**CENTRE FOR TEACHING
& LEARNING ECONOMICS**

Better Together?

– Group work and its Discontents

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Abstract

In this paper, we describe our experiences with group work, both formal and informal, involving undergraduates at a large culturally diverse university. We explain our motives for introducing group work and present data on group performance and student feedback. Finally, we discuss strategies for incentivising participation, including addressing free ridership issues, and consider how to teach students to appreciate the value of group work. We found that participation and performance can be improved by ensuring assigned teams are diverse, providing some but not too much direction on tasks and individual roles, regularly reminding students of the value of group work, developing a wider culture of learning from each other and finding ways to make the group work matter both when it is happening and in any final assessment.

Keywords

Contents

Section 1: Introduction

We are teaching our students to not only understand economic concepts and tools but also to be able to explain them and their value to different audiences and to be able to apply those tools to answer relevant questions. To develop the deeper levels of understanding students need to roll up their sleeves and get working directly with the content. Being given opportunities to explain ideas to each other, discuss challenges, debate viewpoints and identify ways of working well with others enhances learning of the content and development of professional group-working skills. Students get immediate feedback from peers, and the teacher, on their views in a 'safe' environment and have the opportunity to build on what is learnt from independent study.

Group working has genuine value but it is well known that it can also be a challenge for those participating. In an educational setting there are also challenges for those organising the teaching and learning activities. For participants, one set of challenges relate to struggling to work with people of different personality characteristics and backgrounds, different learning styles and different degrees of interest in the content of the subject. Another set of challenges relate to a variety of prior experience ranging from never working in a group before to regularly taking the lead in group work, and therefore difficulty in organising and motivating peers with very different expectations.

These challenges bring inter-related questions for the teacher:

- How should groups be organised given the mix of students in the course?
- How much direction should be given on tasks, activities and group organisation, for example in relation to identifying 'leaders'?
- What teaching strategies work best to encourage sharing of ideas?

- What output should students be asked to deliver that facilitates individual contributions and group working?

- How do you incentivise participation in the activities?

As educators, our aim is to maximise the potential value of group work by recognising and finding ways around these challenges. In this paper we provide examples of a range of group work strategies developed in an undergraduate economics curriculum. We introduced group work across five different courses which involved a mix of teaching and learning strategies both in and outside of the classroom. Our classes were both large and culturally diverse. Group work was a new and potentially uncomfortable experience for many students.

Our experience suggests the following lessons for those considering group working in their courses. First of all, it is important to have strong incentives in place and to clearly communicate the purpose and value of group working to students. Ensuring individual and team activity is visible is key to incentivising participation. Linking the group work to assessment is also important and needs to be complemented with finding ways to make the group work matter at the time it is taking place. Secondly, the size and makeup of the group can have a big effect on the group dynamic and even small variations can lead to large differences in outcomes. There is merit in consciously considering characteristics of the group when assigning students. Thirdly, when considering ability and willingness to engage it is important to design group work activities that build on prior knowledge and have a clear link to wider course learning outcomes. Using different strategies regularly in and outside the classroom can help develop a wider culture of learning in this way. Finally, having set deadlines and well-defined steps in a project often helps structure group work and gives some individual accountability. However, giving overly detailed instructions and assigning group leaders can result in automated allocation of tasks rather than working out what is best for the

group, reducing the opportunity to develop a 'team work spirit'. A balance needs to be reached between providing support on how best to organise team working and stifling team dynamics with too much direction.

Section 2: Related literature

The benefits of collaborative learning setups are well documented in the literature. Collier (1980) shows that peer-group learning can promote higher order cognitive skills in higher education. Springer et al (2006) provide a meta-analysis to show that small-group learning is effective in promoting greater academic achievement, more favourable attitudes toward learning, and increased rates of programme completion. The literature on team-based learning, e.g. Michaelsen and Sweet (2011), is extensive and shows how working collaboratively is not just beneficial for the students' academic experiences, it also equips them with invaluable skills for the workplace.

Collaborative learning does not necessarily have to take place in formalized groups as evidenced by the popularity of the Think-pair-share or Two-way talk learning models (see, e.g. McGoldrick, 2012, Buckles, Hoyt and Imazeki, 2012, and Hansen and Salemi 2012). In such a setup, students are given a question or problem to consider and then asked to 'pair up' with one or two students in the classroom to share their responses. Group ideas can be fed back to the larger cohort. This can be done orally or through interactive technologies. The questions can be designed to require students to have to think and apply concepts. Buckles, Hoyt and Imazeki (2012) suggest that this can be most effective if students are given a role to play, for example being a policy maker or CEO of a company. Hansen and Salemi (2012) also emphasise that students need to be made aware of why the discussion is valuable to their learning. Biggs (1999) notes that 'think aloud' learning activities can help "demonstrate

conceptual skills" and working in groups can allow for further elaboration of ideas and improved problem-solving (Table 1, p68).

Informal problem-solving groups are also documented to enhance student understanding and achievement (Garfield 1993). Students are asked to work on a computational problem, either individually or in groups. They can be asked to identify *how* to solve the problem or asked to come up with the answer. This can be part of 'think-pair-share' and 'quiz' formats and can be done through interactive technologies or old-fashioned paper-based methods.

These activities are all about students having what Light and Cox (2008) refer to as 'meaningful encounters with the content'. For all activities it is important that students get feedback on what they are doing. This is nicely summarised by Reese (2011, p5): "Feedback is also needed because learning by doing requires not only doing something but also learning something from the doing." The teacher can provide immediate feedback in the lecture by summarising and commenting on responses and adding extra ideas where relevant. Seeing the answers of others will also provide students with immediate feedback on how their ideas compare to others. Similarly, small group discussions facilitate informal peer feedback.

The problem of 'free riding' in group work is a genuine one. Fox (2010, p33) notes, for example, that learners 'often find it difficult to see why they should make the effort'. Students may think that in the large group it is possible to be anonymous and for there to be limited consequences to not participating fully. Steps need to be taken to address this early on in the course. Buckles, Hoyt and Imazeki (2012) suggest reducing anonymity by having a seating chart or talking to students in different parts of the room regularly so they know that they can be seen. Having transparency on individual participation in group work outside the classroom is also important, which can be helped by using technologies such as wikis or blogs.

There is also an issue that some students may be nervous about being called on in class to answer a question or being asked to discuss their ideas with others. Light and Cox (2008) discuss related concerns with putting students 'where the action is'. It is important that students recognise that they will be put into similar situations throughout their life, in a whole range of careers, and that they develop confidence in this area. But it is not a case of 'sink or swim'. As emphasised by McKimm (2007, p9) the learning environment needs to be 'safe' and supportive for the students. Anonymised answers, facilitated by technology, can help here as can the fact that answers come from a group rather than the individual. Students who are uncomfortable working with others could also be allowed to reserve the right to work on their own.

There is merit in taking time at the start of any group work activities to explain the 'ground rules' of the learning activities and getting student buy-in to their roles. Students are, as noted by Biggs (1999), going to want to understand the need for the activity at that point in time and to see where it links with other elements of lecture and the assessment. Buckles, Hoyt and Imazeki (2012) emphasise that before the course starts the teacher should be clear on what the grading policy is, how students are expected to communicate with the teacher and each other, what the course syllabus is and how students will be learning. McKimm (2007) notes that writing things down in the syllabus may not be enough, as different people interpret the written word differently. Time therefore needs to be taken to explain and discuss the approach to teaching and its rationale in early lectures.

Section 3: different types of group work in our undergraduate programme

In this section, we describe the group work elements used in five modules taught by the authors. We group the modules in increasing order of the formality of constructed groups. We start by describing the modules where group work is core to teaching and learning, and then

discuss the exact form of group work, building up from relatively loosely constructed "Think-Pair-Share" type activities to a full-fledged Team-Based Learning module. Table A in the Appendix summarizes the demographic characteristics of each module, and the collaborative teaching and learning methods used across the modules.

These modules are spread across the three years of our undergraduate programme, and are all optional modules. The student body comprises mostly UK and EU students ("Home"), but there are many students from outside the EU ("Overseas") and some students who visit for a term or two ("Visiting"). Approximately 60% of the students in the programme are male and 46% of the permanent students are Overseas students. Our students are all Economics majors, and entry into the programme requires a fairly high level of mathematics preparation (an A* in A-level mathematics or the equivalent).

In the first and second year, students in the programme have to take a few mandatory courses in economics, and over their three years at university, a given number of optional courses in economics. Outside of this, they are free to take optional courses from other departments. Each optional module comprises 20 hours of lectures and 4-5 hours of small-group tutorials over 10 weeks, with a one-week reading week in the middle of term. These tutorials are made up to 15 students and are typically led by a PhD student working as a teaching assistant. Most modules are assessed by a single final exam, with no credit for coursework.

3.1 Modules

The modules in which group work was introduced in 2014/15 were quite varied in terms of content and student body. There was one module, meant for first years only; this was also the only one with formalized Team-Based Learning (TBL). There were two modules that were open to both second and third years, and two that were restricted to third (final) year students.

Three of the modules used LectureTools, an online system that allows lecturers to post slides including interactive ones (e.g. "clicker" questions). Like other web-based audience response systems, LectureTools allows free response as well as multiple choice questions. Unlike other web-based audience response systems, LectureTools allows students to make notes to accompany slides and to ask questions linked to particular presentations as well as to flag confusing slides.

Only first years were allowed to take Introduction to Economic Thinking (IET). The raison d'etre of this module is to teach students to read, write and think like an economist. IET focuses on two main sub-fields of economics, migration and education, and uses these literatures to train students to engage in policy discussions as trained economists. As such, it was apparent that the traditional lecture format was unsuited to the module and a more hands-on, learning by doing, approach had to be adopted. The structure provided by the team-based learning format provided a good balance between open- and closed-ended tasks which seemed quite appropriate for this module. Unlike the other modules discussed here, the module had a course cap of 50, though the eventual enrolment was 56. This cap was meant to facilitate the introduction of TBL. The module was nearly 70% male, and about 40% of the students were Overseas. Visiting students were not permitted to take this module. Like a couple of the other modules described here, this module used LectureTools extensively both for individual participation as well as for team participation. The final mark in this module is based on 4 in-class quizzes, an end-of-term multiple choice exam and an end-of-year final exam.

Industrial Relations (IR) was open to both 2nd and 3rd year student in economics. Two thirds of the module was dedicated to what is often referred to as "Personnel Economics" while the last third was on unions. In 2014/15, 49 students chose the module, which is quite consistent with previous years. Of these, the vast majority were 3rd years. This module was

also predominantly male (65%) with 27% of the students Overseas and a further 20% Visiting. Like IET, this module used LectureTools for in-class activities as well as for clarifying questions at any time. This module was assessed using a single final exam at the end of the academic year. Students also participated in a group case study project and completed four assignments which are a mixture of problem-solving and essay writing.

Economics of Regulation (ER) was an optional one-term module open to economics students in 2nd and 3rd year. The class size in 2014/15 was 64, 45% of whom were Visiting students primarily from the US visiting UCL for one-term. The module is predominantly male (64%) and of the non-Visiting students 69% were in their third year. On the course students learn about why and how some industries, largely utilities, are subject to price control regulation. They learn both about the theory of the economics of regulation and how regulation works in practice in the UK. Students discussed issues in groups in lectures and tutorials and worked on a group project which includes presentation of their research in tutorial sessions. The module was assessed using a single final exam at the end of the academic year and students submitted two not-for-credit essay assignments during term.

Competition Economics (CE) is an optional module open to economics students in their final year of the undergraduate programme. The class size in 2014/15 was 82. There was a fairly even split between UK or EU-based students and Overseas students including a small group (5) of Visiting students. 62% of the students were male. Students taking the course learn about how competition (anti-trust) authorities use industrial economics to investigate the effectiveness of competition in markets. They were exposed to technical industrial economics models and to real world competition investigations and were asked to make the links between the two. Students work together in lectures and tutorials and also worked on a not-for-credit group case study wiki project. The module is assessed by end of year final exam and students submit three not-for-credit homework assignments during the term.

Economics of Money and Banking (MB) is an optional one-term module restricted to final year students. The class size in 2014/15 was 91 students, with 10% Visiting students. The course is popular with joint degree students, particularly those taking Economics and Geography degree (15%). 65% of the students are male. The focus of the course is on making use of concepts and tools developed in prior microeconomics and macroeconomics courses to explore competition and regulation policy in the financial sector, taking account of lessons learned in the Global Financial Crisis 2007-2009. Students are exposed to relevant economic models, a wide range of literature in the area and developing regulatory policy in the UK, EU and US. They discuss topics in groups in lectures and tutorials and also work in groups for an in-class debate towards the end of term. They submit two essays during the term and are assessed by a single end of year exam.

Different modes of group working are evident across the modules, varying in particular in terms of the formality of the group organisation and output requirements and the extent to which group working was directed by the teacher. Figure 1 illustrates the spectrum of group working types each of which is described further below.
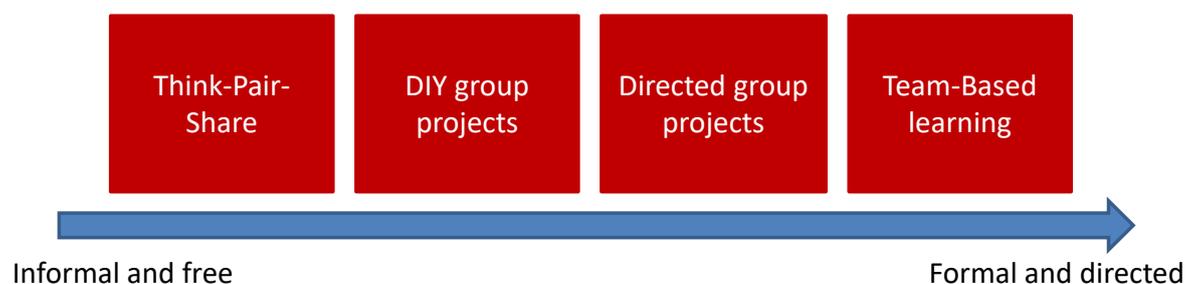
| Think-Pair-Share | DIY group projects | Directed group projects | Team-Based learning |

Informal and free → Formal and directed

Figure 1: Range of group working teaching and learning strategies

3.2 Think-Pair-Share type informal group activities

Most of the modules discussed here had at least some kind of informal group discussion element in lectures and/or tutorials. These ranged from polling students using clicker-type questions, then asking them to discuss their answers with whoever was sitting next to them

that day, and then repolling (traditional Think-Pair-Share) to having students sit in the same groups each week with the option to talk to the other members of their group before submitting answers.

The latter model was trialled in IR. The 2 hour "lecture" was usually divided into a 1 hour traditional lecture and a 1 hour case study session. Here students sat in their tutorial groups in the lecture each week. They were encouraged to confer with group members before submitting individual answers to clicker-type questions during the lecture part of the meeting. Most questions were close-ended (e.g. "what determines the slope of the contract curve"), but there were also questions aimed at canvassing opinion or starting a discussion (e.g. "do you think your university degree is a pure signal of ability?").

IET also included informal collaboration in terms of a peer review in the small-group tutorials. Here students were first given examples of a particular type of economic writing, e.g. a data report, and then asked to write one themselves, based on a set of sources provided by the lecturer. In the tutorials, they were asked to review each other's submissions (with author identifiers removed).

Lectures in ER and MB all included time for students to reflect on policy questions linked to the lecture material. Students were asked to discuss the question with those sitting near them and to feedback their ideas to the wider group. In some lectures the room was divided into sections with students in each section asked to focus on a particular aspect of a question (Jigsaw groups). The discussion groups were not organised and did not relate to the groups that worked on a project outside of class.

LectureTools was used in CE and allowed for problem-based questions to be raised for students to consider as well as conceptual questions relating to the course material. Students were given the opportunity to discuss questions raised in groups and to then submit their answers electronically on LectureTools. The teacher reflected on the answers submitted

in plenary discussion with the group. All group working of this type happened between students who chose to sit near each other.

Informal group discussions, with no submitted output, were also core to learning in small tutorial sessions in ER, CE and MB. In these sessions students were allocated to groups at the start of the module and worked together on different activities in the classes. Activities included preparing essay plans in groups, solving unseen problems in small groups and presenting key arguments from different academic papers linked to the course topics. The group activity regularly involved using flipchart paper and presenting back the group's ideas to others.

3.3 "Do-It-Yourself" (DIY) group project

Several modules included a group project among other pieces of coursework. In this section, we discuss the projects which were mostly outside of the lecture time and had limited intervention from the lecturer.

IET involved a small DIY group project – a team debate in a tutorial. The lecturer decided on the topic, and assigned each team to a side in the debate. Some basic instructions were also given e.g., each side should speak for no more than 15 minutes, each presentation should not have more than 5 slides, and each group member should be given a chance to either present or to respond to questions or points made by the opposing teams. Beyond this, students were free to use any resources from the module or elsewhere to make their points. They were also free to structure their arguments and divide the work as they chose. The only requirement was that the debate slides be submitted a couple of days before the event, so that both sides had a chance to see the other's arguments and prepare a response.

The second half of the IR "lecture" was in most weeks dedicated to a case study. These were prefaced by a lecture or two on the theoretical background (e.g. a principal-agent

model to precede a case study looking at AIG's CEO compensation structure). Each group was asked to appoint a group leader for each meeting, and as there were 10 weeks and about 8 people per group, everyone got a chance to serve as a group leader at least once. This added an element of individual accountability and a focus for the group discussion, as the group leader was the one who was responsible for consensus-building and the one who presented the group's response. During the case study analysis, the lecturer structured the discussion by asking several questions which grew in breadth and complexity. Group members would discuss possible response amongst themselves, with the lecturer walking around to check on progress and answer clarifying questions. Once a consensus had been reached, the group leader for the day would submit the response through LectureTools. Then, the lecturer would invite a handful of groups to present their ideas. The lecturer and the rest of the cohort could ask questions or debate the pluses and minuses of these responses.

Each group was responsible for writing up one case study. This meant that after the class discussion of the case, group members would put together all the elements of the case (a summary of the preparatory material, an exposition of the relevant theory as well as the class discussions of resolutions and strategies) in one coherent essay. This group writing work was done using a wiki. The lecturer set up the wiki with a basic structure, group members were then asked to take responsibility for different sections of the wiki, with the final version of the wiki being due approximately one week after the in-class discussion. The lecturer then commented on the wiki online, and the group responsible were encouraged to address the points made in these comments by editing the wiki. Finally, the group presented their case study in a tutorial, and received feedback from the tutor, in addition to the lecturer. The wiki was not awarded any marks, nor did it form a part of the final mark in the module. The main incentive for making an effort was that the final exam included one question (worth 30% of the total marks) that was based on the wiki. So writing the wiki in as complete a manner as

possible, and receiving and responding to the lecturer's feedback was a way to directly prepare for a significant part of the exam.

In the first tutorial in ER, students were assigned a regulated sector to research by pulling a 'sector name' from a hat. All students with the same sector in that tutorial formed a project group. There were five sectors to work on in total and twenty-one groups altogether. Students were provided with a note providing a broad outline of the type of issues that they should be looking at in their research and were encouraged to make links between what they were learning about in lectures and what they found out about real world regulatory policy from their sector research. General instructions for the end of project output, an in-class group presentation, were also provided. Students were provided with links to websites on each sector that they may find helpful in their research but were free to work with whatever sources they wanted. They had around six weeks to work on the project over the term. There were no mid-project checks on progress or update assignments. Students were not required to submit anything in writing for the project. The only output was the oral presentation itself. When all presentations were completed students gave permission for their slides to be uploaded onto the course intranet page so that they could share what they had learned. There is no formal feedback or assessment of the presentation, although an email was sent to each student providing high-level feedback to help them with any future presentations. There is a compulsory question in the exam, worth one third of the total marks, linked to what students learnt from the research project. The question is designed to ensure students are familiar with the whole case that the group considered.

A debate was organised for one tutorial in MB. Like with IET students were given instructions on the debate motion, what side of the debate they would take and how the debate would be run in the tutorial. Students worked in groups that were assigned at the start of the module for all tutorial work. Beyond these high level instructions students were free to

undertake their own research and develop their own arguments. Time was allotted in the tutorial for responses to be developed and no written work was submitted. The expectation was that students would meet to discuss their arguments ahead of the tutorial session.

3.4 Directed group project

In this section, we discuss group projects which entailed detailed instructions and structure set up by the lecturer. In CE, each tutorial was randomly split into two groups and each group assigned a case study to work on by the lecturer. The case study was a competition (anti-trust) report that the group needed to review and assess. They were asked to produce a wiki that summarised the case and critically evaluated the role of industrial economics in the case analysis. There were 16 case groups in total covering 10 different cases. No credit was assigned to the case study project and there was no formal assessment of group working. There was a compulsory question in the end of year exam (worth 30% of the total mark) linked to what students learnt from their research and hence an incentive to be familiar with the whole case and to ensure the wiki was as complete as possible by the end of the project.

The case study project ran from the third week of term to the second last (10th) week of term. At the start of the project students were provided with a note explaining what was required and provided with links to the case study report the group was working on. Further information and ideas were provided in a one-hour demonstration lecture at the start of the project and students were invited to ask questions at this point.

The project was set-up with weekly deadlines to answer two specific questions on the case. Each week two people in the group were asked to take the lead on starting the answer to the questions that week and others were expected to edit the wiki and add comments to develop the group's answer. The teacher monitored activity regularly, and made it clear that students were expected to have made a start on answering the questions by lunchtime on the

Wednesday each week and complete the task by close of play Friday. With the online wiki it was possible to see which students were adding to the wiki, making comments on other people's contributions and viewing the wiki. The timing of activity for each student was also evident. The lecturer made comments in the wikis directly, suggesting areas that needed more detail and/or asking clarification questions. In Friday lectures the lecturer provided comments on the progress that was being made, reemphasising to groups the need to keep on top of the material and for all members of the group to contribute. Students who were not actively participating were also emailed directly and encouraged to get involved.

During the term only the project group could edit and view the wiki. At the end of the last week of the project all wikis were made visible to everyone on the course. Students also discussed lessons learned in an end of project demonstration lecture. They also discussed their wikis and their experience with them in the final tutorials of the course, linking what they had learned to sample exam questions on the case study project.

3.5 Formal Team-Based Learning

The basics of Team-Based Learning (TBL) are laid out in Michaelsen (1983). The fundamentals comprise setting up groups with 5-8 participants, testing individuals on preparatory material before each section of the module, re-testing in teams with immediate feedback, and then moving to team applications where more complex questions were addressed. IET was the only module to use a full-fledged version of TBL. In this module, as in IR, students were assigned to groups at the start of term, and had to sit with their group in each lecture meeting.

At the start of each new block of the module, there were individual "Readiness Assessments" or quizzes to make sure that everyone had prepared adequately. These were followed immediately by a team Readiness Assessment, where the team took the same quiz

but had to submit only one answer to each question and therefore had to engage in some consensus-building. Once these quizzes were completed, there were "bite-size" lectures to introduce and summarize the topic at hand and most importantly, there were open-ended team "applications". The two main team activities – the team quiz and the team applications – each served a very specific purpose. The main role of the team quiz was of course to start a conversation about the preparatory material. Because each student had completed the individual quiz in class immediately before the team quiz, there was an element of individual accountability. The discussions and negotiations around the team's choice of answer to the quiz questions often revealed information about team members that helped facilitate other team activities. For example, a student who is usually quiet might show that they were very well-prepared in terms of the assigned material compared to a more forthcoming student. The process of reaching a consensus might reveal certain students to be natural leaders and diplomats.

The team application was usually a policy exercise in which students had to put forward arguments for and against current policies or suggest specific policies to address real-world problems. The policy context was the UK scenario, but empirical papers based on data from around the world were used. Teams were asked to brainstorm on parts of the assignment at a time, while the lecturer walked around the room interacting with students and clarifying any outstanding issues. At the end of the given time, teams submitted their responses on LectureTools and then presented these ideas to the entire cohort.

Section 4: Group performance

In this section, we discuss our impressions of how well the group design worked in different contexts. We discuss each module below and summarise our general findings here.

Overall, we found that in formal group work tasks outside the classroom students found ways to allocate tasks and largely work individually. Requiring them to present jointly or work together in the classroom on a structured activity was more likely to elicit genuine group working. In terms of format, a wiki platform seemed to make students think it is easier to hide (despite activity being transparent), making free-riding seem less costly relative to a situation where a public presentation is expected.

Ensuring the activity linked to prior knowledge or pre-reading helped encourage participation but became a constraint if students did not prepare in advance and some students may have lacked confidence if they did not understand the prior reading. Related to this it is important that students have clear expectations of what the course content and learning style is in advance. Lower levels of engagement with group work in CE may have been due to a number of students choosing the optional module who then signalled that it was less mathematical/more policy orientated than they had wished, despite it being made clear in the syllabus. In contrast students in MB seemed to have much higher levels of interest in the topics which may have made them more able and willing to engage in in-class discussions. This was also true of IET students versus IR students.

In some modules the group make-up seemed to matter and there were potential issues around the best size of group. But it is hard to identify clear rules of thumb on either group characteristics or size. Providing tight guidelines, with weekly specific tasks, can help ensure regular activity but may stifle students working out together what to do and when best to do it. We also found that assigning someone a leadership role ensures that a task is completed in a timely manner but may cause others to step back from activity when they are not leader.

It is obviously difficult to get students to put effort into the group work when there are no marks associated with it and limited formal assessment and feedback. Making an exam question at the end of the academic year relate to the group work seems to have limited

incentive effects. For modules delivered in the first term of the year this could be up to five months after completing the course. On the flip slide, making it clear that there is 'no wrong answer' in in-class discussions and providing supportive feedback in these sessions is important to encourage participation. In that context, perhaps the fact that it does not count helps to some extent with those who normally would be risk averse to saying something.

4.1 Group performance in IET

In IET, the first-year TBL module, the level of interaction was relatively high, and the discussion was almost always of high quality. The individual quizzes at the start of each section show both how many students attended that particular lecture but also how well they had prepared the assigned material. There were 4 quizzes which added up to 10% of the final mark in the module. It was clear from the quiz results that students found it difficult to prepare the material on their own (or did not put in the effort). However, the average performance did improve over the term, suggesting that students soon saw the value of preparation. It was interesting that even when students did not know the answers individually, the team quiz which followed the individual quiz was a chance for them to at least start thinking about the answers.

Table 1 shows the characteristics of each group in IET, their attendance and a metric of their participation, and finally, whether or not there was a clear leader who had emerged organically in the group. It was clear that there were particular groups that almost from the start had greater absenteeism. As Table 1 shows, there is no clear pattern for why this is so. However, it is true that the group that performed most consistently in terms of attendance and participation had 5 women out of 7 group members and appeared to operate with a flatter organisational structure (more democratic) than the others.

Group	Total	Female	Overseas	Group Outcome (lecture attendance)	Group Outcome (participation)	Obvious group leader?
A1	7	3	4	50%	Satisfactory	No
A2	8	1	2	70%	Good	Yes
B1	8	2	2	70%	Satisfactory	No
B2	7	2	2	50%	Excellent	Yes
C1	7	2	3	60%	Good	Yes
C2	7	5	4	75%	Good	No
D1	7	2	4	70%	Satisfactory	Yes
D2	5	2	1	60%	Good	No

Table 1: Group Characteristics in IET

4.2 Group performance in IR

The IR module included informal collaboration in the class as well as more formal collaboration for the case study and an out-of-class group project (the case study write-up on the wiki) and a group presentation. Overall the case study collaboration did not transfer over to informal collaboration across the board. However groups that interacted well and produced quality responses in the lecture seemed to collaborate informally as well, and those that did not work very well formally, didn't interact much informally.

Table 2 shows the group characteristics and outcomes for IR. As in IET, the group with a majority of women worked quite democratically. However the two groups with the highest quality of participation were quite different in comparison – group C comprise largely of UK and EU students, while group B had only one. Surprisingly, the group with the highest proportion of visiting students had one of the poorest group outcomes.

Group	Total	Female	Overseas	Visiting	Group Outcome (lecture attendance)	Group Outcome (participation)	Clear group leader?
A	8	2	1	0	60%	Good	Yes (+1)
B	9	4	6	2	80%	Excellent	No
C	9	2	1	1	75%	Excellent	No
D	10	7	2	2	60%	Satisfactory	No
E	7	1	2	4	60%	Satisfactory	No

Group	Total	Female	Overseas	Visiting	Group Outcome (tutorial attendance)	Group Outcome (participation)	Clear group leader?
F	6	1	1	1	50%	Good	Yes

Table 2: Group Characteristics in IR

4.3 Group performance in ER

In ER the majority of students actively participated in lecture Think-Pair-Share exercises although there were always a few students that sat by themselves and preferred to reflect independently. In tutorial sessions students worked together effectively on activities. There was little sign of students free-riding in these situations and limited evidence of groups being overly led by one or two people. Students seemed to enjoy working in this way.

Table 3 shows the group characteristics and outcomes for the out of class group project in ER. The attendance outcome reflects attendance in tutorials during the term. The participation outcome relates to participation in the group presentation on the research project. For nearly all groups it was clear that students had divided up the tasks, worked independently and regrouped just before the presentation. There was very little sign of one students taking on a leadership role in the groups. Many groups made no attempt to make the presentation look consistent, either in the slides or in the way in which they presented their ideas orally. One group showed signs of having worked together on their presentation in a holistic way. But in one other group the students didn't even appear to know each other's names and made no attempt to link their work to that of others. Visiting students were more comfortable with the idea of a group project and were active in their groups but they did not specifically stand out as taking the lead in all groups. On the other hand it is notable that the Best Project Group, marked with a * in Table 3, was all female with 100% attendance record whilst one of the poor performing groups was all male with 90% attendance.

Group	Total	Female	Overseas	Visiting	Group Outcome (tutorial attendance)	Group Outcome (participation)	Clear group leader?
A1	3	1	0	1	93%	Good	No

A2	3	1	0	1	93%	Good	No
A3	3	0	0	1	87%	Good	No
A4*	3	3	0	2	100%	Excellent	No
B1	3	2	2	1	93%	Poor	Yes
B2	3	1	0	2	100%	Satisfactory	No
B3	3	2	1	1	93%	Poor	No
B4	4	1	1	1	85%	Good	No
C1	3	0	1	2	93%	Good	No
C2	3	1	0	2	93%	Satisfactory	No
C3	3	2	1	1	87%	Good	No
C4	4	0	2	1	90%	Poor	No
D1	4	1	1	2	100%	Good	No
D2	3	1	0	3	93%	Good	No
D3	3	2	0	2	87%	Excellent	No
D4	3	1	0	2	93%	Satisfactory	Yes
E1	3	0	1	1	93%	Satisfactory	No
E2	2	1	1	1	90%	Satisfactory	Yes
E3	2	1	0	0	100%	Good	No
E4	3	1	0	1	93%	Good	No
E5	3	1	1	1	100%	Good	Yes

Table 3: Group Characteristics in ER

4.4 Group performance in CE

In CE students were reluctant to participate in Think-Pair-Share discussions in lectures and to respond to questions orally or via LectureTools. Over the term students generally became less enthused by 'think-pair-share' exercises and in the mid-term evaluation there was a request for more discussion with the whole class and the lecturer rather than with each other. Following this the lecturer mixed up the teaching strategies, at times encouraging plenary discussion as a big group and at other times encouraging students to share with each other and then feedback to the group.

The experience of limited enthusiasm for working with others was echoed in the CE wiki project. Two students did not participate at all in the wiki, one group had very limited participation from all students and most other groups had some but limited participation from at least two of the group members. Table 4 shows the group characteristics and outcomes for

the project. The tutorial attendance measures the average attendance rate of students in each

group and provides a guide to wider engagement in the course. The participation outcome

relates to participation in the group wiki. In general, each week the assigned 'leader' for a

question contributed to the wiki and other group members took a back seat. Out of sixteen

group wikis, three were excellent and one, which won a 'best wiki prize' and is marked with a

* in Table 4, was comprehensive and had clearly been produced by the group as a whole.

Discussions with that group afterwards revealed that they were all regular attendees in

lectures and they met away from the wiki to discuss the case during the term. Looking at the

group characteristics there is no clear correlation between the gender, country of origin or

attendance make-up of the group and performance. The groups that were excellent had

female proportions ranging from 33% to 50%, no Visiting students and proportions of

Overseas students ranging from 33-75%. Of the groups that were poor performing one had

20% females and the other 66%. The proportion of Overseas students varied.

Group	Total	Female	Overseas	Visiting	Group Outcome (tutorial attendance)	Group Outcome (participation)
A1	4	2	2	0	75%	Satisfactory
A2	5	3	3	1	90%	Good
B1	6	2	3	0	88%	Good
B2	6	3	3	2	79%	Good
C1	5	1	1	1	85%	Satisfactory
C2	5	1	3	0	70%	Poor
D1	5	2	3	0	85%	Good
D2*	6	2	2	0	96%	Excellent
E1	4	0	3	0	81%	Satisfactory
E2	5	2	1	1	75%	Good
F1	4	2	2	0	88%	Excellent
F2	4	1	0	0	81%	***Good***
G1	6	3	4	0	75%	Excellent
G2	6	4	1	0	88%	Poor
H1	6	1	3	0	92%	Good
H2	5	2	2	0	100%	Satisfactory

Table 4: Group Characteristics in CE

4.5 Group performance in MB

In MB the majority of students actively engaged in 'think-pair-share' exercises in lectures although some were reluctant to engage with their peers or to share what they had discussed with the wider group. Over the term students seemed to get more comfortable with the approach and the material.

Section 5: Student Experience

In this section, we describe the student feedback in each of the modules. Since each module had a slightly different combination of collaborative aspects, we present the feedback by module. In all modules, students were asked to complete a short midterm survey after the first 4-5 weeks of classes, and a longer evaluation towards the end of the full 10 weeks of classes but before exams.

5.1 Feedback in IET: Team based learning

In IET, the first year TBL module, 14 students responded to the end of term survey. When asked about their experience of the TBL format, students were overwhelmingly positive:

> "I find that the best thing about team-based learning was that from the group discussions to presenting our ideas to the class and followed by class discussions, I got to hear a lot of different perspectives from people. I learned that there is not always a right answer to a certain question."

> "The team-based learning worked really well, it gave us immediate answers to the questions, and was an opportunity to hear how other students explained their thought processes, instead of simple hearing the lecturer's explanations. The discussion element made the material much more accessible, and gave me a clear way to approach questions concerning data."

> "… it helped to improve the social side of being a part of the Economics department, as you meet many more people than on the traditional lecture format."

Students also commented on the specifics of the format, e.g., the choice of a different group leader for each class and the seating arrangements:

> "… (I)t was a good idea to select a different team leader each week, as it encourages participation from everyone, meaning you remain engaged throughout the course."

> "… I think that the seating arrangements prevented students from further benefitting from sharing ideas, as seating in rows was making our communication difficult."

> "The setup of the lecture room meant that it was very easy to sit back and not participate in lectures if you were sitting far away from the team leader."

Free-riding as expected was the single largest problem:

> "Future group works should be marked and forced to contribute to a decent percentage of final grades, say 20% (The 10% like iRA will not work). Problem of free-riders shall not be unduly concerned since students are 'vicious' enough to sort out the free-riders themselves in ways that will eliminate the whole free rider problem, as long as THEY HAVE SOMETHING IN STAKE."

> "… very frequently some team mates did not come for lectures so it is usually always the same people in the discussions. I do realise as lectures are not compulsory, it is up to the students to take the initiative."

The bottom line seems to be that in certain groups, both the level of preparation of individual members as well as their attendance record and participation level were excellent, and therefore the quality of discussions in the lecture was also quite good. In others, *from the start of term*, there was low attendance, and this adversely affected the effectiveness of TBL. However, it should be pointed out that as noted in the previous section, one of the teams with chronic low attendance also had very high quality contributions to the discussions.

5.2 Feedback in IR: Think-Pair-Share and DIY project

In IR, the groups sat together during the entirety of the lecture as in IET, but the formal group work took up at most half of the lecture slot. Here, 21 students completed the end of term survey, and nearly all were positive about the group aspects of the module especially the group case study method:

> "The case study groups and methods are particularly effective in making the material more interesting and in encouraging you to think in different ways. Also makes it easier to learn and remember material."

> "… case discussions can get very interesting. It's nice to link concepts to real-world examples!"

> "Group work is not something I'm used to but it is nice to hear other people's opinions on problem sets, going through them myself, and then with the group, and then in the tutorial and again in the peer marking does help to cement knowledge."

Peer marking of essays in the small group tutorials was also mostly well-received:

> "Peer marking … (was something I liked the least) … just because it means more time is devoted to the module (arranging and then attending a meet with group etc.). However I appreciate that it made me more critical of answers and I could get a better sense of what was required in answers."

> "The setup of the tutorials is different to others I've had before but they allow me to test my understanding by having to explain how I got my answers to my group-mates and classmates."

A few commented on the amount of preparation required for the group discussions in the lecture:

> "Case studies showed interesting real examples of theory, but there is too much information that we are unsure whether we should retain or not, such as small empirical facts or statistics, or arbitrary names and locations etc."

Surprisingly, there were only a couple of comments about free-riding:

> "In my case, the group was too big to be able communicate effectively and, more importantly, delegate the work. I believe a good improvement will be to split increase the number of groups thereby reducing the number of members in each group."

This was perhaps predictable from the overall impressions of the group activity in the lecture. Only 1 of the six groups did not have full participation from all present members. This module was relatively small, and while it suffered from some of the same problems that faced the other modules like fixed seating and a culture of low lecture attendance, the small size probably helped address the free-riding issue quite a bit.

5.3 Feedback in ER: Think-Pair-Share and DIY project

In ER students has the opportunity for think-pair-share in every lecture. Of the 18 students that responded to the end of term feedback a number recognised the value of these activities.

> "It was helpful to see other students' reasoning and how they approached the questions. Sometimes it is easier to understand when another student is explaining"

> "Kept students engaged and in some ways tested how well the students were following the material"

> "Aided in the clarification of ideas and the exposure to new viewpoints"

Others, however, found the group discussions difficult. Issues raised included general nervousness, difficulty getting other students to engage and not feeling prepared.

> "I found it quite intimidating, especially as sometimes there was not time to have done all the required reading and it made these discussions quite uncomfortable as sometimes it was necessary to have a very strong understanding of the topic in hand"

> "May come across classmates who are not willing to share ideas and may be quite awkward"

On the case study project and presentation students recognised the value of doing research in groups although a number noted that much of the work ended up being done individually.

"One thing I like about it was it taught me about team coordination"

"Working with a team is always nice as it forces you to explain your understanding to other people."

"Not much (group work) – tasks were just divided up"

Students in ER did not raise any specific concerns about free-riding. This is consistent with the overall impression of the groups running relatively smoothly without any signs of particular people being disengaged.

5.4 Feedback in CE: Think-Pair-Share and Directed Project

CE Students were again asked about the value of 'think-pair-share' exercise in lectures for their learning in the end of term evaluation. A number of students who responded (14 in total) emphasised the value of these exercises for their learning.

"I found it easier to learn a concept by explaining it to another person"

"Just listening to lecturer sometimes may not be good enough to fully understand the course ideas. In that sense, by talking to peers, I was able to make sure that I have full understanding of the ideas"

Limitations of the think-pair-share activities were also identified, largely around student discomfort with the idea of talking to others in the lecture room.

"It can get quite odd and stressful"

"It was just awkward moments of having to interact with a stranger"

Feedback on the case study group wiki project was obtained in the end of project lecture,

with students responding to questions on post-it notes anonymously and in the end of term evaluation. 31 students responded in class and 14 responded to the end of term online survey. Many students highlighted the value of working in groups on this type of case study project.

"The team help give ideas and fresh perspectives"

"We can discuss when we are not sure about something"

"The team leader roles meant we learnt the value of delegating tasks."

"It showed me the importance of working and discussing things as a team in order to get work done effectively"

The challenges of group learning in a wiki case study project were also identified. In most cases these related to issue arising with free-riding by some group members, difficulty finding time to meet as a group, the size of the groups being too big and the wiki disincentivising face-to-face meetings. Students also emphasised that the wiki project was essentially run as individual tasks, perhaps driven by direction given by the lecturer around weekly questions and leader roles.

"Teams were quite large so although we discussed the case as a group we allocated questions individually to maximise time"

"Using Wiki was good - I do like the platform and its function, but realized if not face-to-face it won't work well and wiki becomes excuse for not meeting up."

"Getting a group to work together to work on a project is hard especially when not everyone in the group is motivated to take part"

"Quite stressful in terms of finding time meeting with group and working on it regularly"

Students also provided constructive suggestions on how to improve the case study project in future years, in the process signalling some potential issues with the organisation and

direction of the project in 2014/15. Students also signalled that students would be more incentivised to participate if the project counted in their course assessment.

"Be able to discuss it in tutorials so we are able to present it to other classmates"

"Make contribution to the group task mandatory for everyone with consequences for not contributing"

"Smaller groups"

"Have it part of the final grade assessment. Like a project work component so everyone will have the incentive to contribute. Having it in the exam (summer) is not sufficient to incentivise some to contribute."

In contrast to other modules a few students were generally negative about group working, suggesting that in this course a small cohort had chosen an optional module that did not suit their preferred way of working.

"The case study further re-enforced my desire to work alone"

"I prefer to come up with my own answer"

5.5 Feedback in MB: Think-Pair-Share

Feedback on think-pair-share activities in weekly lectures was generally positive from the 35 students who responded to the end of term evaluation in MB.

"…in class discussions ….help to know about the opinions of other students on various topics".

"Getting people to talk to each other about the topic was a nice break to listening and I think made concentrating for 2 hours a lot easier. It also made asking question in class easier, as we were expected to talk in class."

But some students did raise concerns about the approach to learning because of confidence

issues.

"I (also) lived in fear each week of being asked for my response by the lecturer."

"A lot of people struggle to understand, discussion can only go so far."

Group discussions in tutorials were also considered helpful by those students who responded to the end of term evaluation.

"I received new ideas and different ways to approach questions"

"I think it's good to work in teams and present to make a course more applicable to the real world"

Where more formal group working, and advance preparation was required, for the class debate students raised similar limitations and constraints to those highlighted in CE.

"There was not that much team work involved. We met an hour before the debate and had already split what were going to say within twenty minutes"

"…you always have a couple of people in the group who do not participate and are then carried with the group"

"It will be better if you could book at room...that is somewhat bigger and easier to move around"

Section 6: What's Next for Group Work?

The opportunity to look across five modules that involve different forms of group working has provided us with insights on what works well and what areas need improving. Figure 5 summarises lessons learnt so far in our teaching of these modules including thoughts on how to maximise the potential of different group working strategies.

	Think-Pair-Share	DIY Group Project	Directed Group Project	TBL
Identified potential advantages	• Students develop ability to explain ideas • Students general develop confidence in working with others • Provides update on student understanding • Mixes up learning styles in long lecture	• Freedom for students to identify best ways of working • Develop research skills • Develop team spirit through on-going engagement outside classroom	• Helps students organise themselves • Ensures core elements of project delivered in timely manner • Ensures participation by students • Develop team spirit through on-going engagement outside classroom	• Clarity on individual and team responsibility • Formal points to assess individual and team readiness • Regular collaboration in same team encourages team spirit • Individuals find roles that suit their needs and abilities
Identified potential limitations	• Limited time affects scope of discussion • Team spirit limited as no formal team arrangement in lecture • Difficult to assess participation and performance • Some students intimated by need to feedback to wider group	• Free-riding difficult to monitor and manage • Students not familiar with group working struggle to identify ways of working • Tendency to breakdown into individual tasks	• Restricts development of wider research skills and independent thinking • Leader roles and weekly tasks interpreted in very narrow way resulting in majority of work being individual and around deadlines	• More difficult to manage as class size increases • Issues if students don't prepare in advance • Dominant personalities may take control all term
Lessons learned on how to get full potential from T&L strategy	• Limit scope of questions • Ensure students have background material to engage with question • Be clear 'no such thing as a silly answer' • Mix up who ask for feedback from	• Public oral presentation of output helps with free-riding • Provide support on 'group working' as well as course content • Make project and group working matter for final grade • Provide other opportunities for groups to work together alongside project	• Communicate clearly what is expected in relation to leader role • Provide general timescales and areas to cover but resist urge to formalise all aspects of research • Make project and group working matter for final grade • Provide other opportunities for groups to work together alongside project	• Keep scope of in-class activities manageable • Provide clear instructions on pre-reading in timely manner • Keep size of groups management but with sufficient scale to allow learning from others • Vary leaders each week to limit risk of one person dominating

Table 5: Lessons learnt

As the discussions of group performance and student experience have shown, group work appears to have been a more or less a success across all five modules. However there were some clear indications both from student feedback and from lecturer observation that

some students were not engaging and that this was having a negative effect on those who were. To this end, we have developed a shortlist of changes or improvements that could be implemented to facilitate group work across all the modules.

The first issue students raised was one of incentives. Since most of our modules are assessed only on a final exam, there is little direct gain to students from participating in the coursework and in-class activities. Even where there is a small percentage of the final mark determined by in-class activities (as in IET), it is clear that it is not enough. Changing this system to make these formative activities count is the obvious way to address this issue. There are already plans in place to assign 20% of the overall course grade to the group wiki project in CE from 2015/16. Pending similar changes in other modules, making the output of the group work more visible (e.g. showcase the recorded presentations or the presentation materials on a module website) may achieve the desired effect. Recognizing the group outputs (the wikis or the presentations) with a token award might do the same. This is tricky as most modules do not award prizes for coursework (this is viewed as a controversial "cash for grades" type incentive), but something like a certificate presented by the department chair may serve the purpose.

The second issue, free-riding, is related to the first. Even if there are incentives to complete the group project, how can we ensure that every member does their share? Many of the assigned groups in these modules were made up of 6-8 students, and there were suggestions from the students that this was too big. So rethinking the size and perhaps the makeup of the groups may alleviate this problem. The argument against a group of size 3 or 4 is that given the culture of low attendance, this might imply an effective group size of 1 or 2. There is some indication from the data in Section 4 that having a critical mass of women in the group helps the group dynamic. Visiting students can also provide a focal point of the group as they are more used to group working. These data might help setting up groups in

future iterations. Providing additional contact time (perhaps during small group tutorials) for discussing group projects is another way to facilitate collaboration and increase the costs of free-riding. In addition, where there is an expectation of all students delivering an oral presentation linked to their group work there is a higher chance of student participation. Where marks are awarded to the group work exercise it is possible to design marking schemes that explicitly provide marks for evidence of group working and penalties for individuals who do not participate.

The final issue arising from student feedback is the focus on the value of group work. Rethinking the purpose of each element of the group activities and explaining this explicitly (perhaps repeatedly) to students may enhance the perceived benefits of collaboration. This relates to both the pedagogic and learning benefits, but also the more practical issue of the value of team work in the workplace. We found that even among students who had a positive experience of group work, many viewed it as a side benefit of the module rather than something that was central to the learning process. Sharing feedback from previous cohorts on the value of the group work in the course may help, alongside clearer and regular communication when group activity is taking place on what learning outcomes are being met. This is perhaps the most difficult issue to address as we find that students often discover these benefits only after they have completed a module with collaborative work. Wider communication in the programme, for example with talks from alumni, may help students better understand the value of working effectively with others.

References

Biggs, J. 1999. "What the student does: teaching for enhanced learning." *Higher Education Research and Development* 18 (1): 57-75.

Biggs, J., and C. Tang C. 2011. *Teaching for quality learning at University*. 4th Edition, McGraw Hill, Society for Research into Higher Education and Open University Press.

Buckles, S., G. M. Hoyt, and J. Imazeki. 2011. "Making the large-enrollment course interactive and engaging." Chapter 10 in *International Handbook on Teaching and Learning Economics*, edited by Hoyt, Gail M. and KimMarie McGoldrick, Cheltenham UK: Edward Elgar

Collier, K. G. 1980, "Peer-group learning in higher education: the development of higher order skills." *Studies in Higher Education* 5 (1): 55-62.

Fox, R. 2010. "Constructivism Reviewed." *Oxford Review of Education* 27 (1): 23-25.

Garfield, J. 1993. "Teaching statistics using small-group cooperative learning." *Journal of Statistics Education* 1(1): 1-9.

Hansen, W. L., and M. K. Salemi. 2011. "Improving classroom discussion in economics courses." Chapter 5 in *International Handbook on Teaching and Learning Economics*, edited by Hoyt, Gail M. and KimMarie McGoldrick, Cheltenham UK: Edward Elgar

Light, G., and R. Cox. 2008. "Lecturing: Large Group Teaching.", Chapter 4 in *Learning and Teaching in Higher Education: The Reflective Professional,* edited by Light, Greg and Roy Cox, 2nd Edition, London:Sage

McGoldrick, KimMarie. 2011. "Using cooperative learning exercises in economics." Chapter 4 in *International Handbook on Teaching and Learning Economics*, edited by Hoyt, Gail M. and KimMarie McGoldrick, Cheltenham UK: Edward Elgar

McKimm, Judy. 2007. "Curriculum design and development." Online publication. Accessed 14 July 2014. http://www.faculty.londondeanery.ac.uk/e-learning/setting-learning-objectives/Curriculum_design_and_development.pdf

Michaelsen, Larry. K. 1983. "Team Learning in Large Classes." *New Directions for Teaching and Learning*: 13–22.

Michaelsen, Larry K., Michael Sweet, and Dean X. Parmelee, eds. 2011. *Team-Based Learning: Small Group Learning's Next Big Step: New Directions for Teaching and Learning,* 103 (116). John Wiley & Sons.

Reese, Hayne W. 2011. "The Learning-by-doing principle." *Behavioural Development Bulletin,* 11.

Springer, Leonard, Mary Elizabeth Stanne, and Samuel S. Donovan. 1999. "Effects of small-group learning on undergraduates in science, mathematics, engineering, and technology: A meta-analysis." *Review of educational research* 69 (1): 21-51.

Appendix

TABLE A: COMPARISON ACROSS MODULES

	Introduction to Economic Thinking	Industrial Relations	Regulation	Competition Economics	Money and Banking
Target Audience	1st years	2nd and 3rd years	2nd and 3rd years	3rd years only	3rd years only
Module Enrollment	56	49	64	82	91
% Male	66	65	64	62	65
% Overseas	39	27	19	44	37
% Visiting	0	20	45	6	10
% 2nd year (for multi-cohort modules)		8	17		
Activities:					
Think-Pair-Share		Y	Y	Y	Y
Peer review	Y				
Group Problem Solving				Y	
Group Presentation /Debate	Y	Y	Y		Y
Case Studies		Y	Y	Y	
Wiki		Y		Y	
Team-Based Learning	Y				