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# Developing Self-Directed Learning Strategy for a Construction Project Management Course

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## Abstract

Self-Directed Learning is generally regarded as an important skill throughout life and is encouraged in the tertiary education. However, in the courses implemented with self-directed learning approach, we also see students get off track, fail to make progress, or complain not being assessed fairly. It is observed that many of our construction project management students in the postgraduate program, especially those with working experiences, have a strong desire for a self-directed and autonomous learning experience. In this research, a self-directed learning strategy is adopted and developed over two years in the teaching of a postgraduate course. Investigation and comparison of students learning experience were conducted by using student surveys, and selected students were further interviewed to gain the insights of their opinions and experiences in this course. Problems in current course model were identified and ways to better support self-directed learning in the course are suggested to improve the level of student satisfaction.

**Keywords:** Construction industry, education strategy, self-directed learning, SDL

## 1. Introduction

In the Master of Construction Project Management program in the Faculty of Built Environment at the University of NSW, it is observed that the students' experience and maturity vary significantly, while some students need close guidance and supervision to make progress in their study, many others wish to have more flexibility in their postgraduate learning experience. A Self-Directed Learning (SDL) approach is adopted in one of the courses in the program, aim to enrich students' learning experience and increase students' satisfaction.

Self-directed learning (SDL) is a method of instruction used increasingly in an adult education within tertiary institutions, and is often embraced as an important educational goal throughout life (Bolhuis 2003).

SDL can be defined in terms of the amount of responsibility the learner accepted for his or her own learning (Fisher, King et al. 2001). Many previous studies have proved the benefits of self-directed learning such as saving training costs and increase employee effectiveness in their jobs (Chien 2004), researchers also identified risks of developing SDL strategies and

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provided recommendations. Self-directed learning projects are not for everyone and may cause extreme anxiety and frustration in some students (Fisher, King et al. 2001). The SDL approach may be less successful with a less mature audience that younger learners had difficulty handling the greater freedom of a self-directed learning experience (Ellis 2007).

Based on the literature review findings, the SDL strategy was cautiously introduced to students over two years in 2011 and 2012. It is used in the postgraduate course as students are generally more mature and have some working experience. However the students' background and level of experience vary significantly. This study aims to determine the right SDL strategy for students, and find a "balance point" between the flexibilities and instructions/restrictions given to students in their course study.

## **2. Course Background**

### **2.1 Pre-teaching Survey**

The postgraduate course "Construction Planning and Control" is offered as a core for the Masters of Construction Project Management program in the Faculty of Built Environment at the University of New South Wales, Sydney, Australia.

The course introduces students to various programming and scheduling techniques suitable for planning of long, medium and short-term projects and tasks. A very important strategy to implement the SDL approach in the course is to conduct a pre-teaching survey. This is a postgraduate course and according to the lecturer's experience, there is a wide variety of students' background and experience. Some students may have worked in the project planning area for many years and some may have never touched the field, and others can be anything in between.

The pre-teaching survey serves two purposes:

1. To facilitate effective teaching and successful SDL experience. The survey conducted at the beginning of the semester investigated the pre-knowledge level of the students in the construction scheduling and planning area.
2. To determine whether the students background in 2011 and 2012 are similar and therefore the "end-of-term" survey on their learning experience with SDL strategy are comparable.

The first question is to ask if the student's work is/was related to project planning and scheduling. For both years, about  $\frac{1}{4}$  of the class students believe their work is closely related to this area,  $\frac{1}{2}$  of the class think it is related but not much, the remaining  $\frac{1}{4}$  of the class think their work is not related to it at all.

The 2<sup>nd</sup> and 3<sup>rd</sup> questions ask students' knowledge in two most basic skills in construction planning – calculation of critical path and use of MS Project as a scheduling software. The responses are similar, 46% in 2011 and 48% in 2012 answered that they are aware of

critical path, but do not know how to calculate it or have forgotten most of it, and 40% in 2011 and 52% in 2012 know a little bit of MS Project, but think they need to learn more. About 25-32% students do not know these two skills at all. Therefore calculating critical path and using MS Project software are included in the teaching syllabus, though these are the two skills usually have been covered in the undergraduate course. More detailed survey results in 2011 were reported by Wang and Han (2012).

There are further two questions that asked students' awareness and knowledge on Primavera and other scheduling and planning software. The responses in 2011 and 2012 are very similar too. Very few, only 8-10% of the students have knowledge or skills on those software. Primavera software is taught in the course as it is a widely used planning software in construction industry.

## **2.2 Self-directed teaching and learning strategies used in the course**

According to the pre-teaching survey results, the teaching strategies and SDL plan were established for this course. The lecture material will be presented in an interesting and challenging manner with the aim of actively engaging students in the learning process and encouraging students to take responsibility for their own learning. Students are also encouraged to practice their skills outside the class time. Guest lectures are organized to present students with industrial case studies, and to provide students an opportunity to gain new experiences. Question and discussion sessions with the industrial people will allow students to relate theory to practice. Other self-directed teaching and learning approaches used in this course include:

1. All the lecture materials, including presentation slides, reading text, tutorial sheets and solutions were put on the online system of Blackboard. To facilitate students to explore a particular learning topic more, there were extra web links and reading materials and tutorial questions and solutions in Blackboard. These materials were marked optional and students have the flexibility to read and do it according to their own interest and need. Therefore students can select their own reading material, and explore beyond the basic requirement of the course.
2. A real industry project was adopted as the major assignment project. The assignment project requires students to use the scheduling techniques developed in the course of the study, to solve a problem using a similar approach used in the industry. Industry guest lecturer is invited to brief students about the project. Students are asked to form their own groups to work on the project. Establishing their own collaborative group is part of the SDL approach. Students are encouraged to communicate with their peers and form a group with various skill strength to produce high quality work.
3. As identified in the literature, peer assessment is also part of SDL experience. Therefore students are allowed to use a peer assessment form to grade themselves against their group mates in contributing to the group assignment. The lecturer then

used their peer assessment marks combined with their group mark to calculate individual mark.

4. The 3 hour teaching block is arranged as 2 hour lecture and 1 hour tutorial. It is compulsory to hand in the tutorial work at the end of the class for assessment purpose. Due to the different level of pre-knowledge of students, additional tutorial questions and solutions are provided online to give students flexibility to practice more and at their own time. Additional consultation time is also allocated each week to give students assistance outside of the class.
5. Computer lab sessions are arranged according to the pre-teaching survey. Both MS Project and Primavera are taught in the lab sessions. Several students who are expert users of the software completed the tasks in a very short time in the lab sessions and provided support and help to others. Tutors extended the lab sessions to support less capable students. Software manuals and additional lab sheets are provided to students for them to explore more on the software.

### **3. Evaluating the Self-Directed Learning and Teaching Strategies**

#### **3.1 Survey design**

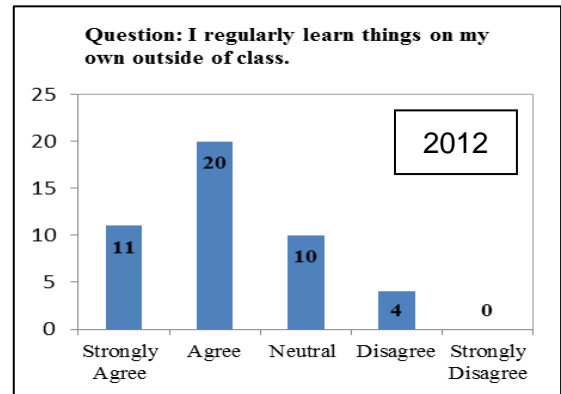
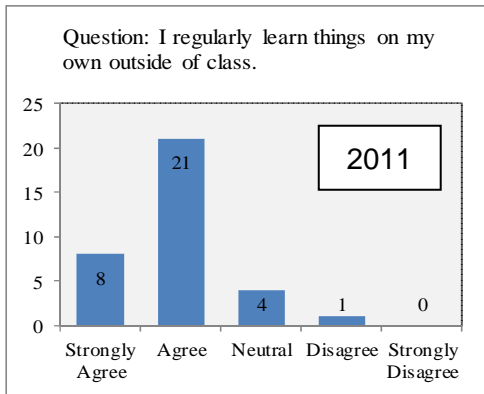
Many previous studies used questionnaires to collect feedbacks from students and evaluate the outcomes of students' self-directed learning (Zhang, Zeng et al. (2011) and (Victori 2007). The questionnaire comprises both Likert-scale type questions as well as semi-open questions. Stewart (2007) designed a questionnaire to evaluate the SDL readiness of final year civil engineering students at Griffith University, Gold Coast, Australia.

In this research, questionnaire surveys are also used to evaluate the SDL strategies adopted in the course. The survey was conducted at the end of the semester in 2011 and 2012, and it is to evaluate the teaching model and SDL strategies used in this course, and investigate students' SDL ability and students' satisfaction with the SDL strategies used in the course. 34 students in 2011 and 45 students in 2012 participated in the survey, and two students from each year are further interviewed to get their feedback on the SDL experience.

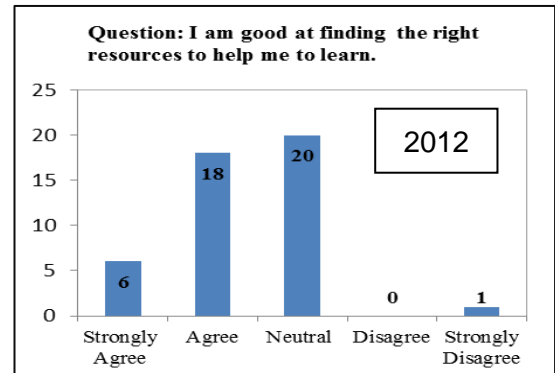
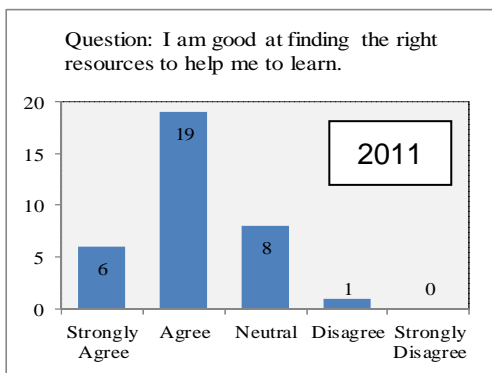
Altogether there are 22 survey questions with a Likert scale in the survey. Questions are grouped in different areas of teaching and learning and they are reported below.

#### **3.2 Students' SDL ability**

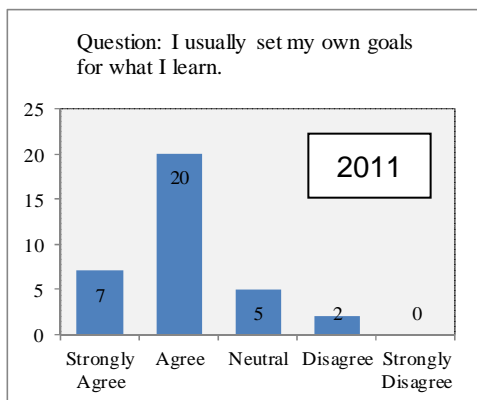
There are five questions in the survey are related to students' SDL ability, and the response are summarized in Figure 1.



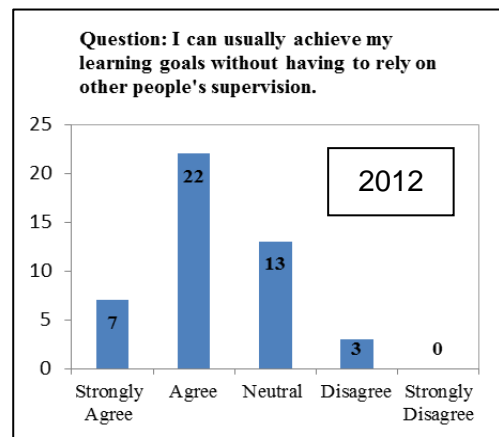
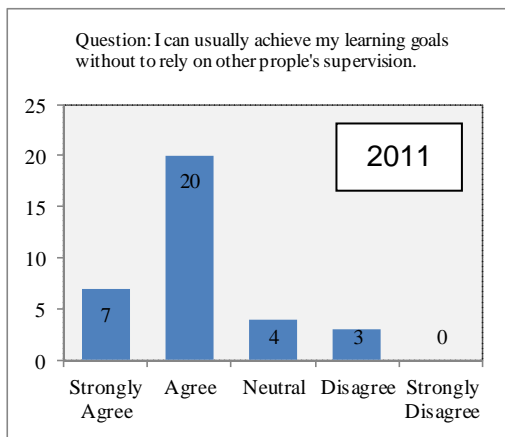
(a) Question 1: I regularly learn things on my own outside of class



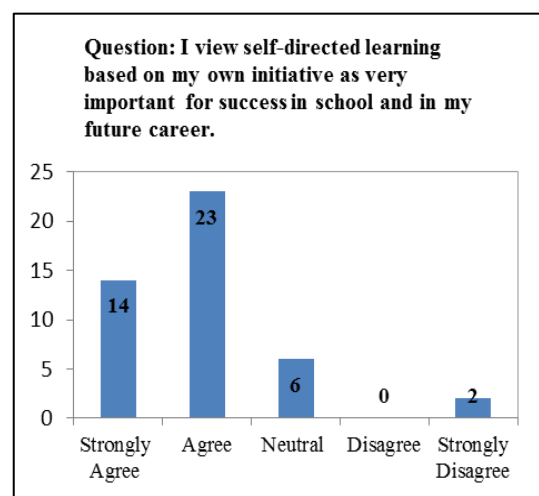
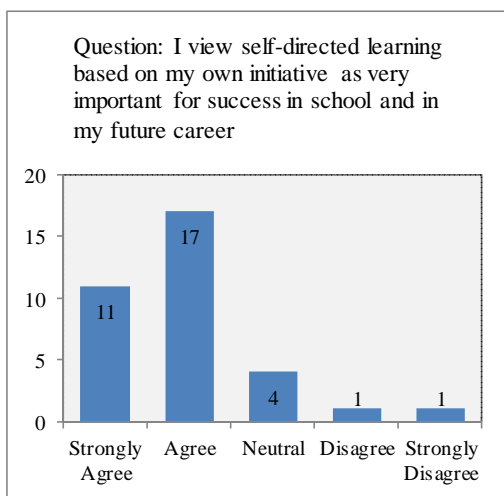
(b) Question 2: I am good at finding the right resources to help me to learn



(c) Question 3: I usually set my own goals for what I learn



(d) Question 4: I can usually achieve my learning goals without having to rely on other people's supervision



(e) Question 5: I view SDL based on my own initiative as very important for success in school and in my future career

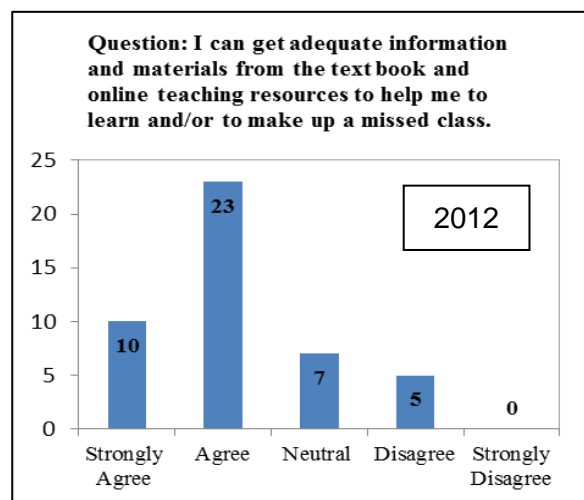
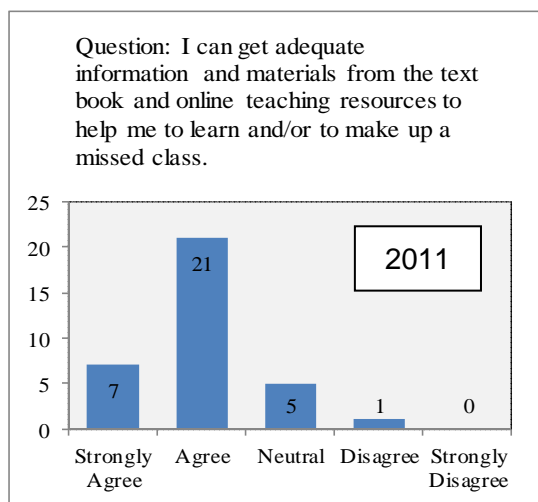
**Figure 1. Comparison of 2011 and 2012 survey responses on students' SDL ability**

The response given in Figure 1 shows that the students responses in 2011 and 2012 are very similar. Generally about 75% of the students are very confident about their self-directed learning ability and view themselves as good self-directed learners. This means students are comfortable with the SDL ability required in this course, and they are not stressed by the choices and flexibility provided to them.

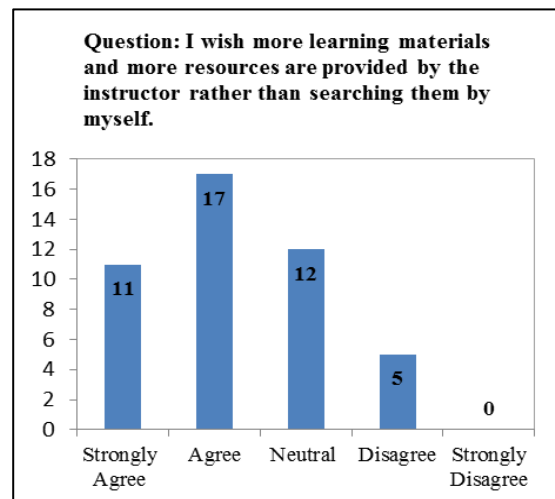
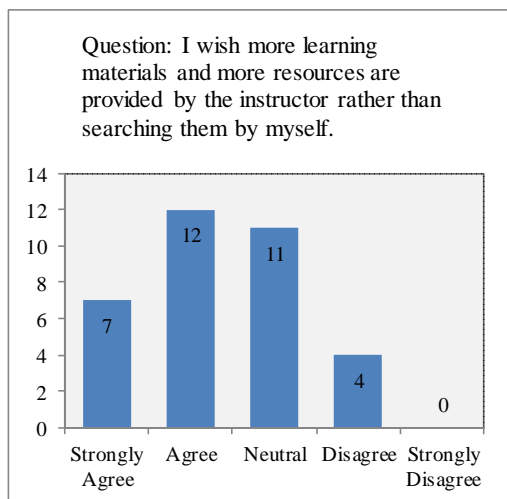
### 3.3 Teaching and learning resources

There are a wide range of learning materials provided in the course, and the survey comprises two questions to obtain students' feedback on learning materials and the outcome is in Figure 2. While over 80% students think they can get adequate information and

materials from the lecturer-provided resources, 55% of the students wish more learning resources would be provided. Further interview with the students indicate that the assignment project is the main task that they feel they are in need of more material. The intention of the lecturer is to challenge students to search necessary material themselves, as this is an important part of SDL ability. The students' feedback reflect that they believe there are adequate material for them to complete the assignment, but they wish more material are available for them to complete the assignment with high standard. They students feel they had to spend too much time in searching additional material by themselves.



(a) Question: I can get adequate information/materials to help me to learn



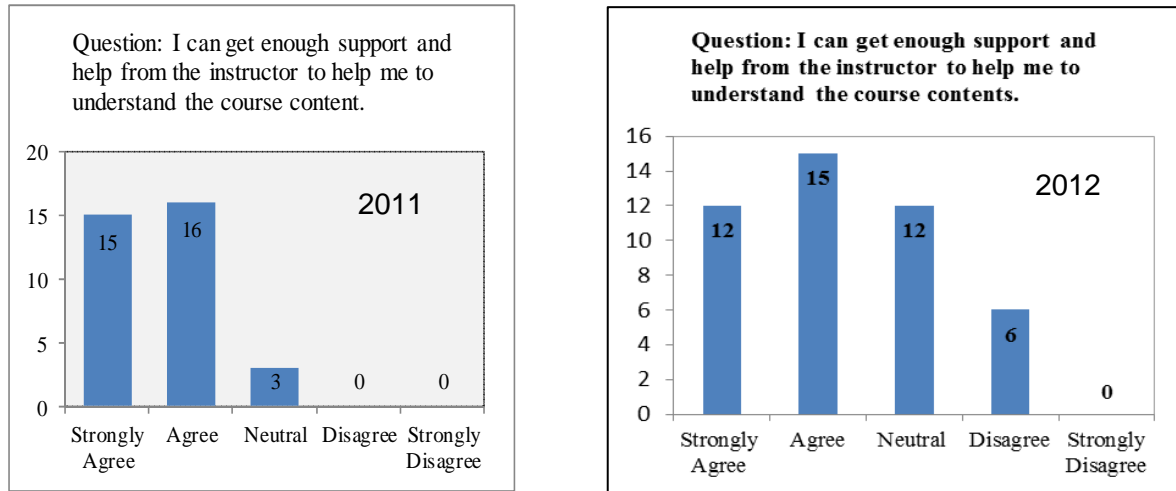
(b) Question: I wish more learning materials are provided rather than searching by myself

**Figure 2. Students' feedback on the provided teaching resources**

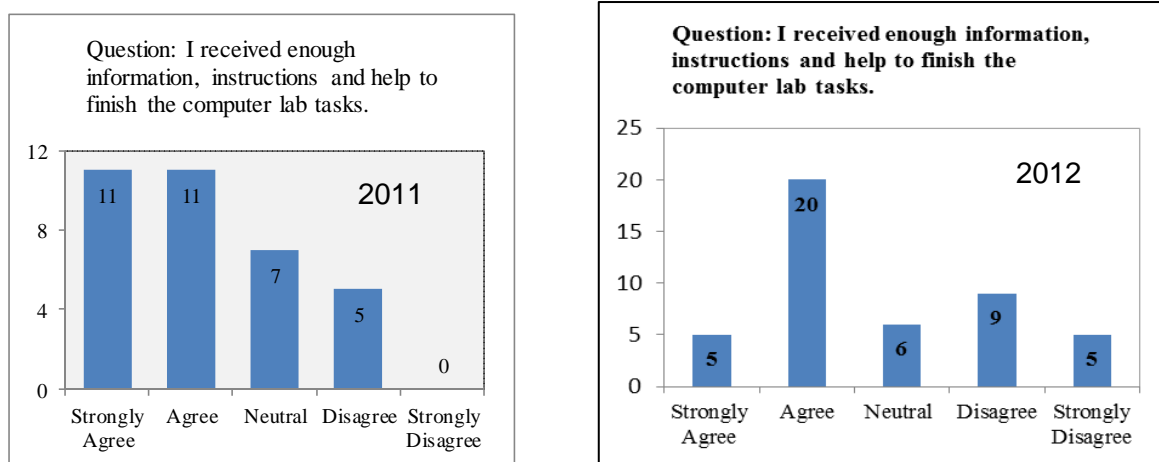


### 3.4 Lecturer and tutor's support

Self-directed learning should be adequately supported and guided by teaching staff. About the support from the lecturer and tutors, the students' feedback are given in Figure 3.



(a) Question: I can get enough support and help



(b) I received enough information/instructions and help in the lab

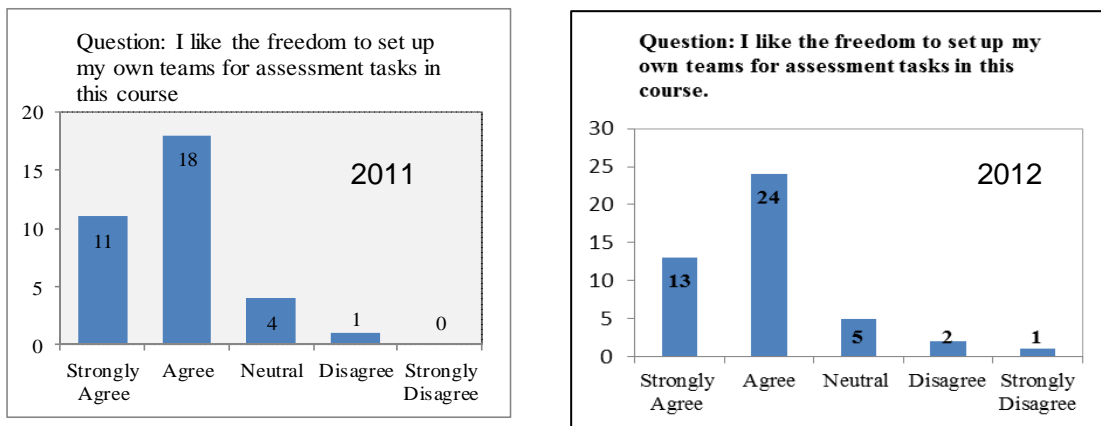
**Figure 3. Students' feedback on lecture's and tutors' support in the course**

An obvious difference can be seen from the students' response in 2011 and 2012. In 2011, generally all students think they can get enough support to understand the course content. In 2012, there are 6 students who think that the instructors didn't provide enough support and the other 12 students are not sure whether they have got enough support or not. When asked about the lab sessions, more students in 2012 believe that they didn't receive sufficient help and support from the staff. This response is in line with the fact that in 2012, more flexibility is given to students and less spoon-feeding style help is provided. Another

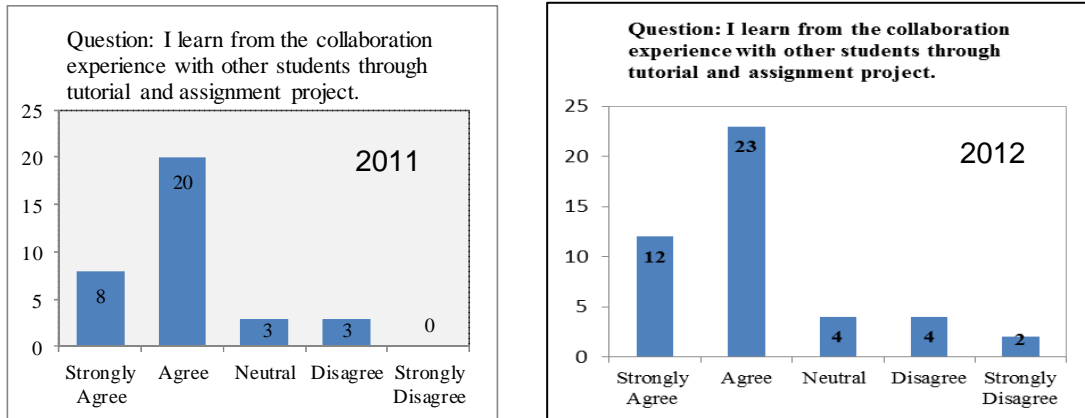
factor that has influenced the responses is that the requirement of using Primavera software in 2012 has increased.

### 3.5 Collaboration and Peer support

About the collaboration and peer support experience in the course, students' feedback are given in Figure 4. Most students are very positive about their peer learning experience, however, a few students have disagreed as they do not believe they learnt much from peers. The peer assessment method also was regarded by over 40% students as not necessary.



(a) Question: I like the freedom to set up my team for assessment tasks in this course



(b) Question: I learn from the collaboration experience with other students through tutorial and assignment project

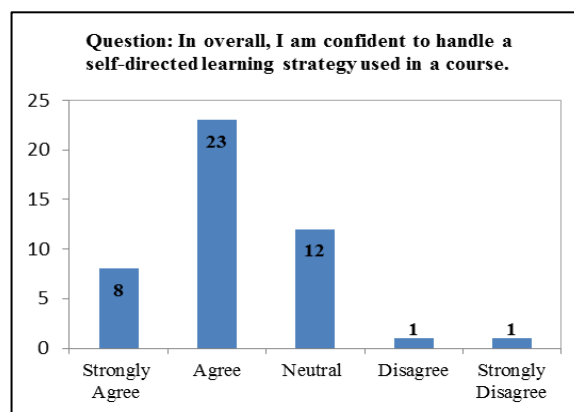
**Figure 4. Students' response on collaboration and peer support**

The responses from students on collaboration and peer support are very similar in 2011 and 2012. The approach used in both years are similar. The only difference is in 2012, up to 4 students can choose to be in a group to complete their assignment project, while in 2011, only 2-3 students are allowed to be in one group. The increase of the group size didn't show negative impact on the students learning experience.

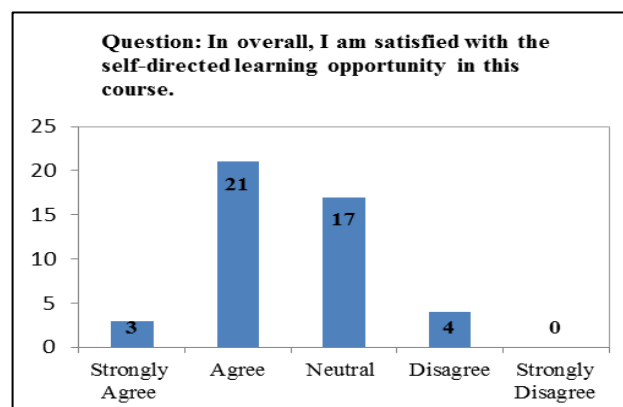
### 3.6 Overall satisfaction on self-directed learning strategy

The increased use of online teaching and lab-based learning has facilitated SDL strategy to be used in this course. This study found that our postgraduate students are quite capable self-directed learners, and they are confident about their own self-directed learning capability. Figure 5 shows the students response to their overall capability in SDL strategy in 2012 (This survey question was not included in 2011 survey). The postgraduate students are from a wide variety of background and experience, the SDL strategies in this course aim to provide possibilities for them to learn at different pace, focus more on different area, and support each other.

Based on the survey results in 2011, which indicated general support of using SDL strategy in this course, more flexibility and less instruction were given in 2012 in order to increase the level of self-directed learning. From the above sections, it is obvious that although students are generally supportive in using the SDL strategy in the course, more students indicated in the survey that they expect more resources and support provided to them. The overall satisfaction of the SDL is about 50%, with about 40% are neutral and 10% students are not satisfied with the SDL strategy (Figure 6).



**Figure 5. Students' overall confidence of their own self-directed learning ability**



**Figure 6. Overall satisfaction on the self-directed learning opportunity in this course**

## 4. DISCUSSION AND CONCLUSIONS

The greatest challenge of successful implementation of SDL strategies is how to balance between the instructions given in lectures and the freedom of SDL to provide satisfactory learning outcome. To decide the right “balance point”, more flexibility and less instruction/guidance were given to 2012 students based on the overall supportive response to SDL strategies from 2011 students. The responses from students are mixed in regard to provided learning materials, instructor’s support, and the flexibility offered by the current SDL approach. Based on the survey findings, the following are proposed to improve the SDL strategies in the postgraduate teaching:

1. Due to the wide range of postgraduate students’ background and experience, pre-teaching survey is always helpful in determining appropriate teaching contents, setting the difficulty level and establishing the SDL strategies for the course. The pre-teaching surveys in 2011 and 2012 have indicated similar students background and distribution in industry experience and pre-knowledge related to the course.
2. Most of the postgraduate students see themselves as capable self-directed learners, but the level of support they need varies. Based on the 2011 survey results, a more flexible teaching model is adopted in 2012, e.g., more allocated consultation time and optional after-class exercises, less restrictions on the methods of completing assignment project, less instructions on how to complete lab tutorial tasks, etc. With this change, it is found that some students are not satisfied with the reduced support from instructors. Individual or small group consultations are welcome by students but mostly they are used by students who have great difficulty in completing compulsory tasks rather than by capable students who are willing to explore more in the area. It is suggested that “bonus points” to be used in future teaching to reward students who learn beyond the basic requirement.
3. While some students expect more flexibility in choosing the topics and contents to fit their personal goals, it is noted that some of them do not enjoy the process to explore the topic area and searching for materials. It is suggested that more learning resources be provided to students, therefore they can search “within a boundary” and more likely to find the information they need in an efficient way. This is particularly important to the small portion of the full-time (especially international) students who have not worked in the industry, as they are usually confused when too many choices are presented to them. In another aspect, it should be made clear to students that one of the learning objectives for SDL is to enhance their skills in searching and selecting additional and relevant information to complete a set task successfully, and encourage them to develop their capability in this area.
4. The survey results in 2012 have indicated the flexibility given to students have “gone beyond desirable”. The satisfaction reduced rather than increased, therefore it is suggested that better defined topic area and clearer requirements for the tutorial tasks and assignment project be given to future students. Although the capability to search and identify the most appropriate material to complete a task is one of the

important aspects of SDL, it is observed that many students feel it is too time-consuming. This indicates that students need more guidance on obtaining relevant material.

5. As a large portion of postgraduate students works or worked in the industry, many of them have valuable experience. Over 80% of students appreciate the collaboration experience in the group work, which provides them with opportunity to learn each other. It is suggested that online discussions be established in the course as it could facilitate students' learning from peers. Ongoing web-based blogs and online discussion/forum could also enhance students' learning and promote deep learning.

After two years "trial and error" approach in adopting the SDL strategies in the postgraduate course, it is expected that the "balance point" between flexibility and instructions are now better defined and enacting the above suggestions will improve students' satisfaction to the course in 2013!

## References

Bolhuis, S. (2003). Towards process-oriented teaching for self-directed lifelong learning: a multidimensional perspective. *Learning and Instruction*, Vol 13, pp 327-347.

Chien, M. (2004). The relationship between self-directed learning readiness and organisational effectiveness. *The Journal of American Academy of Business*, March 285-288.

Ellis, H.. (2007). An assessment of a self-directed learning approach in a graduate web application design and development course. *IEEE Transactions on Education*, Vol 50(1), pp 55-60.

Fisher, M., King, J., and Tague, G. (2001). Development of a self-directed learning readiness scale for nursing education. *Nurse Education Today*, 21, pp 516-525.

Wang, C., and Han, J. (2012), Supporting students' self-directed learning in a construction management postgraduate course. *Proceedings of the 37<sup>th</sup> AUBEA International Conference*, 4-6<sup>th</sup>, July 2012, Sydney, Australia, pp 200-211.