An Investigation of the Team Knowledge and Team Performance of the Chinese Engineering Students in a Senior Technical Module

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Abstract—**Teamwork is a very important attribute for future engineers. China graduates a large number of engineering graduates every year, so it is necessary to investigate the teamwork knowledge and performance level of the Chinese engineering students, and work out a better mechanism of teamwork teaching for them. This work investigates the team knowledge and team performance of the Chinese engineering students in a Year 3 senior technical module – Software Engineering, in which teamwork skills are one of the course objectives. The test results demonstrated that the declarative knowledge of the Year 3 students on team working increased through the years of learning but it was not successfully transferred into action, the skill based outcome. It was found that the participation rate for teamwork training in the technical module was low, and students focused more on the technical production. It was suggested to include the peer rating of team citizenship with a certain percentage (5-10%) in the final coursework mark, and also a certain percentage for individual contribution (5-10%). This will switch the product oriented to both teamwork and product oriented, and the individual contribution assessment will prevent social loafing and hitchhiking.**

Keywords— Teamwork; technical module; Chinese students; Team Knowledge; Communication Skills

I. INTRODUCTION

Teamwork skills have been recognized as the fundamental skills for the potential engineers by the industry worldwide, including that in China. As one of the countries that play a more and more important role in the global economy, China has been cultivating a large number of engineers: in 2013, there were 4.523 million registered undergraduate students and 600,000 registered postgraduate students majoring in engineering [1]. With the rapidly rising influence of China in the global economy, how to effectively teach technical teamwork to Chinese engineering students needs to be studied urgently, especially as most of the teamwork training in China is undertaken in after-class activities rather than in an academic setting. However, due to the large population and limited resources, it is really a big challenge to teach and assess technical teamwork effectively in such a competitive environment and to large cohorts of students in China.

A pilot practice on teamwork training was conducted in a joint degree programme between a leading British university and a top Chinese university in 2011 [2, 3]. This programme aims to mix the best of teaching approaches from China and the UK, and it includes more emphasis on professional skills than is usual in other Chinese degree programmes. In the experiment, many successful Cooperative Learning (CL) practices from the West [4] were used in the Personal Development Plan (PDP) module that takes team working as one of its key teaching objectives. Students were asked to produce an advertising video for a Chinese product to be sold in the UK in groups with the basic teamwork concepts and skills being introduced at the beginning, which includes team effectiveness, team development stages, assertive communication skills, social skills, interpersonal skills, and conflict resolution skills. Other skills, like interviewing, questioning, exchanging ideas, giving advice, defending oneself, and summarizing information, are introduced and practised in later PDP tasks throughout the whole undergraduate period. In the experiment, students were asked to designate different roles in their group instead of a single leader. The instructor formulated the policies for taking responsibilities and for the practices expected. Students were encouraged to improve their team performance during the process by drafting and signing the experiment agreement and filling the mid-term evaluation form. At the end of the task, students rated the team performance of the team members including themselves.

It was noted that most of the experiment strategies and mechanisms achieved their teaching objectives and learning outcomes; students generally understood and performed what they were expected to do. The CL practice was generally effective in team work training, though some mechanisms were not suitable to the Chinese students, like shared team leadership and roles. A gap between the declarative knowledge and the skill-based outcomes was identified and it was also noted that the inherited practices and cultural norms had a big influence on team behaviour [5]. Except for the PDP training of team working skills, students were also put into several group projects in the technical modules from the second year.

This work attempts to investigate the team knowledge and team performance of the Chinese engineering students in a Year 3 (Yr 3) senior technical module – Software Engineering (SE), and then to find out how much the previous training and practice increase students' team knowledge and skills, and how much teamwork training could be implemented in technical

modules. The findings will benefit other Chinese institutes in making teaching arrangement of teamwork skills through the undergraduate years, and can also be referenced by foreign institutions with the same problems and worries uncovered.

This work is a pilot study of the Chinese engineering students on how they reflect and react in team endeavour, which is much influenced by the culture and norm. In the team knowledge test, students were asked to mark what they thought were right and what they chose to do. Different from other knowledge tests, this study attempts to discover the differences between what students know and what they do, and to reveal the underlying reasons. This will help to understand the team behaviour of the Chinese students either in China or overseas.

II. LITERATURE REVIEW

Many studies report successful practices in classroom-based teaching of team work, the most popular practice being to assign group projects in technical modules. Many approaches to design and manage group projects can be found from the literature, for example [4, 6]. Researchers often comment on the teacher-controlled factors that influence students' team experience [7, 8], and many computer systems have been developed to help the process of group formation, administration and teamwork assessment [9-12]. Lingard and Barkataki suggested an approach to teach team working skills using free web-based tools [13]. Sims-Knight et.al developed tools to incorporate an assessment-based continuous improvement process on team skills into engineering classes, which focuses on Team Knowledge Test (TKT) and Team Process Check (TPC) [14].

However, other researchers and educators argue that teamwork skills cannot be learned through ad-hoc project experience without teaching; it is a learned skill, and should be taught, practised and assessed as other academic skills. Among the ways suggested to teach teamwork skills as directly as academic skills are: (i) setting up a project module with teamwork as its main objective [15]; (ii) developing a specific programme that teaches interaction skills [16]; and (iii) building up a minor in Engineering Communication and Performance [17].

Many educators have done a lot of research on teamwork teaching in Software Engineering, especially on the factors of how to manage and assess team work in the group projects [6, 14, 18, 19]. Some researchers also investigate the gap between what students learnt and what they used in practice in software engineering subject [20, 21].

III. METHOD USED

In this Software Engineering module, students were grouped into 9-10 to do a group project – developing a Technical Conference Management System. The groups were divided into 2 sub-groups each with 4 or 5 students. Each sub-group was responsible for either paper review management or paper voting management. Although they were divided into two sub-groups, they were still *one* group, and they should work together to complete this system. As a learning process, they should not parcel the responsibilities such that (for

example) one student writes all the code and the others do the software engineering. All students in a group had to work on all aspects of the projects.

The weekly reports (1 group leader summary and 9 individual ones) had to be appended to the final project report. This aimed to track the work completed by each member of the group. The coursework mark is marked out of 100 with 90% being the group mark and 10% was given for individual participation and achievement, as presented by weekly reports.

In the middle of the project, students were asked to do two tests: Team Knowledge Test (TKT) [14] and Self Assessment of Communication Skills [22]. These tests helped students to enhance their awareness, knowledge, understanding and self-reflection of teamwork and communications skills. In the TKT test, students were asked to mark what they thought was correct and what they chose to do. The difference between knowledge and behaviour was examined. The communication learning outcomes were suggested by Software Engineering professionals [22]. The 31 communication skills comprise communication in a software engineering workplace; however, most of the outcomes are also applicable to other engineering programmes.

These students are the same cohort of students as in the previous experiment two years beforehand. A similar TKT test was conducted with the current Year 1 (Yr1) students. This allows a comparison of the team knowledge level between Yr1 and Yr3 students to investigate any progress in the process of group work practice.

After the project, students were asked to complete the Team Process Check (TPC) [14] online to evaluate their team performance.

Since the peer rating mechanism had not been proved to be effective, valid, reliable or culturally appropriate in the PDP module, it was not introduced in SE. Because this is a senior core course that takes a reasonably high percentage in the degree Honours calculation, more caution had to be given in changing the evaluation criteria. In senior years, the course content becomes more difficult and students are all busy preparing postgraduate applications and job hunting. If the overhead for students in teamwork learning is too high, the efficacy of the study suffers as student responses become hurried and superficial. A questionnaire was circulated to students to complete, and a semi-structured interview was conducted after the group coursework. Ten students (six females and four males) attended the interview. They were randomly selected by the tutors, regardless of their gender, academic rank and class. The interview was a one and half hours semi-structured questionnaire-based discussion. Students were encouraged to speak freely and were assured anonymity.

IV. PARTICIPANTS

The participants are all formally registered students of both BUPT and QM, having been recruited through the national Chinese university entrance examination system achieving a score above the BUPT minimum, which is above the top line[1]

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[1] The results in the Chinese university entrance examinations are group in

in the examinations. They are, therefore, representative of Chinese students in a national key university.

There were 518 students registered for the SE module and participated in the experiment. About 65% students studied for the degree of Telecommunication Engineering and Management, where the management was an add-on subject; and 35% of them studied for the degree of E-Commerce Engineering with Law, where the law was an add-on subject.

V. DATA ANALYSIS

A. Impact of the previous team training and practice on students' team knowledge and team behaviour

Among the 20 team knowledge questions, there are 14 questions (70%) that half of the students knew what they should do (Table I). The average percentage for the correct choices of the Yr3 students is 62.7%, which is much higher than the percentage of the Yr1 students (54.5%). These Yr3 students are the same students in the previous experiment in 2011 that were given some teamwork training in the 1st year PDP course. This indicates the previous training and group practice in the first three years for the Yr3 students effectively enhanced students' team knowledge, though they still had space to improve.

However, this knowledge does not always translate into practice. There is a big gap between the knowledge and the practice (62.7%-49.8%) (Table I). The reason, as students explained in the interview, was that they knew the better solution, but when they found it was hard and troublesome to implement, they would choose the easy way instead of the better one. Sometimes they knew what should be done, but they had difficulty to put it into practice.

1) Listening skills

Most of the Yr3 students were aware of the importance of listening to others' opinions especially different ideas and feedback, but in their knowledge and practice they would often compare the feedback and opinions with theirs, be defensive, try to explain their own idea, and look for others' weak points. This means they would like to listen carefully but sometimes lacked the skills to do so.

2) Skills to organize and attend meetings

The students were aware of the importance of making and following the meeting agenda, but sometimes might disregard it, and depend on the team leader to control the discussion; they got used to set an order of speaking to ensure that every member's opinion could be heard; they tended to mark each idea with ownership or rate the goodness of each idea.

Some students also reported in the interview that their meeting was inefficient, as after a long meeting they could not work out an agreed solution. When they were asked whether they made an agenda before the meetings, most of them admitted that they normally did not prepare formal meeting agendas, but a general plan of what would be discussed during the meeting. Therefore although they wrote meeting minutes afterwards, they did not have the resolution and action points.

3) Decision making skills

Though most of the students (70%) knew they should suggest finding a middle ground by taking the best from each approach when they found their approach was better but different from the others, some of them (21%) chose to be quiet and follow the majority rules in practice. Though most of the students (75%) understood that they should come to a consensus that every member felt it was workable and defensible, in practice, many preferred to vote to get consensus.

In the interview students also reported a common problem they met: when different opinions were proposed, the consensus was difficult to achieve. Sometimes they found that both the proposals were right, one might be best from the technical view, and the other might be from the time management view. However neither side could persuade the others, so they often put the difference aside and continued with the work to find out the better solution later.

One student said their group normally followed the majority rule to make the decision when different ideas were put forward. When she was asked whether she thought the majority rule was good or not, she explained that she thought it might be the fairest way, as everyone expressed their opinions, and the decision was made on the basis of the common interests of everyone and nobody objected.

4) Evaluating skills

Most of the students knew how to give feedback and how to evaluate other's work; they knew they should give both positive and negative responses, and offer specific, constructive suggestions for change. However in practice, some of them would give only excellent ratings or be general to avoid the negative responses. One consideration is Chinese people often try to save the face of others.

One student commented in the interview that it was very difficult to evaluate each member's contribution objectively. For example, there was a student who was sick for most of the time for the project, but at last they also gave him an equal distribution of the marks, as they thought sickness and absence out of his control.

5) Expression skills

Almost all the students (91%) knew they should understand listener's demands and tailor their presentation to the use of the listener, but in practice the percentage fell down to 68%. More students would just let it flow naturally without preparation, or expect other people to see things the way they did, or focus on what was important to them.

6) Conflict resolution skills

From the TKT test results it was noted, (i) though more than half the students knew it was best to address the disagreement directly and supportively, in practice most of them would minimize the significance or ignore the disagreement, which was consistent with the characteristics of

TABLE I. TEAM KNOWLEDGE TEST RESULTS OF THE YEAR3 STUDENTS

Question	Think	Do
Average	62.7%	49.8%
1. When there is a disagreement or difference of opinion in your team, it is generally best to		
- B. address the disagreement directly and supportively, even if there is a risk of conflict. (1):	33 (57.89 %)	22 (38.60 %)
2. When you are listening to other people offering their ideas, it is useful to		
- D. maintain eye contact with the person. (1):	26 (45.61 %)	22 (38.60 %)
3. Your team leader comes to your scheduled meeting without an agenda. What should you do?		
- A. Make your first agenda item developing an agenda as a team. (1):	27 (47.37 %)	22 (38.60 %)
4. When dealing with a team member, who is not doing his/her fair share of the work, it is best to		
- A. have a team meeting at which the norms of the team are discussed in a frank and open manner. (1):	50 (87.72 %)	24 (42.11 %)
5. The single agenda item for your next team meeting is to generate ideas for a project. You decide to use the brainstorming technique. Which of the following should you do?		
- C. The process of generating ideas should be separated from the process of evaluating ideas. (1):	22 (38.60 %)	26 (45.61 %)
6. When receiving feedback from your team members, it is generally useful to		
- C. try to perceive the feedback as information that you can use, not an evaluation of you as a person. (1):	42 (73.68 %)	32 (56.14 %)
7. When expressing an idea or presenting some information, it is best to		
- B. try to understand the listener's point of view, and tailor your presentation to what may be of use to the listener. (1):	52 (91.23 %)	39 (68.42 %)
8. You have been asked to review another team's process check. Which of the following would be the best response?		
- D. A variety of responses, some high and some low, because that would give pointers for improvement. (1):	37 (64.91 %)	34 (59.65 %)
9. Your team is deciding how to solve a problem. Your three teammates all agree on a way to proceed, but you feel quite sure that your different approach is better. What should you do?		
- D. Suggest that you try to find a middle ground by taking the best from each approach. (1):	40 (70.18 %)	35 (61.40 %)
10. When you and another team member are having trouble communicating, which is the worst thing for you to do?		
- B. Planning your response while he is speaking (1):	20 (35.09 %)	18 (31.58 %)
11. You have gotten quite angry in a team meeting. Which of the following is the least productive thing you could do?		
- B. Get it off your chest. Everyone will feel better if you get it all out. (1):	11 (19.30 %)	14 (24.56 %)
12. In order to increase the chances of everyone doing their fair share of work, a team ought to:		
- B. assign specific tasks and monitor progress. (1):	43 (75.44 %)	34 (59.65 %)
13. The opinions of quiet members of a team are often not heard. If you were meeting leader, what would you do about it?		
- D. Ask them to write down their positions and give it to you anonymously after the meeting. (1):	15 (26.32 %)	10 (17.54 %)
14. If a team member is expressing an opinion different from your own, it is generally helpful to		
- C. listen carefully to what is being offered, even though you have an alternative way of looking at the issue. (1):	44 (77.19 %)	41 (71.93 %)
15. A lot of time in your team meetings seems to be wasted due to conversations that seem beside the point. This can be fixed by:		
- C. having a meeting agenda and sticking to it. (1):	37 (64.91 %)	24 (42.11 %)
16. When giving feedback to someone on your team, it is generally helpful to		
- D. offer some positive supportive comments and then propose specific, constructive suggestions for change. (1):	47 (82.46 %)	40 (70.18 %)
17. You know consensus has been reached when		
- C. every team member feels that the decision is workable and defensible, even if not what s/he would have chosen on his or her own. (1):	43 (75.44 %)	36 (63.16 %)
18. Effective discussions of team business are often made difficult by people who are argumentative or dominating or disorganized. To get the meeting moving forward you need to:		
- A. let them know that you have understood and appreciated their point. (1):	37 (64.91 %)	29 (50.88 %)
19. If a member of your team is hostile or critical it is generally useful to		
- B. try to find some area of agreement or acknowledge some truth in what he/she is saying to diffuse the attack. (1):	42 (73.68 %)	30 (52.63 %)
20. Two members of your team have a genuine disagreement (not just miscommunication or personality conflict). Which of the following would be most likely to lead to a resolution?		
- A. Ask questions to try to understand each person's position and look for solutions that both might like. (1):	47 (82.46 %)	36 (63.16 %)

the Chinese people, who often avoid conflict to save face and keep harmony; (ii) though most of the students thought it was best to have a team meeting at which the norms of the team were discussed in a frank and open manner to deal with the hitchhikers, in reality they would prefer to ignore this behaviour or depend on the instructor to handle it; (iii) though most of the students knew they should try to get everyone do their fair share of work, they often chose to ignore this as long as the work was done; (iv) many students did not acquire the proper communication skills; (v) when angry most students thought it was better to get it off your chest; (vi) half the students showed less patience in dealing with the dominant, argumentative and hostile members in practice: they either argue back or ignore it at all; (vii) half the students would solve the disagreement by letting each side compromise or following the majority rules.

Students also showed much dependence on the team leader to solve the team problems. One student remarked in the interview that the role of team leader was very important. If the leader could not distribute the tasks reasonably, the team members would shift the responsibilities to others, refuse to complete their work with excuses, or show little interests in doing the work. They knew that even if they did not do the work well there would be somebody help to check and improve, and they claimed that they already tried their best.

This shows that there are still many students who lack the proper skills and techniques to deal with team problems and conflicts. They do not know how to solve the problem, but choose to restrain their own feeling and ignore it to keep superficial unanimity and harmony. This might be explained by the fact that Chinese people were often educated to sacrifice their individual interests and restrain their personal feeling to contribute to the collective interests and harmony.

B. Impact of the previous team training and practice on students' communicaiton skills

It was found that the Yr3 students had much confidence in their ability to use common forms and tools to communicate agreeing that they could use email appropriately, understand what information should be included and what should not, when to use "reply all", and the necessity to read carefully before sending. However when they were in the first year of university, many of them did not show these abilities: using private email address instead of the university address to write emails to the instructors; did not open and close emails properly (proper address of the receiver and sender were neglected); using abbreviation and slang instead of full sentences; and being unreasonable in expectation of reply times.

This confidence extended to all forms of communications so that in conclusion: i) Students had been enabled to use various communication forms and digital tools, and to give effective presentations after three years' learning and practice in the joint programme; ii) They showed professionalism in communication: participate in meetings, communicate through transparency, be nice to others, help each other, be passionate, give opinions with a balance of confidence and humility, and prevent potential team problems. But they also showed their weakness in avoiding complaining and managing non-verbal communication. iii) Most of them could listen actively and read with comprehension and evaluation, but they showed less confidence in adjusting communication based on non-verbal reaction and soliciting feedback and help. iv) Many of them could prioritize communication tasks to use time wisely, but less of them were skilful in using silence and asking questions instead of asserting an opinion. v) Most of them could discuss productively, deal constructively with conflicts, and give criticism constructively. However, many of them easily got defensive to criticism, and not many people were very confident in supporting the transition from debate to a decision. vi) Most of the students were competent in explaining clearly with conciseness, using consistent and appropriate terminology, getting to the point directly, explaining by telling the intent, and communicating convincingly. They still need more practice in presenting information by providing the big picture and a high level of summary and answering questions clearly beyond the question itself. Many students reported less confidence in communicating effectively under stress.

To these experiment students, it was found that many of them were easy to assert their opinion, be defensive to criticism, and complain. This might also indicate the face-saving character of the Chinese people. When their opinion is challenged by others, they instinctively defend their opinion to save face. When a team problem or fault was found, many of them might choose to complain and blame others to wipe off their responsibilities to save face. However, students showed a lot competence in most aspects of the communication skills, and through this self-assessment they should have been aware of the effective skills for communication and their weaknesses.

C. Problems in the team precess

The Team Process Check results showed that most of the student teams could get everyone' ideas before making a decision, help individuals to get their ideas out, assign tasks to each members carefully with each member clear about their tasks, operate according to clear rules, generate best solutions through evaluation, and improve work by self-assessment; but some students also reported team problems, such as having difficulty staying focused and on track, working without an explicit plan, some people doing most of the work, and having difficulty completing the work effectively.

D. Low participation rate

There were only 11% of the Yr 3 students (57 students) submitted answers to the TKT test, and the response rate was even lower in the TPC test (3%) and Communication skills test (9%). The reason for the low participation rate might because the Yr3 students were very busy with the technical modules and various proficiency tests, such as GRE, TOEFL and IELT, and this teamwork study tests were formative and did not contribute to the final marks.

Students were asked to comment on the low response rate in the interview. One student said when she informed the other students of these tests, the other students asked whether these tests were compulsory or marked; if they were not compulsory or marked, they would not bother to do that.

When they were asked whether the response rate would rise if the tests were marked, they said if it was made compulsory, it might raise the response rate, but the completion quality could not be guaranteed.

Some students thought these skills should be gained by practising in real group work instead of doing several tests, and these tests were no use.

One student commented that she found the tests were very useful: "There were many problems that I only realized after I did the tests. I would reflect on how I would think about the problem, whether there were other solutions, and what the difference between my thought and the implementation was. If to make all the students complete the tests, it would be good."

Though the importance and objective of the tests were explained in the informing emails, students were not aware of this. The tests employed the learning method of self-evaluation and self-improvement. The importance and objective of the training ways should be explained clearly next time, and face to face introduction was suggested.

E. Students' comments and suggestion

1) Assessment
Students suggested final product demonstration and questions to individual members to prevent hitchhikers, non-product-oriented assessment to draw more attention to team working, and more challenging tasks to promote team cooperation.

A male student said in their group they parcelled the task into several parts, and each member took one part. They had no idea about what the others did and their knowledge was isolated and incomplete. They did not do the work together, and changed the group work into individual works. He thought the intention was good to set up a group coursework to practise team working, but because the assessment mechanism was based on groups instead of individuals, it resulted in social loafing and unequal contributions, some members working really hard and some not caring about the work and cooperation. He said if only assessing the reports, these problems would often happen. He suggested that the instructor checked the work by asking questions during the product demonstration. If the students did not participate in the work, they would not be able to understand the process and could not explain clearly. It was important to make a connection between the individual contribution and their final mark, and to find out an effective method to examine what each member had done.

When students were asked how much effort they would spend on teamwork improvement, one student said group members cared more about how to write the final report well and get a high mark, but not about how to cooperate well as a good team. It did not matter whether the team cooperated, as long as the report was written well and got a high mark, every member was pleased.

One student suggested that the coursework should not be product oriented. One good student in a team might be able to complete the whole task and produce a very good product, but there was no team work and cooperation. If the emphasis was to let the team combine together and get every member to contribute their best, the final result might not be as good, so leading to a lower mark. Therefore, if the coursework was product-oriented (result-oriented), students would concentrate more on the result instead of team working.

2) Project task selection
One student commented the task was not big and difficult, and it did not require so many people (9-10 students) to accomplish it. He remarked that team cooperation and cohesion could only be motivated and enhanced when there were a few people that whould complete a big project. If the task was easy, the students did not need to cooperate, and they could complete it easily by themselves. He suggested letting 2-3 people do the work 5-6 people supposed to do, and setting a basic mark of 60 for the fundamental functions. Students could exert the strength of a team to complete more functions in the limited time to get more marks. This will raise the efficiency and make the cooperation more joyful. The other students did not agree with him. They said if making the task difficult and the group smaller, students would complain and several groups would work together to finish the task. If the weak students found it too hard, the work would fall on the shoulders of a few students.

3) Team performance assessment
When they were asked whether we should assess the teamwork performance as well, or just assess individual members upon their contribution and the percentage of their share of work, most of them expressed worries about the objectiveness and fairness of the peer rating of team performance or contribution. They said it depended on how and who assess it. Even the anonymous rating could not guarantee the fairness. It was difficult to rate oneself and others objectively. Students stressed that Chinese people admired moderation and harmony, and they often rate everyone the same or similar to keep the harmony.

4) Group forming methods
Most of the students preferred random selection of group members. They said self-selection would keep the same people in the same group for different coursework, they could not communicate with others, and the resource they could share was limited because they knew each other very well. They thought random selection was better and good for group productivity. It was notable that students remarked that it was more efficient when working with strangers. This was inconsistent with the previous experiment result, where self-selection was the preference and random selection was the second choice [23].

One student commented that if the aim was to learn more technical knowledge, it was better to do the work individually, but he did not support self-selection, because that would make the good ones better and the weak ones worse.

When they were asked whether they would be in a group with the people they really wanted to work with when self-selection was allowed, the answer was *NO*. They explained for fear of hurting other's feeling and face, they normally chose to group with their friends or those who appealed to join their group. The weak students would distribute themselves into good student groups, and ask the good students to help, and the

good students found it hard to refuse and they were grouped by others actually.

One student mentioned that some good students expected more for the mark and product, and some students only aimed to complete the assignment and showed less interest in doing the work. He suggested letting the students with the same interest and objective join together to form a group.

F. Skills need to improve

Students were asked to comment on which aspect they thought they needed to improve to be a good team player. They did not have a clear idea about this. They said different people had different personalities and characteristics, so they did not need to learn the same teaming skills but did what they were good at. For example, the silent students did not have to learn brainstorming skills, and they might be more suitable to do some implementation work.

As for conflict resolution skills, they stated the characteristics of Chinese students: they were not so aggressive, and were always nice with others; to those problem team members, they might complain behind their backs, and rely on the team leader to take any action and if there was no action taken, they would just let them go. They said the role of the team leader was very important, and should be taken by an authorised person, and most of the students in the team were accommodating and easy-going.

Most of the students did not want to work with the dominant students. However one student said it was not proper to judge whether the dominant students were good team players or not, because being dominant was their inherent personality. Sometimes a team needed a person, who was decisive and resolute, otherwise the decision process was long, and the discussion was not efficient. Some students did not have their own ideas, and would like the others to make decision for them.

The responses suggested that these students did not find the significance of the teamwork skills; to their understanding, team working is being nice with others, avoiding a quarrel or fighting, not being assertive or aggressive, and doing what they were good at. They also emphasized the importance of the role of a team leader, and they depended on the team leader to make decisions, solve team problems, and manage the members of the team.

G. The best way to learn teamwork skills

Discussing the best way to learn teamwork skills, one student suggested a module of career development. She said teamwork learning should not be mixed with technical learning. To those who care about their career development, they could learn teamwork from this module, and they should also be able to consult with the instructors. She suggested that the teamwork learning should not be made compulsory.

Though they admitted the PDP module gave them the opportunity to put many important professional skills into practice, they found the PDP module was more like a big coursework, with setting up and checking, but did not have much knowledge or skill teaching.

For the Communication Skills module, they benefitted more from the material on written communication, like how to writing reports, but not much on teamwork communication.

There are three major ways to influence others to get them to do what you want: one is to threaten them with sticks (coercion); the second is to pay them with carrots (inducement); the third is to attract them or co-opt them, so that they want what you want [24]. In teaching and learning relations, it is predicted that these methods also apply. Compared to coercion and inducement, attraction and co-operation are better. Team knowledge learning can be made compulsory in a technical module: students cannot pass the module without completing the learning arrangements, which is coercion. Extra marks can be added if they complete the teamwork learning very well, which is inducement. It would be ideal if students themselves want to improve the skills and the instructors help and coach in the process. In order to achieve this, the training should be attractive, practical, and efficient, instead of only focusing on declarative knowledge. Selective workshops on different aspects of team working are suggested. However, the lazy students might not be attracted, and the mark-oriented characteristics of the Chinese students that they only do work that are marked will bring a barrier to this practice. To be practical, different methods should be used together to enhance the learning of team working: coercion, inducement and attraction.

VI. CONCLUSION

It was found that the Year 3 students had better knowledge of teamwork than the Year 1 students, according to the answers they selected on what they thought was correct.

It was also noticed that there was a big difference between what they thought was correct and what they normally choose to do for the Yr3 students: they knew better than they did. This means that although the awareness of team knowledge was developed, the practice was not much improved.

The TKT test results demonstrated that the declarative knowledge of the Yr 3 students on team working increased through the years of learning but it was not successfully transferred into action, the skill based outcome. This reconfirmed the finding of the previous study, there was a gap between the declarative knowledge and the practice skills [5]. It might reflect that more experience of group work without instruction does not necessarily teach or improve team skills; on the contrary it might reinforce the wrong understanding and practice, and the frustrated experience might bring negative attitude of team work to students. This finding is consistent with others [9]: it is not sufficient to organize students into group projects and then assume that they will gain the team skills merely by team participation. These skills should be taught purposely as other academic skills and practiced with guidance.

Without knowledge teaching, students will not be aware of the many potential problems and the alternative useful practices; and without practical instruction, they will not know how to put the skills learned into practice. However, it was found that the participation rate for teamwork training was low in the technical module, and students focused more on the

technical production. It is not good to put the teamwork teaching and coaching in technical modules. A good way suggested is that students learn teamwork skills in the PDP module, and attend workshops for the practical instruction to transfer knowledge into action in the first year. After they are well prepared with both knowledge and practice, students can complete some technical coursework in groups. The hard skills are essential and critical in a technical module, but the soft skills are also important. Teamwork skills should also be emphasized in the technical group work. It is suggested to include the peer rating of team citizenship with a certain percentage (5-10%) in the final coursework mark, and also a certain percentage for individual contribution (5-10%). This will switch the product oriented to both teamwork and product oriented, and the individual contribution assessment will prevent social loafing and hitchhiking. The teaching objectives are well illustrated by these assessment methods: a technically strong person who cannot cooperate with other in a group is not what the university wants to cultivate. The emphasis on technical learning is also reflected by the big percentage of distribution in the final mark.

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