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The use of a case study approach to teaching and group work to promote autonomous learning, transferable skills and attendance

Karianne Backx
Cardiff School of Sport,
University of Wales Institute Cardiff
kbackx@uwic.ac.uk
Tel. 02920417077

Abstract

The project aimed to promote autonomous learning through the implementation of group work and a case study approach to teaching in a large class size, year one module. The module was evaluated by the students through a structured questionnaire. These evaluations were compared to the student evaluations of the same module, taught in a more traditional way in the previous year, therefore involving a different cohort. This ensured that the effectiveness of the case study approach to teaching was checked and compared to the traditional methods of teaching, rather than following a cohort of students, who might have matured in terms of their 'learning to learn' ability. Assessment by student response reinforced the effectiveness of cooperative-learning strategies compared to the traditional lecture-based classroom in terms of their perceptions of enhanced autonomous learning, transferable skills and increasing their attendance. A significant difference was observed between groups for the questions related to the 'learning process' ($p < 0.001$). Specifically students felt more able to work independently, using effective planning and time management skills, and were better at evaluating their own performance through self-appraisal and reflection within the intervention group. The group taught through traditional methods reported significantly lower levels of satisfaction with their ability to work in groups than the intervention group ($p < 0.001$), the intervention group also felt that more transferable skills were gained during the module ($p < 0.001$), rated the quality of the module as a whole significantly higher ($p < 0.01$) and also felt they learnt more on this module compared to other modules than the traditional taught group ($p < 0.001$).

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Introduction

Learning becomes more effective when students are actively involved in the learning process (Bonwell and Eison, 1991; Sivan, Wong Leung, Woon & Kember, 2001). The case study approach to teaching is a way in which active learning strategies can be implemented. There are a number of definitions for the term case study, for example, Fry, Ketteridge & Marshall (1999) describe case studies as complex examples which give an insight into the context of a problem as well as illustrating the main point. Most importantly, case studies may be student-centred activities based on topics that demonstrate theoretical concepts in an applied setting. The structure and format of a case study approach to teaching can be likened to problem-based learning as described by Savin-Baden (2003). The case study approach differs from the problem-based learning approach in that larger numbers of students can engage in the process at one time, which is appropriate for many institutions, as classes at undergraduate level are growing rapidly. The students typically also get more guidance in a case study approach to teaching compared to problem-based learning as the learning outcomes are clearly set out, and the process is supervised and often supported by lectures.

Educational research has shown case studies to be useful pedagogical tools. Grant (1997) describes the benefits of using a case study approach to teaching as an interactive learning strategy, shifting the emphasis from teacher-centred to more student-centred activities. Case studies have also been linked with increased student motivation and interest in a subject (Mustoe and Croft, 1999). The case study approach to teaching is student-centred and will promote autonomous learning. The term ‘autonomy’ can be used in several ways within this context. Firstly the term can be applied to situations where students learn entirely on their own, and secondly, refer to a set of skills which can be learned by the student and applied to self-directed learning. Thirdly the term autonomy could mean an inborn capacity of the student, which is suppressed by institutional education, or alternatively it could imply the exercise of the learners’ responsibility for their own learning. Lastly it could be defined as the right students have to direct their own learning (Benson and Voller, 1997). The author

interpreted autonomous learning to be the skills that students developed to evaluate their own performance through reflection and self-appraisal, as well as the ability to work independently using effective time management and planning skills. Students are exposed to a range of teaching and learning strategies within the case study approach, which allows them to find the learning style which suits them best (Johnson, Herd, Adrewartha, Jones & Malcolm, 2002). A case study approach to teaching allows the gap between theory and practice to be bridged by the demonstration of the application of theoretical concepts. It therefore provides an opportunity for the development of transferable key skills such as communication, group-work, information gathering and analysis, problem solving, time management, presentation skills and increases the students' enjoyment of the topic and hence their desire to learn. The student will 'learn to learn' and will be able to apply their knowledge to real life situations they might come across once they start working. A case study approach to teaching encourages students to share knowledge and information through group work and discussions.

The use of group work facilitates the acquisition of knowledge and several other desirable attributes, such as communication skills, teamwork, problem solving, independent responsibility for learning, sharing information, and respect for others (Johnson and Johnson, 1989). A case study approach to teaching can therefore be thought of as a small group teaching method (that can also take place within a large lecture theatre with a large group of students) that combines the acquisition of knowledge with the development of generic skills and attitudes. Group work has been shown to benefit learning in terms of information retention (Prince, 2004). Students also become more articulate in expressing ideas and appreciate different viewpoints when compared to the traditional lecture method. Another distinct advantage of the teaching approach that uses team-based or group learning is that attendance has been shown to increase (Herreid, 2001). In terms of employability, most jobs today depend on good interpersonal skills students need to experience working in teams in class to improve these skills. One thing that is vital when making use of group work is that each team set rules that they will follow, they draw up a contract and all members sign it. All members of the team also set sanctions or penalties for those people that break the rules. Teams revisit these rules and revise them after the first few weeks of the module. The process of rule development along with the peer evaluations is necessary for good team work to take place (Herreid, 2001).

The Innovation

The project aimed to promote autonomous learning, develop transferable skills and increase attendance through the implementation and evaluation of a case study teaching approach and group work in a 1st year Sport and Exercise Science module. Traditionally, this module had been taught using twice-weekly lead lectures delivered by an interdisciplinary team. A further objective of the project was to enhance the lecturers' understanding of the potential of the case study approach to teaching.

Sport and Exercise Science is ideal for using a case study approach because of the wealth of practical, real-life examples that can be used to contextualise the theoretical concepts. During the first year of the project six case studies were written that supported the learning outcomes of the module. During the second year of the project the module was taught using a case study approach during both the lead lectures (once a week) and the tutorials (every other week).

At the start of the module students were divided into teams (~5 students/team). Students worked within the same team throughout the module. Tutorial groups were made up of groups of 4-5 teams of students and a tutor that facilitated the session. These tutorial sessions were repeated eight times to allow for the total cohort (158 students) to be taught in this way. Case studies were discussed during all tutorials and, where appropriate, during lead lectures. Students sat within their teams during all the lead lectures and tutorials. To ensure that students worked effectively within the small teams a peer evaluation was put into place according to a model used at University of Buffalo (Herreid, 2007).

The module assessment consisted of individual and team course work as well as individual and team class tests. Student marks were determined by scores in three performance areas: individual performance, team performance and peer evaluation. The individual work constituted 75%, and the team performance constituted 25%, of the total module mark. The team performance mark was modified by the peer evaluation using the method described hereafter. For the peer evaluation each individual (anonymously) rated their team members at the end of the module. Individual peer evaluation scores were the average of the points they received from their team members. If there were five members in the team, each individual assigned 40 points

among their four team members. If a student received an average of 10 points, then he received all of the possible marks of the team. If he received an average of 9, he received only 90% of the possible team mark. Additional directions given were that students should only assign equal points if all members contributed equally to the group work, and that they could allocate a maximal of 15 points. Students did not have to distribute all points if they felt this was unwarranted. Students had to give reasons for giving someone more or less than 10 points, and also had to write down what they thought they deserved themselves and why.

Evaluation

Ethical approval for the study was obtained through the University's ethical committee. The module was evaluated by the students with a structured questionnaire (See Appendix 1), which was given to the students to fill out at the end of the academic year, during their final lecture. These evaluations were compared to the student evaluations of the same module taught in a more traditional way the previous year. The traditional method involved two lead lectures per week and occasional 'break-out' groups within these lectures. Students were also allowed to work in groups of their choice outside the class room setting. Using two different cohorts of students ensured that the effectiveness of the case study approach to teaching was checked and compared to the traditional methods of teaching in terms of key skills and autonomous learning, rather than following a cohort of students, who might have matured in terms of 'learning to learn' ability. The two cohorts had similar characteristics; all were first year students who had been accepted on the programme using the same entry requirements and all students were of County standard in terms of sporting background. All students followed the same undergraduate curriculum and expressed an interest and empathy with the subject of Sport and Exercise Science, as this was an option module. Both cohorts followed the same induction into Higher Education and the programme.

The questionnaire was developed by adapting existing validated questionnaires such as the versions of the course evaluation and course rating questionnaires used by the Institute for Transforming Undergraduate Education (University of Delaware, 1999). The questionnaire was piloted using a group of 15 first year students who were not

registered on the CSM or TM modules, to check the validity of the questionnaire. Series of closed questions were used to extract information about: 'working in groups' (Items: 4, 6, 7, 19, 20, 21, 26, 27, 28, 29), 'transferable skills developed during the module' (Items: 1, 2, 3, 9, 24, 25), 'learning outcomes of the module' (Items: 11, 12, 13, 14, 15, 16, 17, 18), 'ability of the lecturers' (Items: 31, 32, 33, 34, 35, 39), 'the learning process' (Items: 8, 10), 'problem solving abilities' (Item: 5), 'lectures and tutorial content' (Items: 22, 23), 'appropriateness of the assessments' (Item: 30), 'effort required' (Item: 37), 'amount learnt in this module compared to other modules' (Item: 36), and the 'quality of the module' (Item: 38). The closed questions were scored on a 5-point scale (5 =strongly agree, 4 =agree, 3 =neither agree nor disagree, 2 =disagree, 1 =strongly disagree).

The questionnaire response was 50% (n =35 out of a cohort of 70) and 90% (n =158 out of a cohort of 175) for the traditionally taught (TM) and intervention groups (CSM) respectively. The sample size of the TM group (n =35) prohibited the teasing out of individual items within the themes. The overall summed score of the themes were therefore compared between the groups. The Likert-type data were treated as interval data, as justified by Dawis (1987). SPSS (version 12.01 for Windows) was used to analyse the data using parametric statistics (Student t-test, two-tailed). P-values less than 0.05 were considered to be statistically significant. Six open questions enquired about which aspect(s) of the module contributed most to learning, whether the module made a difference in other academic or social situations, how many hours were spend on the module, whether the student benefitted from the process of investigating and discussing problems, changes that should be made to improve the module, and any problems that were encountered during the module.

Findings

A significant difference was observed between cohorts for the 'working in groups' theme, as shown in Table 1. The group taught through traditional methods reported lower (34.3 ±5.0) levels of satisfaction with their ability to work in groups than the CSM group (40.4 ±3.8, $p < 0.001$). The case study approach therefore alters the way the students perceive their ability to work in groups and how beneficial they found working in groups to their ability to learn. The approach to working in groups was much more

structured in the CSM cohort, where students worked in set teams throughout the module, and students used peer evaluation to assess the contribution of members of their team. It could be argued that more value had been placed on the concept of group work in the intervention module by the lecturers, and that this had highlighted the benefits of group work to these students, which could be reflected in the answers to the questionnaire.

Table 1 Questions related to the theme 'Working in groups'

Item Number	Question	Traditional teaching (n =35)	Case study teaching (n =158)
4	This module increased my ability to work effectively as a member of a team to achieve agreed objectives	2.7 ± 0.9	4.1 ± 0.7
6	This module helped me to develop my ability to interact with other people	3.0 ± 0.9	3.9 ± 0.7
7	This module made me more confident	2.8 ± 0.9	3.6 ± 0.7
19	Working in groups was beneficial to my ability to learn	3.0 ± 1.0	4.1 ± 0.7
20	Communicating about sport & exercise science issues with my peers was beneficial to my ability to learn	3.3 ± 0.8	4.0 ± 0.5
21	Participating in discussions was beneficial to my ability to learn	3.3 ± 1.0	4.0 ± 0.7
26	I am comfortable working in groups	4.1 ± 0.6	4.3 ± 0.6
27	I feel comfortable asking for help from others in my group	4.1 ± 0.4	4.1 ± 0.6
28	I feel that my group members listen to me when I present information	3.9 ± 0.4	4.2 ± 0.5
29	I feel comfortable sharing information with others	4.0 ± 0.6	4.2 ± 0.5
	***Overall summed score**	**34.2 ±5.0**	**40.4 ± 3.8**

Scale: Strongly agree = 5; Agree = 4; Neither agree nor disagree = 3; Disagree = 2; Strongly disagree = 1; *: $p < 0.001$

Questions related to the theme 'Transferable skills' are shown in Table 2. The intervention group felt that more transferable skills were gained during the module (CSM: 22.1 ±2.5; TM: 18.9 ±2.1, $p < 0.001$). These transferable skills were also mentioned in the open questions, where numerous students on the module taught

through the case study approach mentioned having 'learnt to find information' as an aspect that contributed most to their learning and their 'ability to reference correctly' made a difference in other modules followed.

Table 2 Questions related to the theme 'Transferable skills'

Item Number	Question	Traditional teaching (n =35)	Case study teaching (n =158)
1	This module helped me to develop my oral communication skills	2.5 ± 0.8	3.6 ± 0.7
2	This module helped me to develop my written communication skills	3.3 ± 0.8	3.6 ± 0.7
3	This module increased my ability to interpret numerical data and written information	2.8 ± 0.9	3.6 ± 0.7
9	This module developed my skill to use computers for information retrieval and data analysis	3.0 ± 0.9	3.4 ± 0.8
24	Finding relevant information by using electronic resources was beneficial to my ability to learn	3.5 ± 1.0	4.1 ± 0.7
25	Finding library resources, other than electronic ones was beneficial to my ability to learn	3.8 ± 0.8	3.9 ± 0.8
	***Overall summed score**	**18.9 ±2.8**	**22.2 ± 2.5**

Scale: Strongly agree = 5; Agree = 4; Neither agree nor disagree = 3; Disagree = 2; Strongly disagree = 1; *: $p < 0.001$

Both groups agreed that the learning outcomes of the module had been met (TM: 3.3 ±3.0; CSM: 3.8 ±3.0; $p = 0.32$). The lack of difference between the groups on this aspect of the questionnaire demonstrates that the case study approach to teaching can achieve both improved student interaction and cover content. This finding argues against previous concerns about the ability of the case study approach to cover content and achieve learning outcomes compared to traditional teaching methods, it must be

remembered that covering content is not the same thing as learning. This ties in with significant difference that was observed between groups for the questions related to the 'learning process' (CSM: 7.1 ±1.1; TM: 6.3 ±1.1; p <0.001). Specifically students felt more able to work independently, using effective planning and time management skills, and were better at evaluating their own performance through self-appraisal and reflection. The intervention group rated the questions related to the 'ability of the lecturers' significantly higher than the traditional group (CSM: 23.2 ±2.5; TM: 20.8 ±2.6; p <0.001). The teaching staff on the module was almost the same for both teaching methods. The increased interaction between staff and students is therefore the most probable explanation for this finding.

The intervention group scored significantly higher than the traditional group on the question related to the amount of effort that was required for the module compared to other modules (CSM: 3.5 ±0.8; TM: 3.0 ±0.9; p <0.001). Working in smaller groups might have led to an increased feeling of responsibility towards others in the team to do the set tasks, and therefore a sense of increased effort.

The intervention group rated the quality of the module as a whole significantly higher (CSM: 4.0 ±0.6; TM: 3.5 ±0.8; p <0.01) and also felt they learnt more on this module compared to other modules than the traditional taught group (CSM: 3.3 ±0.8; TM: 2.5 ±1.1; p <0.001). 'Lectures and seminar content' (CSM: 7.6 ±1.2; TM: 6.6 ±1.4; p <0.001) and 'appropriateness of the assessment' (CSM: 3.9 ±0.7; TM: 3.5 ±0.7; p <0.001) were also scored higher by the intervention group. The use of case studies in the module led to students rating their ability to solve problems effectively and efficiently higher, than those students who followed the traditionally taught module (CSM: 3.7 ±0.6; TM: 3.1 ±0.8; p <0.001). The learning outcomes and the assessment set for the module were however, the same for both groups of students. The case study approach allows the learner to seek their own learning method. Instead of sitting and listening, the student is required to find the information that is required to solve the case. Group work also encourages the students to report their findings to the rest of the team. Discussion often takes place within the team allowing the information to be repeated in several different formats, thereby reinforcing the information. Johnson, Johnson, and Smith, (1991) performed a meta-analysis of over a thousand studies comparing the effectiveness of cooperative-learning strategies with the traditional lecture-based classroom. The data

are unambiguous: students working in groups retain information better, like the subjects better, develop a better appreciation for a diversity of opinions, and develop better skills in self-expression. The results from the current study therefore reinforce these findings.

Benefits and Drawbacks

Attendance levels were monitored throughout the modules. For the CSM, these were high (>90%) throughout the academic year, compared to other modules, and higher than the previous year (<60%) when there was no structured group work or peer evaluation in place. This increased attendance could be due to several factors. Firstly, by asking students to sit in their teams during lectures and seminars, students were aware of absenteeism within their group. The team peer evaluation could be used by students to upgrade/downgrade members of their team in terms of their involvement in the team discussions and course work. Student peer evaluations during the module were found to be honest and their mark for the peer evaluation reflected their attendance. Secondly, it was easier for staff to keep an eye on attendance as it was clear during smaller group work when students were absent. Thirdly, students felt an increased sense of responsibility towards others in their team to attend the classes, as their knowledge was needed to score high on group tests. Group work also led to staff getting to know the students better, even in such a large class setting. This enabled staff, despite the large number of students on the module, to monitor attendance, 'pick up' on problem students, and provide improved pastoral care.

One of the objectives of the project was to enhance lecturers' understanding of the potential of the case study approach to promote autonomous learning. Lecturers involved in the project were asked by the module leader/researcher about their feelings towards the effectiveness of the teaching method. All staff (n =9) involved with the module were enthusiastic about the teaching method. They reported the teaching experience to be 'more enjoyable' than when they delivered the same content the previous year in the traditional teaching format, and several lecturers commented on the increased levels of student engagement. Drawbacks of the project were the administration of the module, for example finding timetable space (adequate classrooms for the tutorial groups) and management of student numbers (increased from 70 students in the 1st year to 175 in the 2nd year of the project).

Future Developments

Dissemination workshops were given to staff members at the university who had not been involved in the project. These workshops focussed on case study writing, the case study approach to teaching and the use of organised group work within a larger cohort. A staff workshop is planned, during which staff that attended the dissemination workshops will discuss their own implementation of the case study approach to teaching. It is envisaged that the feedback from staff will highlight the advantages and disadvantages of this method of teaching in different subject areas. Exchanging experiences will lead to further dissemination of this teaching method and the implementation in different teaching settings.

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Appendix 1: Module evaluation Questionnaire

	This module:	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	Helped me to develop my oral communication skills	1	2	3	4	5
2	Helped me to develop my written communication skills	1	2	3	4	5
3	Increased my ability to interpret numerical data and written information	1	2	3	4	5
4	Increased my ability to work effectively as a member of a team to achieve agreed objectives	1	2	3	4	5
5	Increased my ability to consider and solve problems effectively and efficiently	1	2	3	4	5
6	Helped me to develop my ability to interact with other people	1	2	3	4	5
7	Made me more confident	1	2	3	4	5
8	Helped me to develop my ability to work independently using effective planning and time management skills	1	2	3	4	5
9	Developed my skill to use computers for information retrieval and data analysis	1	2	3	4	5
10	Developed my skill to evaluate my own performance through self-appraisal and reflection	1	2	3	4	5

I have a good understanding of:						
11	The definition of sports science & exercise science and their main sub-disciplines	1	2	3	4	5
12	The interdisciplinary nature of sport & exercise science	1	2	3	4	5
13	How the sub-disciplines within sport & exercise science integrate to enhance health and performance	1	2	3	4	5
14	What is meant by the scientific method	1	2	3	4	5
15	How to apply the scientific method to problems within sport and exercise science	1	2	3	4	5
16	How to interpret data and appreciate issues related to its validity and reliability	1	2	3	4	5
17	How to read scientific literature to gain an understanding of common research problems in sport and exercise science	1	2	3	4	5
18	The career opportunities that exist within sport and exercise	1	2	3	4	5
The following aspects of this module were beneficial to my ability to learn:						
19	Working in groups	1	2	3	4	5
20	Communicating about sport & exercise science issues with your peers	1	2	3	4	5
21	Participating in discussions	1	2	3	4	5
22	Lead lectures	1	2	3	4	5
23	Seminars	1	2	3	4	5
24	Finding relevant information by using electronic resources	1	2	3	4	5
25	Library resources, other than electronic ones	1	2	3	4	5
26	I am comfortable working in groups	1	2	3	4	5

27	I feel comfortable asking for help from others in my group	1	2	3	4	5
28	I feel that my group members listen to me when I present information	1	2	3	4	5
29	I feel comfortable sharing information with others	1	2	3	4	5
30	I think that the assessment in this module fairly reflects the objectives of the course	1	2	3	4	5
The lecturers in this module have:						
31	Helped me develop my reasoning process by posing questions, and challenging and critiquing information presented	1	2	3	4	5
32	Guided and intervened when necessary to keep students on track	1	2	3	4	5
33	Listened and responded well to student concerns and problems	1	2	3	4	5
34	Encouraged the use of a variety of resources	1	2	3	4	5
35	Used good judgment to provide information when necessary, but knew when to deflect some questions back to the students	1	2	3	4	5
		Much less than usual				**Much more than usual**
36	Compared to other modules, I learned:	1	2	3	4	5
37	On the whole, the amount of effort required in the module was:	1	2	3	4	5
		Very poor				**Excellent**
38	Overall, I would rate this module as:	1	2	3	4	5

39	Overall, I would rate the lecturers on this module as:	1	2	3	4	5

Please answer the following open questions:	
40	What aspects of this module contributed most to your learning?
41	What aspects of this module should be changed to make the module better for you?
42	How many hours per week would you estimate that you spent on this module outside formal lectures/seminars?
43	Do you think you benefited from the process of researching and discussing the problems? Why or why not?
44	Have the skills learned in this module made a difference in your other academic or social situations? If so, please give examples.
45	What special issues, concerns or questions do I need to know about in order to plan this module in the future?