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Undergraduate Student Acceptance of a Unit Design for Developing Independent Learning Abilities

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Abstract
This paper describes a method intended to advance students along the path to independent learning. The method is consistent with the principles of enquiry-based Learning. It involves restructuring student contact class time into a single three-hour block, and dedicating the majority of this time to working in small research project groups. Non-punitive, formative feedback is provided continuously on student work through the semester. In order to gain insight into the student experience of the design, a qualitative study using focus groups was conducted across two consecutive semesters. Reflection on the teaching experience in light of the student responses provides insight into aspects that have worked well, particularly the nature and channels of support provided to students. Despite the students' unfamiliarity with the unit design, the contact structure and the group work has been popular and has been perceived as contributing to the students' learning experience. The levels of support and feedback made possible through the unit design have also been very positively viewed. However, interesting questions are also raised. The first is regarding the balance between encouraging independent learning and the provision of structure and support by staff. The second is related to going beyond student perceptions and reliably measuring changes in independent learning abilities.

Keywords
independent learning, enquiry-based learning, group work

1. Introduction

One goal of undergraduate education is that graduates be able to learn independently (Baird 1988; Gow & Kember 1990). The ability to learn independently is open to various interpretations; however, a variety of researchers agree that they include concepts of critical and independent thought as well as autonomy (Ramsden 1992; Moore 1973; Eneau 2008; Bradley, Noonan, Nugent & Scales 2008). Our experience with teaching using the conventional lecture and tutorial model, along with our reading of the literature on the topic, indicates that this model does not adequately allow students to improve their independent-learning abilities. Our particular concern was with cohorts of students undertaking third-year undergraduate studies who seemed to lack the independent learning skills that we expected from students about to graduate from university. To address this problem we developed an alternative method, with the intention of providing more support for the higher-level skills associated with independent learning. Our method is consistent with the principles of the family of "inductive" (Prince & Felder 2006) or "inquiry" teaching methods (Hmelo-Silver, Duncan & Chin 2007). In particular it can be considered compatible with enquiry-based learning (EBL), which has explicitly stated objectives in relation to independent-learning skills (Hutchings 2007).

The aim of this paper is to present our findings regarding the effectiveness of our model. However, direct measurement of improvements in the higher-level skills associated with independent learning is difficult. Given these difficulties, our study focuses on student perceptions based on their experience with the model. These perceptions were studied across two semesters using focus-group interviews conducted twice each semester.

The rest of the paper is structured as follows. Section 2 examines traditional and recent approaches to undergraduate teaching, from which we argue for a selected set of pedagogical elements appropriate for developing independent learning. Section 3 describes our unit design, which incorporates these elements. Section 4 presents the results of our focus-group studies into student perceptions of the unit design as offered over two semesters. Finally, Section 5 summarises the findings of our analysis and offers a discussion of our future areas of inquiry.

2. Independent Learning within Universities

The concept of "independent learning", sometimes termed "independent study", has been interpreted in various ways. Moore (1973) recognised multiple uses of the term, which includes correspondence and distance studies as well as out-of-school, part-time degree programs for adults. According to Moore (1973, p667), the crucial ingredient is learning autonomy, which is defined as "the will and ability to exercise powers of learning, to overcome obstacles for oneself, to try to do difficult learning tasks, and to resist coercion". Baird (1988, p142) states that the "effective, independent learner" is a "commonly espoused" goal of both secondary and tertiary education. The independent learner "is both willing and able to take responsibility for, and control over, one's own learning". Therefore to demonstrate independent learning, students must be given autonomy. Baird (1988, p142) also notes, "Such a person can make informed, purposeful decisions about planning, managing and evaluating personal learning; he or she can thereby function proactively in and contribute to the betterment of society at large."

However, Baird (1988) cautions against interpreting independent learning as solitary learning. In fact, Eneau (2008, p. 230) discusses the "role of interpersonal relationships in the construction of the learner's autonomy", and suggests (p. 231) that "individual autonomy can only be established in a dialectic between individual liberty and external constraints". This implies that the autonomy necessary to support independent learning must incorporate social aspects. The term "independent learning" may also be used without an exact definition; for instance, Geraghty and Quinn (2009) do not explicitly state what they mean by independent learning, but refer to individual learning, which takes place outside the classroom.

Having discussed various concepts associated with independent learning, we now look at how it can be supported in a teaching environment. Ramsden (1992, p88) recognises "a commitment to encouraging student independence" as one of the important properties of good teaching. Dimensions of independence include student "[p]erceptions of choice over how to learn the subject matter, and of control over which aspects may be focused on" (Ramsden 1992, p100). It is also related to giving students the opportunity "to practice the art of inquiry" (Ramsden 1992, p101). Laurillard (1993, p2) characterises the vision of academic learning as a community of scholars where students take responsibility for their own learning as "attractive". She recognises that such a vision is realised for post-graduate (i.e. Higher Degree by Research, or HDR) students. HDR students remain largely autonomous and exercise significant control and responsibility over what to learn, and in what sequence. They also engage in learning through academic enquiry, which necessitates critical thought and reflection in the sense of becoming "critically aware of the suppositions of one's thought" (Schumacher 1977, p54) and "regarding the assumptions beliefs and values … assimilated during childhood and adolescence" (Brookfield 2000 p94). We argue that all of these elements are important in developing students' independence.

For our purposes, rather than debate definitions of independent learning, we consider it more useful to identify the high-level (generic) skills that we believe independent learners should possess. Based on the discussion above, we have identified the following:

1. Self-management skills, especially time-management skills (Baird 1988, p142).
2. Critical thinking, including being aware of the underlying suppositions of one's thoughts and beliefs (Schumacher 1977, p54; Brookfield 2000 p94).
3. Creative thinking, to identify worthwhile goals and methods of achieving them (Baird 1988, p142; Laurillard 1993, p2).

It is these specific skills that we seek to improve in our own teaching practice, and that form the basis of the research in this paper.

It is also evident from the literature that the following pedagogical elements are important for supporting the development of these skills:

- Giving students increased autonomy over the conversation about their learning and its execution (i.e. control over both content and process), such as topics and their sequence (Ramsden 1992, p100; Moore 1973, p667).
- Frequent customised feedback on student work, allowing changes prior to final assessment (in a manner analogous to HDR student supervision, building on Laurillard 1993, p2).

- A creative element allowing individualised engagement with, and use of, the material being learned (Baird 1988, p142; Eneau 2008, p231).
- Social learning, not just individual – students should have opportunities to discuss their ideas and be exposed to different opinions (Eneau 2008, p230).

These elements are difficult to accommodate within the limitations of conventional undergraduate teaching. Particular limitations of undergraduate teaching are identified by Laurillard (1993, p2): the costs involved in the labour-intensive nature of assessment and guidance in this context; and the nature of the undergraduate curriculum, which is often concerned with transmitting a body of knowledge to students (Laurillard 1993). Laurillard (2002, p143) further argues that university teaching needs to be more oriented towards the "generic skills of scholarship". These sorts of skills can be developed through the techniques Ramsden (1992) associated with good teaching practice, some of which we have already discussed. In fact, Ramsden (1992, p100) recognises that the desirability of student independence is "rather bad news" for traditional lectures, tutorials and orthodox approaches to the curriculum. One reason for this is offered by Phillips (2005, p3), who contends that lecturing tacitly adopts an objectivist epistemology, "assuming that the learner is an empty vessel to be filled with content", leading to a dissonance between the professed theory of most lecturers (which is constructivist) and their actual practice. Phillips (2005) draws on prior work, such as Laurillard (2002), to conclude that a significant limitation of lecturing is that it requires the entire class to have shared capabilities and background knowledge. An additional problem is that lecturing creates a power imbalance where "the teacher's responsibility is to 'teach', which implies determining the content, and controlling the sequence" (Phillips 2005, p6). This limits students' autonomy. However, lectures and tutorials do have their place in the educational landscape. Bligh (2000) identifies lectures as suitable for content-delivery, although not for the development of the higher-level generic skills associated with independent learning. For these reasons, we have sought an alternative approach that is better suited to our objective of fostering independent learning.

In contrast to the standard lecture and tutorial model, researchers have identified a family of related approaches that have been described as "inductive learning" (Prince & Felder 2006). Such methods include project-based learning (Thomas 2000) and EBL (Hutchings 2007). We recognise that such methods incorporate a significant degree of scaffolding.

It has been argued that scaffolded inductive learning methods, such as those described above, are more closely aligned with constructivist principles (Prince & Felder 2006). Consequently, they offer an alternative that addresses the dissonance between theory and practice that Phillips (2005) identified.

Therefore, despite the fact that the traditional lecture and tutorial model is relatively uniform in higher education in Australia (Phillips 2005), it is clear that other teaching approaches can be used at the undergraduate level that may be better suited to developing the generic skills that independent learners need.

3. Unit Design to Encourage Independent Learning

To best support our students to develop the high-level skills we associate with independent learners, and to incorporate the pedagogical elements we consider necessary to facilitate the

exercising of such skills, we made major changes to the structure of the available class time, and to the design of assessment tasks and the feedback processes around these tasks (Mitchell, Zutshi & Weaver 2010).

We made every effort to apply these adaptations within the limitations on staff, room and time resources for undergraduate classes. The unit of study for which we applied our adapted techniques was an eCommerce unit, which was originally largely content-based, with some assessment based on a small-group assignment. The unit was redesigned to reverse the significance of these two components, so that it did include a curriculum of content, but assessment was primarily based around a group research project and individual research and reflection. The predominant classroom activity was teamwork in the project groups. We describe the structure of the contact and the assessment and feedback strategy below.

Faculty policy requires that the unit must have the standard student-to-staff-ratio for tutorials and the same total face-to-face teaching hours as other equivalent units offered in the university. For our university, this meant a weekly one-hour lecture (for the entire cohort), supplemented by a two-hour tutorial (in groups of up to 25 students).

We addressed these constraints by replacing the separate weekly lecture and tutorials with a single three-hour session, in which all students were in one large room for the entire time. The class time was then reorganised as follows:

1. Mini-lecture to full cohort (30 minutes) – a single staff member present;
2. Group work (two hours) – students in small groups (typically five per group), with several tutors present, depending on class enrolment; and
3. Second mini-lecture to full cohort (30 minutes) – a single staff member again.

During the group-work session, tutors met separately with their student groups for at least 20 minutes. Each tutor was responsible for up to six groups, and could therefore be responsible for up to 30 students (depending on the semester enrolment).

The full-group (mini-lecture) sessions were intended to support the development of independent learning by modelling planning, self-management and critical-thinking skills.

Each week the lecturer reviewed the requirements of various assessment items, questioned students on their organisation and planning to meet deadlines, and described techniques for the project steps, as well as providing sample plans and discussing possible impediments. This unit design was trialed with cohorts of up to 90 students prior to the focus group study described in Section 4.

It may be argued that modelling thinking processes and providing guided planning and self-management within a structured unit is inconsistent with the development of autonomy in students. However, Willison, Pierce and Ricci (2008, p489) found that "some of the skills required in complex open-ended field-research environments were developed through guided and well-structured literature research tasks". Consistent with our belief that students need a staged

introduction to higher-level skills, we applied a scaffolding approach to developing critical thinking. A major proportion of the full-group sessions remained dedicated to content delivery, such as academic challenges regarding the benefits of technology, and to modelling critical assessment of these topics, challenging student beliefs and encouraging students to question critically. The support we attempted to provide is summed up by the words of Hmelo-Silver et al., who state that "scaffolds act by 'rocking the boat' and stopping mindless progress through the task, thus redirecting students' attention to important learning goals such as examining counter claims, articulating explanations and reflecting on progress" (Hmelo-Silver et al. 2007, p100).

The second aspect of the unit's redesign was to incorporate assessment and feedback strategies, taking advantage of the new class structure to further encourage independent learning. A major objective was to provide continuous feedback in group meetings, including questions, not only as a way to direct student efforts and understanding, but as significant component of modelling. The difficult skills of independent learning and critical thinking are not developed easily, and we aimed to provide as much support as possible. We also believe that these skills are developed over time and were realistic about what can be achieved in a single final-year unit. The group sessions focused on giving continuous and targeted feedback prior to the final submission of group projects.

Creativity and personal ownership have been identified in Section 2 as important elements for independent learning. To provide this element, the major group assessment task was to create an innovative new business idea or adaptation to an existing idea. Content presented in lectures was not directly assessed (there were no tests or exams); however, aspects of the content were relevant to particular group projects. Given the concern that some groups may not have operated as well as others (Fowler, Gudmundsson & Whicker 2006), a substantial proportion of marks was allocated to individual reflections on the group process (specific questions were provided to guide students' reflections). This allowed individuals in underperforming groups to compensate by providing insightful reflection on their group's processes.

For their second major assessment piece, students submitted an individual essay on their choice of an issue related to their course of study. Allowing student choice here was intended to allow them the desired element of autonomy. However, substantial marks were again allocated to a reflection on their paper, which in this case was intended to encourage critical thinking in relation to the topic they wrote about.

4. The Focus-Group Study

During the pilot phases of implementation, we undertook a focus-group study to assess student perceptions of the redesigned unit. We focused on student perceptions because reliably measuring improvements in independent learning is largely still an open question. Based on our arguments above, we assumed, tentatively, that the elements of this unit design were appropriate, in varying degrees, for developing independent learning. Measuring improvements in independent learning is an objective we hope to explore with future cohorts.

Our student cohort consisted predominantly of Chinese students, who had come to Australia to complete either the last 10 or 16 units of their degree. Their university studies in China had followed a teacher-centred model (similar to our formal lectures), and were typically assessed by final examination. However, some had experienced tutorials where they received practical

experience with eCommerce tools. The aim of our study was to determine how the unfamiliar structure of our unit might affect their perception of the unit design overall and of their learning experience. In other words, we were investigating their reaction to this particular combination of teaching methods and techniques.

4.1. Methodology

Focus-group interviews were conducted with student volunteers across two consecutive semesters. A set of questions was developed as a basis for semi-structured discussion. Group interviews, which allow a balance between required answers to posed questions and free-ranging discussion (Saunders, Lewis & Thornhill 2009), was seen as appropriate because it was not clear initially what specific issues could be of interest in relation to the unit's design and delivery. This method allowed for elaboration beyond simple answers; moreover, it allowed movement beyond the researchers' perceptions to better understand the participants' point of view (Esterberg 2001; May 2001).

One topic of interest was whether student perceptions would change over the semester. We believed that students might experience considerable discomfort early in the semester, but that this discomfort would reduce as the semester progressed and they become more familiar with the unit's format. We therefore conducted two sets of group interviews: one in the first two weeks of the semester, and the other in the second-last week of classes. Small gift vouchers ($20 AUD) were offered to students who participated in these sessions, and sessions were conducted immediately following classes. Students who were not comfortable with group discussion were invited to have an individual interview; this option was adopted by some students. All interviews were conducted by an independent staff member (the third author), who had not been involved in the teaching and assessment of the unit, and ethics approval was gained prior to undertaking the project.

Interview questions were based on studying students' perceptions around four dimensions:

1. The contact structure;
2. The level and nature of support and feedback provided by staff;
3. The group work required to complete the major assessment task; and
4. Unit learning outcomes.

The first three were broadly related to the unit design, while the last related to students' perceptions of unit outcomes.

Cohort	Cohort 1		Cohort 2	
Number Enrolled	(n = 29)		(n = 25)	
Session	Early	Late	Early	Late
Number of Participants	6	9	20	23
Participation %	21	31	80	92

Table 1: Focus Group Participation

For cohort 1 and the early session for cohort 2, student responses were recorded manually, as handwritten notes by the interviewer, to alleviate students' possible concerns about electronic recording. Responses were recorded verbatim as far as possible, with the interviewer reading back notes to students, to ensure responses were captured accurately. However, in the early session for cohort 2 it was noted that while the number of participants was very large, the extent of the discussion remained brief. In an attempt to increase the level of participation, and to avoid problems of group-think, students were given a handout with the focus-group questions and encouraged to write brief responses on the handout prior to engaging in discussion. The ensuing discussion remained limited, but the (anonymous) handwritten responses provided a rich source of data. (Table 1 shows the cohort sizes and participation rates.)

4.2. Summary of Results

We have grouped the students' responses into the four main dimensions identified in the previous section. Here we present and discuss the student responses across these dimensions, considering each dimension in turn and summarising the main themes in the responses. Interestingly, in the last two dimensions (group work and outcomes), the responses refer to a number of what are often termed "generic skills" or "higher-level skills". The specific generic skills mentioned are communication, teamwork (cooperation), critical thinking and analysis. Note that we have distilled the dimensions and themes from across all four focus group sessions; this is because the only significant trend from the start of semester to the end is a crystallising of themes rather than a marked change, and there are no significant changes in views apparent between the first and second cohorts. An extract of the key themes arising in each dimension with sample quotes is presented in Table 2. A more detailed discussion of each dimension follows.

Dimension	Key Positive Theme	Sample Quotes	Key Negative Themes	Sample Quotes
Contact Structure	Mix of transmissive and non-transmissive learning	*I enjoy the mix of group and full class work very much.*	Three hours can be a long class	*The class was OK, but it's a little tired [sic] that we do class & tutorial together.*
Staff Support and Feedback	Liked immediate and formative feedback	*The tutor gives feedback [on] our assignment every week and we can improve it following this feedback.*	Some confusion around requirements remains	*[…]sometimes I'm a bit confused because the focus of different tutors may be different[…].*
Group Work	Students liked meetings in class times Allowed for	*No meetings outside class – there was enough time in class.* *My team members*	A few cases of inequitable workload reported	*Each member should keep in mind clearly what our proposal is & contribute equally to the report.*

	sharing opinions and ideas	*teach me a lot. I mean, when we discuss, they usually give me new ideas.*		
	Students appreciated the successes of group work	*Cooperation and communication. Only by the effort of all team members can we work out a good project.*		
Outcomes	Perception associated with development of generic skill	*How to manage tasks well.*	Some lack of confidence in ability to apply skills in real life remains	*I think so, but still need more practice.*
	Specific, practical skills developed	*Yes, I have learned some new methods of analysing business design.*		

Table 2: Key Themes in Student Responses

Contact Structure

The contact structure, with the mix of group work and class work, seemed to be widely accepted. The vast majority of the responses regarding the structure at the end of the semester were clearly positive, with many comments like:

- *I enjoy the mix of group and full class work very much.*
- *This way works well, I think.*

There was also a minority expressing qualified acceptance, saying that the method itself was good but could be tiring:

- *A little bit tired when we have to have six hours a day to attend class both morning and afternoon. But group work is good since we can have brainstorm for our topic.*
- *The class was OK, but it's a little tired that we do class & tutorial together.*

The reference to the six hours indicates that at least some students had contact sessions for other units on the same day of the week as the one being reported on. Some students expressed the counter-view that the three-hour block was a good use of time:

- *I like this model – it's more effective in time. I prefer 3 hours in 1 block. There is more opportunity to communicate with fellow students and to improve my group work skills.*

Apart from the qualified acceptance, there was one dissenting response from the later session in cohort 2 remarking on the lack of staff contact:

- *Not very effective. As only one tutor, spending about 20 minutes of each group, then the remaining time is quite a waste. If it is for group discussion, we can have it after class, organising by ourselves, and we do not need to pay for the time.*

This is an interesting contrast to the sentiment expressed in the earlier session of focus groups for cohort 1, where the use of class time for group meetings is specifically identified as a positive:

- *Specially like the meeting times for groups not outside class.*

We believe that by allowing in-class time for group meetings and discussion, one of the significant barriers to group work (i.e. finding common meeting times) is overcome.

Staff Support and Feedback

Students were asked separately about whether the support and feedback received were sufficient. Students appear not to have made a distinction between these two questions. However, the student responses were almost unanimously positive, as reflected in comments like:

- *Yes, we did. Face to face.*
- *Yes, I did. The tutor gives feedback [on] our assignment every week and we can improve it following this feedback.*
- *Yes, they are both friendly and knowledgeable. They give us sufficient suggestions each time.*

One response was indicative of qualified agreement:

- *Yes, but I think sometimes I'm a bit confused because the focus of different tutors may be different a bit. I need to learn how to satisfy both of them.*

The response above refers to the fact that both members of staff (corresponding to the traditional "lecturer" and "tutor") had significant input in the feedback process, and may perhaps have emphasised different aspects. The only responses that were not clearly positive were:

- *Not so much. I need more focus.*
- *It is hard to say. How much is enough? But every question I asked has got answers.*

The first response above is difficult to interpret, while the second appears to be a qualified positive.

Group Work

Students took advantage of the opportunity to conduct group meetings within the scheduled class time, except in one group, where at least one member was reported as consistently absent. However, clearly some groups met outside of the class time.

- *No meetings outside class – there was enough time in class.*
- *Yes, every week group meeting at class & in free time.*
- *We worked together outside class time.*

In response to all group-work-related questions, students clearly acknowledged two main benefits: the diversity of opinion and the opportunity to exchange ideas. The evidence for this was particularly strong, with frequent comments similar to these:

- *Yes, more people, more opinions.*
- *Different people come with different points, so we learn from each other. We learn communication skills.*
- *My team members teach me a lot. I mean, when we discuss, they usually give me new ideas.*

Cooperation was another theme that arose consistently in response to questions related to group work, often in conjunction with references to communication:

- *Cooperation and communication. Only by the effort of all team members can we work out a good project.*
- *Yes, my group's members are getting on well with each other during this summer course. And I think this helps my group in critical thinking.*

In many responses related to group work, such as the one above, students report developing and exercising a number of generic skills (critical thinking in this case). Of interest is the fact that these usually appear together, suggesting the students connect elements of group work with generic skills.

- *I learnt critical thinking skills from this group project.*
- *Teamwork skills, communicating skills, creative skills.*

The following two responses to questions about group work also mention the generic skills of critical thinking, communicating and analysis:

- *I learnt the way of critical think* [sic]*, and how to organise a paper well in an academic way.*
- *Cooperate and analysis skills. Analysing problems.*

Some other responses in relation to group work are relevant to outcomes, and are discussed under that theme.

A final theme within this dimension is students' assessment of how effective their groups were. The majority of students reported that their groups worked effectively:

- *All our members worked very hard.*
- *Yes, we have allocated the work well. Everyone is satisfied with the job. And we have worked effectively.*
- *Yes, we worked together effectively. Everyone including me finish their job in time and with good quality.*

In each cohort, it became apparent that there was one group in which at least some of the students did not feel that their groups worked effectively. In one student's response, the negative experience is attributed to a perceived lack of participation by another member of the group. In the other cases, the negative responses seem to be based on difficulties coordinating with other members:

- *Not really, but fine. Each member should keep in mind clearly what our proposal is & contribute equally to the report. And we should learn how to better integrate each part of the report.*

Outcomes

We wanted to know about at least one major expected unit learning outcome, the ability to critically analyse business design. We were also interested in learning what skills the students believed they had developed as a result of engaging in the group project.

Overall, responses were positive, with a few qualified or uncertain answers. Positive responses included the following:

- *Yes, each time during the tutorial, both our lecturers give us suggestions about our business project.*
- *Yes, definitely.*
- *Yes, I have learned some new methods of analysing business design*.

In the qualified responses, the uncertainty seems to stem from a recognition that more practice or experience was needed.

- *Need more experience first.*
- *Still need teacher guidance.*

- *I think so, but still need more practice.*

In addition to the generic skills identified by students in the previous section, there were a range of specific skills that students reported developing:

- *I learnt how to draft diagrams well.*
- *I learnt something about searching for customer needs and how to attract investors.*

Students perceived that they had exercised or improved the high-level skills that we identified as those that an independent learner should possess: self-management; critical thinking; and creative thinking to identify goals and methods of achieving them. The following responses are relevant to these skills respectively:

- *How to manage tasks well.*
- *Yes, my group's members are getting on well with each other during this summer course. And I think this helps my group in critical thinking.*
- *This is a good way to teach the unit because we can identify the problems we have, and learn how to resolve them.*

4.3. Discussion

This section presents our findings based on the student responses above, and discusses the implications of these in relation to other research on this topic as well as for our future investigations.

Our main finding is that students were very positive overall about their experience with this model. It appears that this is primarily due to a perceived high level of feedback and support, as well as perceived benefits from the group work. One element that may have contributed to this perception is the support within this design for group work, particularly allowing a single block of time in which group meetings could be held both with and without staff participation.

Two elements of instructor feedback that students appeared to appreciate particularly, based on their responses, were its immediacy, and the fact that formative feedback was received prior to submitting work for assessment. Both these elements were intrinsic to our design, whereby students could present and discuss drafts of work face-to-face on a regular basis and seek clarification on expectations within class time, in addition to their scheduled group meetings. Students were also very satisfied with the effectiveness, not just the process, of their group work. This may be due in part to the assistance given to students in managing their time both during the mini-lectures and in the regular group meetings. Regular feedback on drafts, along with time-management assistance, are the two primary avenues of providing scaffolding to students. The literature suggests that scaffolding is essential for EBL (Hutchings 2007; Kahn and O'Rourke 2004) and similar "inductive" or "inquiry-based" methods (Hmelo-Silver, Duncan & Chinn 2007).

One student stated that feedback from multiple members of staff was confusing. We believe that it is beneficial for students to receive feedback from multiple staff members, even if the feedback appears contradictory, as it requires students to exercise judgement in balancing alternative

viewpoints. However, it may be of benefit to make this expectation clearer to students early in the semester.

Of interest to us was that our results support the work of Kember (2000), who provides evidence against the mistaken belief held by some educators that Asian students prefer passive forms of learning, such as rote learning. In fact, our cohorts were made up almost entirely of international students from Chinese partner universities, with a maximum of two prior semesters' study outside of China. However, our results are in contrast with the study by Li and Campbell (2008), which found that Asian students felt "disheartened and discouraged" participating in group assessments. That study reported negative perceptions around group assessment tasks (although the students valued in-class group discussion). The negative perceptions reported by Li and Campbell (2008) were associated with, among other factors, a lack of adequate support from staff as well as non-contributing members. In our responses, dissatisfaction with group work appeared limited to issues associated with non-contributing members and was relatively rare, while Li and Cambell (2008) reported unanimous dislike of group assignments. An interesting difference between the cohorts of students in our study and those studied by Li and Campbell (2008) is that out student cohorts were more homogeneous, with almost all students from the same country and from a small number of institutions that have partnership agreements with our university. We did not gather sufficient data nor design the study to focus on this factor of homogeneity, which may be another reason why our findings vary from those reported by Li and Campbell (2008).

Two open questions related to this study remain. First, we cannot infer from the data whether the scaffolding we provided negatively affects student autonomy. This is really a question about what an appropriate level of scaffolding ought to be for students in EBL and similar models, such as ours, and what forms it should take. Second, our study has focused on student perceptions, not on changes in abilities. We are not aware of a reliable method for measuring changes in independent learning ability, but are currently investigating ways of doing so for future research.

4.4. Limitations

One limitation of phase 1 of the study was the small numbers of students from cohort 1 who volunteered to participate in group interviews (20% participation for the first round, and 30% for the second round), from an already small cohort of only 30 students. Additionally, the use of group interviews, rather than individual interviews, may have influenced the responses from students. Esterberg (2001, p. 111) notes that such group interviews carry the risk that "participants might censor themselves and defer to group opinion so as not to 'rock the boat' or make others feel uneasy". May (2001) raises concerns about generalising results from a single group to a wider population, given that the internal interactions of groups may result in people modifying their opinions. These two risks could both be regarded as relating to group-think.

However, elements of our ongoing study may address these group-think issues. Phase 2 extended our study across a further student cohort with a much higher participation rate. For the later focus group, the second cohort were asked to discuss their answers in pairs and to individually write down their responses to the posed questions before engaging in group discussion. The written responses were then collected to ensure that any views not aired in the ensuing discussion were taken into account. This could help to reduce the group-think concerns raised by May (2001). It also helped address one difficulty of the study, which was reluctance to voice opinions in the full

group interview and discussion. This may seem contradictory, given their positive reporting of communication in their project groups. There are a number of possible explanations for this. One is that free and open communication in groups can take time to develop, and the focus groups were not the same as their project groups. The setting, type and purpose of communication in focus groups is very different to that experienced in project groups. Because of this limitation, it is probably worth taking advantage of our ethics approval to analyse their reflections on their work (one of the assessment items). This may provide additional insight into their experience.

Finally, we note that the cohort size has been comparatively small in both the semesters during which the study was conducted. Further investigation is necessary to determine how well the approach scales to larger cohorts.

5. Conclusion

In relation to the design and execution of our study, we note the following. Firstly, the student responses to the design have been investigated across two consecutive semesters through a focus-group study. While the participation rate from the first cohort was quite low, the second cohort was very highly represented in the focus-group sessions.

From this study the following points of interest emerge in relation to teaching and learning practice. First, the paper demonstrates how it is possible to move away from a conventional lecture/tutorial format, within standard undergraduate resourcing constraints, for cohorts of up to 90 students.

Second, the proposed unit design has allowed us to better support those pedagogical elements that we argue are better suited to developing independent learning skills, as identified in Section 2: providing students with substantial autonomy, frequent feedback and opportunities for creativity and social learning. However, student autonomy as presented in this paper requires an appropriate level of scaffolding or support as an important part of unit design.

Third, in relation to student perceptions of our design, their response across the two cohorts was largely positive in terms of the contact structure, staff support, the group work carried out and the outcomes students felt they achieved. The conclusion we draw is that students were accepting of our unit design, despite its novelty. This offers encouragement to practitioners seeking to explore alternatives to the standard lecture-tutorial model for particular pedagogical outcomes.

Finally, the research highlights the following issues for further investigation. We identified scaffolding as important; consequently, the development of guidelines around appropriate methods and levels of support for independent learning would be valuable. Also, there is a need for methods to reliably measure changes in levels of independent learning, rather than relying on student perceptions. Another important open question is the scalability of unit designs, such as the one discussed here, to larger cohorts.

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