1. Introduction

Large class teaching is common in modern universities which have been made to accommodate tens of thousands of students. The globalization has witnessed classes in universities growing even larger to realize populist and cost effective higher education. However, as classes grow larger and larger, it is difficulty to maintain education quality. To prevent university degrees from being downgraded to ‘Mac degrees’, many universities now have started to implement various quality control measures. Most of these measures focus on controls of managerial process, the physical teaching quality, however, is still up to the creativity of individual lecturers.

Large class teaching is an important link in the chain of teaching techniques. Even though a large diversity of teaching tools are now available, large class teaching still has a significant role to play in university. It is one of the most effective and efficient way of teaching delivery. Students get extensive opportunities of interactions within the class; students also gain full textual, oral and visual interpretation of the concepts from the lecturer in two hours. However, as large class teaching is a highly organized and compact teaching method, it requires high teaching skill and a lot of practice. Large class teaching is difficult because of the following characteristics:

- Student numbers are usually large, lecture has less flexibility but more anxiety.
- Students become faces or names, rather than people.
- Organizational problems are compounded; more unexpected issues like late arrivals, early leavers, misbehavior and talking among themselves, ill phrased and difficult questions.
- Diverse learning backgrounds.
- More diverse social and ethnical backgrounds, students may react to lecturer’s talk differently.
- Lecturer’s speech may not be clearly heard in back seats.
- Difficult to convey care and give individual advice to students.
- Difficult to monitor attendance.
- Students tend to be more passive due to easier hiding among others.
- Need more time and effort to organize class activities.
- Need technology to support and technology may fail.
- Group work hard to manage because of too many or too large groups
- Restricted opportunities for student assessment and individual feedback

Generally speaking, knowledge, communication and organization are essential skills for conducting large class teaching. In past teaching, I put too much effort and attention to the first two skills, with little effort on organization of class activities.
In this project, I will focus my attention on the organization of class activities. The purpose of the project is to engage, involve and motivate students in learning, encourage class interactions. I will use action research methodology to conduct the project. General strategies to motivate students into action are as following:

- Develop amiability in class and tutorial to create atmosphere and environment for student-lecture interactions
- Create cooperative and collaborative activities to encourage peer-peer interactions
- Use reflective questions and discussions to engage every student to interact with learning material

A number of activities will be used in class, they include group discussions, thoughtful questions, reflective responses to learning contribution, team work, brainstorm, peer teaching etc.

In the following, I will first give a brief review of action research methodology in literature, then a practical action research plan is presented, then the implementation results from the project are shown. In the last I will conclude the report.

2. A Brief Review of Action Research

Many research and experiments have been done on higher education to improve teaching quality, some are purely research based, some are purely action based. Research based methods adopt theoretic or analytic approach to identify issues and propose solutions using variety of means like survey, interview, questionnaire, observations, literature review, statistics, case study etc. Action based methods adopt practical or experimental approach to implement a particular plan in teaching. Traditionally, in higher education, academics consider themselves either as educational researchers/theorists or as practicing teachers. However, there is an emerging paradigm in the social sciences that recognizes the dialectical relationship between theory and practice. Recently, a unique methodology called action research or AR has attracted much attention for higher education teachers. AR combines both action and research into a cyclic process which can effectively improve teaching. Action and research are like two sides of a coin. Action and practical experience may be the foundations of educational research, and research may inform practice and lead to action. In brief, it is a spiral of cycles of action and research consisting of four major moments: plan, act, observe and reflect [1].
The basic assumption of AR is that people can learn and create knowledge:
1. on the basis of their concrete experience;
2. through observing and reflecting on that experience;
3. by forming abstract concepts and generalization; and
4. by testing the implications of these concepts in new situations, which will lead to new concrete experience and hence to the beginning of a new cycle.

Carr and Kemmis [2] distinguish between three types of action research which is summarized in the following table 1.

RA has a long history that is often associated with the work of K. Lewin who viewed AR as cyclical, dynamic, and collaborative process in which people addressed social issues affecting their lives. Through cycles of planning, acting, observing and reflecting, participants sought a change in practices leading to social action for improvement. A form of AR was used address problems of assimilation, segregation, and discrimination, assisting people to resolve issues, initiate change, and study the impact of those changes. There are many articles and books on action research. These diverse works are based on different theories used by the writers, the different assumptions that derive from these theories about what should or could be accomplished, and the set of appropriate practices that are therefore entailed. Most authors, however, present a naturalistic approach to research, seeking to engage teachers in reflective processes illuminating significant features of their classroom practice and enabling them to understand the experience and perspective of other participants in classroom and school contexts.
Table 1: Types of AR and their main characteristics

<table>
<thead>
<tr>
<th>Type of AR</th>
<th>Aims</th>
<th>Facilitator’s Role</th>
<th>Relationship between facilitator and participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Technical</td>
<td>Effectiveness/efficiency of educational practice; Professional development</td>
<td>Outside ‘expert’</td>
<td>Co-option (of practitioners who depend on facilitator)</td>
</tr>
<tr>
<td>2. Practical</td>
<td>As (1) above Practitioners’ understanding; Transformation of their consciousness</td>
<td>Socratic role, encouraging participation and self-reflection</td>
<td>Co-operation (process consultancy)</td>
</tr>
<tr>
<td>3. Emancipatory</td>
<td>As (2) above Participants’ emancipation from the dictates of tradition, self-deception, coercion; Their critique of bureaucratic systematization; Transformation of the organization and of the educational system</td>
<td>Process moderator (responsibility shared equally by participants)</td>
<td>Collaboration</td>
</tr>
</tbody>
</table>

Based on the above investigation, the author in [1] has proposed a AR model called CRASP which is Critical collaborative enquiry by Reflective practitioners being Accountable and making the results of their enquiry public, Self-evaluating their practice and engaged in Participative problem-solving and continuing professional development. The five components well covered the 5 important goals in university teaching which are also acronymized as CRASP: AR promotes a Critical attitude, Research into teaching, Accountability, Self-evaluation and Professionalism. The author then presents AR research in university teaching based on the 5 AR projects conducted in Griffith university: The development of student learning skills at the undergraduate level; and at the postgraduate level; the development of people’s awareness of research and teaching effectiveness; and effective professional development. In the last, the author demonstrates her own meta-action research. The cases presented in the book are well transferable in general higher education community.

In [3], the author focuses AR discussions on nine aspects: change, reflection, participation, inclusion, sharing, understanding, repetition, practice and community. The author develops a systematic AR routine for AR practitioners. The routine is a five stage cycle which consists of research design, data collection, data analysis, communication and action. Specifications of these stages have also been shown:
• Research design—initiating a study, setting the stage, focusing and framing, literature review, sources of information, ethics and validity.
• Data collection—capturing stakeholder experiences and perspectives, interviewing, observing, artifact review and literature review.
• Data analysis—identifying key features of experience, analyzing epiphanies and illuminative experiences, categorizing and coding, enhancing analysis, constructing category systems.
• Communication—writing reports, presentations and performances.
• Action—creating solutions, solving problems, classroom practices, curriculum development, evaluation, family and community, school plans.

The author then goes through each stage specifically in each of the chapters.

McNiff and Whitehead [4] give a good review of a number of key AR theories and how they influence our thinking in education. The authors credit AR development to Dewey who advocates that the purpose of education is to lead to further education; that is, education is a process of growth whose purpose is to sustain growth. AR, they claim, is a form of researching one’s learning. They find that within the broad arena of educational research, different paradigms exist, they are classified into three categories: the empirical, the interpretive and the critical theoretic. The former two categories are called by the authors as the E-theories and the third the I-theories. For E-theories, the purpose of action research is to observe and describe individuals’ actions in order to understand how they behave, it is conducted from the perspective of external researchers who are aiming to understand and describe a situation as an object of study. For I-theories, the purpose of action research is to find ways of influencing social change through the production of descriptions and explanations by individuals themselves to account for their educational practice, it leads to knowledge of self within a world which the researcher co-creates with others who are similarly occupied. They argue that it is the critical theoretic paradigm which has been largely responsible for generating AR as a form of enquiry. They further identify three different approaches to AR over recent years: an interpretive approach, a critical theoretic approach and a living theory approach. They show that the development of the living theory constitutes a sharp departure from traditional forms, on a par with the second cognitive revolution of the 1950’s in its move away from the descriptive E-
theories of the social sciences and demonstrating a commitment to the development of explanatory I-theories of education.

Most of the AR articles in literature deal with specific approaches to Lewin’s cyclic AR process. In [5], however, McTaggart focuses on the ‘participatory’ aspect of AR and argues that based on Lewin’s writings, his interest in the theory of group dynamics overshadowed what we would now see as fundamental to participatory action research, the commitment that all participants actually do research for themselves. The author clarifies that two of the ideas crucial in Lewin’s work are group decision and commitment to improvement. Participatory AR is in principle a group activity. But in situations where people with different power, status, influence, and facility with language come together to work on a thematic concern, the idea of participation becomes problematic. The author then discusses about a number of guiding principles for dealing with the issues and problems involved in participatory action research. At the end, the author also clarifies 5 things which are not participatory action research. Particularly, he indicates that participatory action research is not research done on other people. It is research by particular people on their own work, to help them improve what they do, including how they work with and for others. It does not treat people as objects for research, but encourages people to work together as knowing subjects and agents of change and improvement.

Babbie [6] describes a number of qualitative data analysis techniques which are suitable for action research. In contrast to quantitative analysis, qualitative analysis is less abstract than statistical analysis and closer to raw data. Qualitative analysis does not draw on a large, well-established body of formal knowledge from mathematics and statistics. The data are in the form of words, which are relatively imprecise, diffuse, and context-based, and can have more than one meaning. The author first describes how to form concept from the collected data by using different types of coding techniques. The author then goes on discussing the methods of qualitative data analysis which include successive approximation, illustrative method, analytic comparison, method of agreement, method of difference, domain analysis, and ideal types. While the emphasis of the analysis is on finding patterns, analyzing events, and using models to present what is found in the data, the author also stresses that things that are not in the data can be important for analysis. These things can be found by negative evidence.

In [7], Kemmis and McTaggart propose a planner for implementing AR. To justify the necessity of an AR planner, they argue that once you begin you project you may easily become preoccupied with the practicalities of the project itself. There is a danger that you may miss steps, accidentally because you are preoccupied with a particular idea or issue, or deliberately as your confidence in the process grows. They create a blow by blow AR planner by asking a series of questions in each step of the implementation.

McNiff [8] presents a concise description of the criteria to judge the right implementation of each AR component. The checklist serves as a quick guide for an AR beginner.
3. Action Research on Large Class Activities

As mentioned in the introduction, large class teaching is an important link in the chain of teaching techniques. The difficult and complex nature of large class teaching has attracted large attention from practitioners in higher education community. More and more teachers are writing about how they have tried to improve the effectiveness of large group teaching [9-13]. These articles cover both general methodology and specific approaches adopted by individual lecturers. While comprehensive as they are, to make them work is still up to the managing capability of individual lecturers.

In past teaching, I’ve found it’s difficult to get students involved in interactions in class because large class tends to nurture passive learning and students tend to ‘hide’ among fellow students easily. Besides, due to the demand of achieving the required knowledge transfer in less than 2 hours, it is really a challenge for the lecturer to engage students into interactive activities. As the result, large class teaching often lends itself to rote learning, students forget what they learn in class quickly. In the past, I put too much effort on knowledge transfer and communication in class. In this project, I focus my attention on organizational skill of engaging students into group activities and interactions so as to develop an active, creative and hopefully, passionate learning culture in class.

Based on the know-how obtained from above review of AR and past teaching experience, I develop a simple and practical AR plan for the project.

Phase I. Plan

1. Designated class activities
   - Thoughtful questions or short quizzes to test students’ understanding of concepts. These are questions to test each concepts and methods conveyed during the class. They are delivered to students step by step and stage by stage along the process of lecturing and tutoring. The purpose of the questions is to keep students concentrating during the teaching and encourage them to think rather than only memorize the content. It also catalyzes questions from students themselves. The questions are designed to inspire student to lecturer interactions.
   - Stimulating questions — open-ended, probing, analysis, synthesis, application — to inspire discussions. These questions are designated to expand students’ viewpoint in the field and are at a higher level of learning. They do not directly point to specific concepts or methods, but are more towards the methodology of generating the concepts, the field research of the topic and the practical applications of the methods. They often involve subjective judgement and require students’ own experience about what they are learning. The questions are designed to inspire both student to lecturer and peer to peer interactions.
   - Problem solving tasks in class. These will be the major activities to engage students into group activities and peer to peer interactions. Although the tasks are to target specific concepts and methods, the tasks will have to have certain difficulty to push students working cooperatively. However, due to time limit in class, clues or tips have to be provided for them to follow.
Past experience tells that students in class tend to keep to themselves, it’s difficult to break their psycho barrier to let them open to other fellow students, especially in the class where students come from various background, both academically and culturally. The first priority in the teaching is to establish trust between students, between students and the lecturer/tutor; build a close and amiable community; and nurture a cooperative and communicative culture. Many excellent proposals and suggestions are available to achieve this purpose [9~13]. A number of practical strategies will be used to create that atmosphere.

- Learn and remember each student’s name and get acquainted with them to create rapport. People feel being looked after and being cared for when you remember their names. They want to be involved if they feel being cared for.
- Build good relationships with students and connect with them by making it clear that my office door is open to their inquiries; by providing email address and inviting students to mail queries or make phone call. Increase student access to me by getting to class early to talk to them. Ask for a few volunteers each day to help with demonstrations and activities and throughout this process learn more student names.
- Listen to their questions, concerns and grievance in the learning, look for feedbacks.
- Stop and ask questions regularly during class, when asking, wait for answers, look around the audience, repeat the question, ask the questioner’s name and thank him or her. When receiving questions, again repeat them for all to hear and thank the questioner.
- Moving out into the aisles during the lecture or tutoring to solicit comments. Patiently provide individual assistance when they need it to create a small class atmosphere in large class.
- Encourage and reward learner participation by appreciation and acknowledgment.
- Encourage peer-teaching among students.
- Acknowledge student feedback at the next class meeting and indicate which changes I can and which I cannot make and why.

2. Implementation

The above activities will be implemented in both the lecture and tutoring. Basically, the implementation will include the build of an amiable and friendly learning community, and conducting the interactive activities in class. During the teaching, the activities will be carefully monitored, observed and recorded. Actions will be revised or new actions will be added as the implementation progresses.

3. Evaluation and reflection

Data or feedbacks will be collected for analysis. Issues and patterns will be identified. Three types of data will be collected to measure students’ reaction to the plan.

- Number of interactions in the lecture
  - The number of student-lecturer interactions each week in the lecture
  - The number of students initiating interactions each week in the lecture
  - The number of students involved in group activities each week in the lecture
• Number of interactions in tutoring
  o The number of student-tutor interactions each week in the tutoring
  o The number of students initiating interactions each week in the tutoring
  o The number of students involved in group activities each week in the tutoring

• Survey of students’ agreement with the class activities

4. Revise plan and repeat the cycle

With the findings from the evaluation and reflection, the original AR plan will be revised and the revised plan will be carried out in the next cycle.

Phase II. Action

In this phase, I start to implement the class activities and the strategies designated in the planning phase. This year’s on-campus teaching is just right to implement this AR plan, because the subject has been taught before, so I’m able to compare with previous teaching. The size of the class is reasonably large with around 40 students, among them, around 30 students regularly attend the lecture. The 40 students are divided into two tutoring groups in the tutorial sessions.

I start to learn and remember students’ names from the very beginning of the semester. In the week leading to the teaching, I print out the complete student roll and read through all the names. At the first lecturer, I hand out a sheet of paper to each student and ask them to write their names on the paper and then fold them to display their names on the desks, while I myself do the same. In this way, I am able to match the names with the faces. In the next couple of tutorial classes, I ask each student to tick his/her name on the roll and match the names with the faces again, so it strengthened my memory of their names. After a couple of weeks, I am able to remember most of their names.

Recall students names do help to forge close relationships with them and help to bring on interactions. In class, whenever ask questions, I don’t have to wait a long period without any answer, I can invite someone to speak out, I can also develop balanced interactions between male and female students, and between local and international students. In most time, if there is no response to a question from the audience, it’s not because they don’t know the answers or because they don’t have any comments, it’s because they worry being wrong or they expect others may answer it, you get to given them a bit push. They are always positively acknowledged or thanked for whatever they answered so they have the courage to speak out again the next time. After two weeks of initiation, trust has been established, I can see more and more students are responsive to my questions, and more and more answers are from different areas of the seating.

I also try to keep connections to some of the students out of class. This semester, I get a few students who are doing third year project with me, so I have the chance to talk with them regularly about their issues including their study in this subject. I also participate in
a couple of soccer matches the students organized, so I have more chance to get students closer to me.

In the first two weeks, students haven’t got acquainted well and are a bit coy, I have to push them a little bit to get them involved into problem solving tasks in classroom. I have to build momentum of a cooperative working culture. Tutorial class is the best place to create a close, communicative, and friendly learning community. I use a number of strategies to build this community and cooperative culture.

- Ask students to seat closer so that they can communicate more conveniently
- Request them to select partners to form as groups so they can do team work
- Encourage them walking around to talk to other groups
- Encourage students joining different groups each time, so they have different partners and enjoy different experience
- Encourage peer teaching, select quick students as ‘sparks’ to spread the ‘fire’ to others
- Explain the benefits of team work to advocate cooperative culture
  - Learning tasks are hard, difficult to finish by oneself alone
  - More efficient to do tasks in team work, people working in a group solve problem faster and are likely to complete all the tasks in time
  - Learn how to make friends which is a life skill and an objective of university study
  - Learn how to communicate to people which is a life skill and an objective of university study
  - Share ideas, more people, more ideas, 1 mind + 1 mind > 2 minds
  - Reduce stress as you talk each other
  - Enjoyable and rewarding as you learn from others or help others
- Response to every query patiently, respect their opinions, care for their concerns
- Participate in group activities and discussions
- Reward good group works by selecting them for demonstrations

After two weeks into the teaching, the interactive culture has been successfully developed in the class, students are much more responsive to class activities than they were in the beginning of the semester. Even though the time and environment in the lecture are not as flexible as in the tutorial, most students are still engaged into peer-to-peer interactions. Although there is no recorded data from past teaching, based on experience, the number of interactions in this semester is significantly higher, the cooperative working culture is much more obvious, and I’m much happier with students’ involvement in the teaching than with any previous teaching years.
Phase III. Evaluation and reflection

In this phase, I show the data I recorded or collected during the teaching, and evaluate the data to improve the plan.

Table 2. The number of attendance (No.), interactions to lecturer (I), students initiating interactions (S) and ratio to no. of attendance (RS), and students engaging in group activities (G) and ratio to no. of attendance (RG) each week in lecture.

<table>
<thead>
<tr>
<th>Items</th>
<th>Teaching Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>No.</td>
<td>38</td>
</tr>
<tr>
<td>I</td>
<td>3</td>
</tr>
<tr>
<td>S</td>
<td>2</td>
</tr>
<tr>
<td>RS</td>
<td>0.05</td>
</tr>
<tr>
<td>G</td>
<td>N/A</td>
</tr>
<tr>
<td>RG</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 3. The number of attendance (No.), interactions to lecturer (I), students initiating interactions (S) and ratio to no. of attendance (RS), and students engaging in group activities (G) and ratio to no. of attendance (RG) each week in tutorial.

<table>
<thead>
<tr>
<th>Items</th>
<th>Teaching Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>No.</td>
<td>39</td>
</tr>
<tr>
<td>I</td>
<td>31</td>
</tr>
<tr>
<td>S</td>
<td>26</td>
</tr>
<tr>
<td>RS</td>
<td>0.67</td>
</tr>
<tr>
<td>G</td>
<td>33</td>
</tr>
<tr>
<td>RG</td>
<td>0.85</td>
</tr>
</tbody>
</table>

In the middle and at the end of the semester, class surveys were conducted to seek feedbacks from students about how they feel about the class activities and what needs to be improved. A MonQuest was also conducted to seek for feedbacks about the overall teaching including both the lecture and tutoring.

All together, 22 feedbacks were collected in the mid semester survey. Due to space limit in this report, I’m not able to present all the content of student feedbacks. Using the qualitative data analysis method suggested in [6], I divide those feedbacks into three categories based on how strong they agree with the class activities: high (with comments like good, very good, excellent, very happy etc.), medium (with comments like helpful, useful, clear, specific, easy to understand etc.), and low (with comments like more
examples, need time for working alone, too fast, more explanations, too difficult etc.). The result is plotted in the following graph

![Bar graph showing students' appraisal on class activities in the middle of semester.

At the middle of the semester, MonQuest surveys on both the lecturing and tutoring are also conducted through the CHEQ of Monash University. The MonQuest results on lecturing and tutoring interactions are shown in the following. The data shows that the lecturer and tutor score quite high in class interactions, however, there is still room to improve, especially in the areas of out class contact with students and overcoming the language barrier to react to students comments more effectively and clearly in lecturer.

Table 4. MonQuest survey of ‘The lecturer’s interaction and support’ in GCO2802 lecturing based on 21 responses.

<table>
<thead>
<tr>
<th>Items</th>
<th>All/almost all (%)</th>
<th>Most (%)</th>
<th>About half (%)</th>
<th>Only some (%)</th>
<th>Very few/none (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturer enthusiastic about the task of lecturing</td>
<td>61.9</td>
<td>23.8</td>
<td>9.5</td>
<td>0</td>
<td>4.8</td>
</tr>
<tr>
<td>Lecturer reacts positively to students’ comments/questions</td>
<td>42.9</td>
<td>47.6</td>
<td>4.8</td>
<td>4.8</td>
<td>0</td>
</tr>
<tr>
<td>Lecturer’s responses focused on resolving questions</td>
<td>66.7</td>
<td>19.0</td>
<td>9.5</td>
<td>0</td>
<td>4.8</td>
</tr>
<tr>
<td>Opportunity for students to clarify issues</td>
<td>61.9</td>
<td>19.0</td>
<td>14.3</td>
<td>4.8</td>
<td>0</td>
</tr>
<tr>
<td>Lecturer willing to assist students with difficulties</td>
<td>52.4</td>
<td>33.3</td>
<td>9.5</td>
<td>0</td>
<td>4.8</td>
</tr>
<tr>
<td>Possible for students to consult lecturer out of class</td>
<td>47.6</td>
<td>33.3</td>
<td>14.3</td>
<td>4.8</td>
<td>0</td>
</tr>
<tr>
<td>Suppl. Materials accessible to students</td>
<td>57.1</td>
<td>19.0</td>
<td>14.3</td>
<td>4.8</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 5. MonQuest survey of ‘The tutor’s interaction and support’ in GCO2802 tutoring based on 19 responses.

<table>
<thead>
<tr>
<th>Items</th>
<th>All/almost all (%)</th>
<th>Most (%)</th>
<th>About half (%)</th>
<th>Only some (%)</th>
<th>Very few/none (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutor’s enthusiastic about the tutorial activities</td>
<td>61.5</td>
<td>23.1</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tutor encourages all students participation in activities</td>
<td>53.8</td>
<td>46.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Opportunity for students to participate in discussion</td>
<td>53.8</td>
<td>30.8</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tutor reacts positively to students’ comments</td>
<td>61.5</td>
<td>23.1</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tutor probes students understanding of material</td>
<td>69.2</td>
<td>15.4</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tutor indicates individuals’ response could be improved</td>
<td>46.2</td>
<td>38.5</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tutor’s response focused on resolving questions</td>
<td>53.8</td>
<td>38.5</td>
<td>7.7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Possible to consult tutor out of tutorial class</td>
<td>46.2</td>
<td>38.5</td>
<td>15.4</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Phase IV. Revise plan and repeat the cycle

Based on the constructive comments collected from the mid semester survey, some of the strategies planned in the beginning of the semester have been revised, adjusted or added to improve the class activities. Specific measures are as following

- Refresh key concepts and illustrations of key methods at the beginning of tutorials
- Illustration of procedure of each task during the process of tutoring
- Discussions and summarization at the end of tutoring
- Not to push hard for the few individuals who insist to work mainly by themselves
- Not to disturb individuals too much when they are concentrating on their work
- Talk more patiently and complete the conversation before ask if they understand
- Cover less and uncover more in the lectures so as to focus on key points and give more time on interactive activities
- Not to push so hard for the few who are struggling in tutorials, not to require them to complete all the tasks as others but to finish as much as they can
- Break up groups with constant members and reorganize groups so quick and slow students are better mixed up
- Let some of the quick students approach those who like to work alone, and involve all students into group action
- Encourage and invite more students to visit my office for discussing about their problems, concerns and issues in the study
A survey is conducted at the end of the semester, 28 responses have been collected, the result is shown in the following graph which shows a significant improvement to the mid semester data. The improvement can also be observed from the interaction data in Table 2 and 3.

![Students' appraisal on class activities at the end of semester](image)

4. Conclusions

In this project, I’ve developed and implemented a simple and practical AR targeting a typical event in undergraduate teaching, which is engaging students in active learning through large class activities. Due to the heavy teaching load and time limit, the project has been limited to a reasonable small scale and on-campus teaching. However, the methodology used in this project can be readily applied to other parts of the teaching. The project has gone through the process of reconnaissance, resource collection, topic selection, field review, methodology review, planning and designing, implementation, evaluation and revision. Results have been both quantitatively and qualitatively analyzed. The project generally has achieved the target of improving large class teaching significantly. While positive results have been achieved, the project has obvious limitations which need to be addressed in future. The first limitation is the lack of participatory of students and colleagues in the AR. The AR process may be designed to be transparent to students to involve them into improving their own learning, and colleagues can also be involved to contribute. The second limitation is that only on-campus students are involved in the investigation, the plan may be expanded to include both on-campus and distance students.

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Reference:

[9] The Large Class Teaching Guidelines, Teaching and Educational Development Institute, the University of Queensland, Australia, www.tedi.uq.edu.au/LargeClasses.