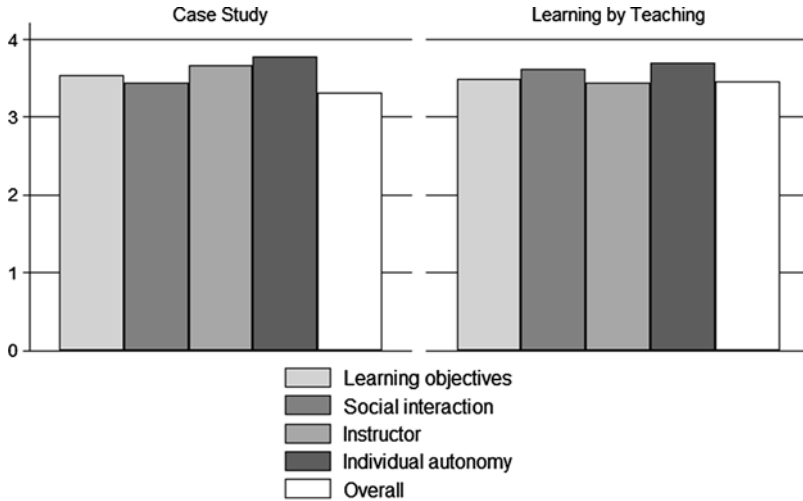
Fig. 3.1 Case study vs. learning by teaching

Table 3.3 T-test for difference

	Difference	
Learning objectives	−0.051	(−0.27)
Social interaction	0.179	(0.73)
Instructor	−0.230	(−1.01)
Individual autonomy	−0.076	(−0.08)
Overall satisfaction	0.153	(0.41)
Observations	13	

t statistics in parentheses

languages. Therefore, learning by teaching improved not only social interaction but also cultural awareness and language skills.

How satisfied were you with this course? For example, were your goals and/or expectations met?

"I learnt a lot of new things and I saw a new style to have lessons"

"All in all I was satisfied with the class because I learnt a lot and due to the case study it was very practical related. And due to the preparation of the presentation in the second part we got more in contact with other students from other cultures and that was quite interesting"

"I'm very satisfied with this course because I listened and tried to speak English language and the course activities and assignments were appropriated."

"I didn't expect much of this course because most of the concepts I have already known. However, the methodology and the different activities were useful for my improvement."

"The course activities and assignments were appropriate. I already knew a lot of stuff taught in class. I liked the group discussions."

"Many things were already taught during our classes at home. The content was really long but I liked the conversations in class and the interactions in groups."

Which aspect of this course was most beneficial to you and why?

"Integration, communication."

"Cases done within the class due to the variety of things. Especially entrepreneurial case studies were very good."

"The best for me was the presentation of guests and presentations during the classes. They were interesting and give me some good information for following life."

"The case studies were interesting and most of the guest lectures as well. In addition I liked the contact with the different people from different countries."

"Case studies and discussions about the topics with the whole class and teacher."

"I think that the most beneficial aspect was the interactions with people that came from other countries because we could learn some English and we could teach some Spanish."

"Talk all the time in English with Erasmus because we talked business English. So, I've improved my English and my knowledge about many things of the businessstrategy."

"The type of activities, we can look the reality of the company with external instructors and we need to think as a CEO to resolve problems of some companies."

"The most beneficial of this course was the people who came to present their companies and also the different Erasmus classmates."

3.5   Conclusions

The learning by teaching and assessing method allows students to study course material in greater depth than is otherwise feasible with traditional teaching methods. Learning by teaching and assessing helps students to develop competencies such as accountability and critical analysis. The technique forces students to step out of the comfort zone afforded by traditional courses, which generally require students to study only for an exam. With learning by teaching and assessing, in contrast, students must confront situations they will face in professional environments. The evaluation process promotes decision-making and encourages students to identify relevant issues. The method also improves one important aspect of the case study method: teachers' assessment of students. As Douglas et al. (2006) note, 'promptness of feedback on performance' and 'usefulness of feedback on performance' are two feedback items that are key components of student satisfaction.

Despite questionnaire results, our observations during the last 2 years have shown that teaching by learning and assessing stimulates students' empathy more than traditional methods do because playing the role of teacher forces the student to think about other students. Results of the qualitative survey highlight the benefits of learning by teaching in social interaction, cultural awareness, and foreign language learning. Learning by teaching is therefore highly recommendable for groups with a high percentage of foreign exchange students.

This approach also enhances students' responsibility and empathy. The result of a student's individual midterm influences both the student's own marks and the marks of peers. A poor test result is a setback not only for students' academic

records but also for the results of classmates. Thus, students must take individual actions that demonstrate responsibility for the group as a whole.

Both academic and personal results are unequivocally positive. Learning by teaching nonetheless requires careful teaching and technology planning. We are interested in making changes to improve the programme. These changes may include correcting cases studies, creating a self-assessment instrument, and finding the right tool to measure aspects of education such as empathy and self-awareness.

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