

# IMPROVEMENT OF INDIVIDUAL LEARNING AND INSTRUCTOR'S ROLE FOR BETTER TEAM LEARNING

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## ABSTRACT

Applying and improving the active learning and teaching model is always an important component in improving the quality of education within the CDIO framework. In this paper, we focus our analysis on a series of observations, interviews and focus group discussions about the pros and cons of individual learning as well as those of team learning in the university so as to propose a number of methods to enhance the efficiency and effectiveness of students' learning in coursework and projects. Despite all the good things being said about team learning, there is always a discrepancy in the progress of task completion among students because of their different background and knowledge. Therefore, an emphasis has been placed on the development of interpersonal and personal skills in team building. The purpose is to help students bridge the gap in their communication: to overcome personal fears in team interactions, to accommodate with different human characters, and to become more open to others' opinions. However, through our systematic observations, in the end, the top students in most teams still excel other students and try to impose their ideas upon others. This hinders the benefit of active team learning and teaching, and many students even commented that they did not recognize much benefit from the general CDIO approach. Through a series of additional observations and interviews, we have realized that we need to allow for certain periods during the week, in which students will carry out individual learning through structured settings. Individual learning space, individual checklists, individual brainstorm tactics were set up and introduced to a sample of 200 students in four senior classes of different majors, including Software Engineering, Information Systems, Civil Engineering, and Electrical Engineering. In addition, instructors in those four classes were asked to show more of their leading role in supporting students' interactions: to help facilitate open discussion, to encourage idea sharing and appreciation, and to direct top students' effort more toward idea integration than domination. Interviews followed by focus group discussions carried out in the end have showed favorable feedbacks from the majority of the students even though some complained that the new settings required them to spend more time than usual. A number of suggestions for new learning methods and self-improvement were also come up by the students themselves.

(380 words)

## KEYWORDS

Active learning, CDIO framework, CDIO Standard 2, 7, 8, 9 and 10, FSNPA model, Learning Pyramid, individual learning, team learning

## INTRODUCTION

Team learning is the process of sharing knowledge and complementing for each other amongst members of a team, who are working collectively to achieve some common goal (Decuyper, 2010). Under such settings, there are always dependencies between the work and roles of its members, hence, a high level of commitment toward the common goal, fair work distribution among the members and effective responsibility delegation by the team leader are some of the key factors to a team's success (Michaelsen et al., 2002). Successful team learning usually helps with the learning capability of its members in various areas. As a result, team learning is now widely adopted by many universities and institutions in the teaching of many subjects.

Team learning, however, is usually hindered by many problems during the course of the team development process. As depicted in Tuckman's FSNPA (Forming-Storming-Norming-Performing-Adjourning) model of team development, the team progress can break down at various stages if the team cannot find consensus and commitment in its operation (Tuckman, 1965). At Duy Tan University, team learning is at the heart of our CDIO deployment, yet, many times, we observed that our engineering students did not realize the benefits of team learning because of various breakdowns in team development. These are mostly attributed to communication problems and the discrepancy in task completion rates and end-product quality of team members due to their different background, knowledge, and skills. In an effort to improve team learning and teamwork efficiency, our university has encouraged different faculties and departments to find better ways for teamwork approach in their CDIO projects. Our paper, based on a series observations, interviews and focus group discussions, will propose a number of improvements in the instructor's role and individual learning so as to better support team learning in our CDIO projects.

### A. CAUSES FOR BREAKDOWNS IN TEAM DEVELOPMENT & TEAM LEARNING

An initial revisit to the benefits of team learning would not be redundant in our effort to pin-point what usually hinders the realization of those benefits by our students. As pointed out in the Learning Pyramid in Figure 1, the highest knowledge retention rates usually come from discussion groups, practice by doing, and teaching others or immediate use of the knowledge (NLT Institute, 1954). These learning activities are also most prevalent under team settings, in which students usually have to discuss various issues with one another, to teach each other about different things, and to carry out many tasks in the scope of their project. So, what might hinder their team learning effort?

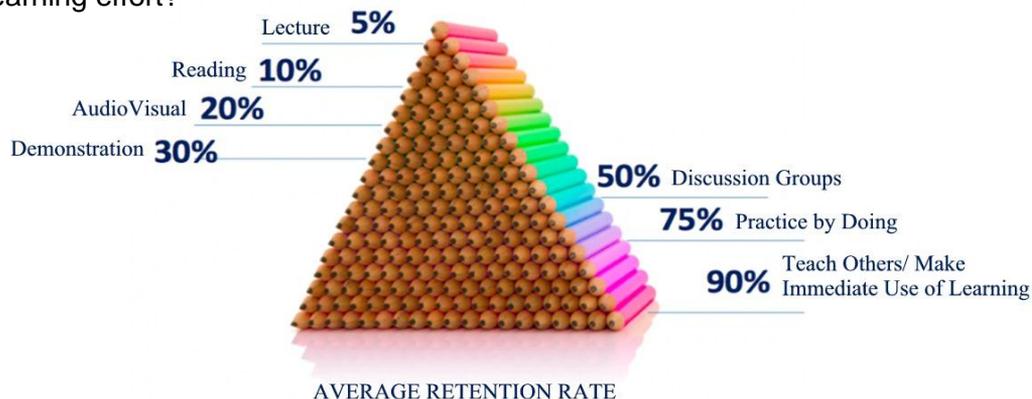


Figure 1. The Learning Pyramid

(Image Courtesy: <http://karenhume.ca/the-learning-pyramid>)

The list of requirements for team-learning and teamwork success below provides the automatic answers about causes for teamwork failure (as also confirmed by our observations at DTU):

- *A high level of consensus amongst the team members is required for its success* (Decuyper, 2010): There will be no such consensus if the team members do not share the same goals or vision.
- *A high priority must be given by team members to the goals and success of their team so as to make teamwork successful* (Decuyper, 2010): No such priority will be given if team members do not find the team's goals or success important.
- *A suitable style of management is required for the team's success* (Michaelsen et al., 2002): No suitable style of management can be found if the team members do not stick together and understand each other.
- *A democratic environment is required for the team's success because it helps foster idea sharing and teamwork contribution* (Hmelo-Silver, 2004): No democratic environment will be developed if certain members take over all the workload or dominate every discussion, or if the team members keep fighting for their personal ideas.
- *A fair share of opportunity must be given to every team member to learn and grow in order to make teamwork successful* (Decuyper, 2010): No fair share of opportunity will be given if the team only focus on its tasks and not its members - some members will be left out, as a result.

## B. INADEQUACIES OF TEAM LEARNING OBSERVED AT DTU

As the list of possible causes for teamwork failure demonstrates: Most of the breakdowns in teamwork usually have to do with communication problems. To accurately determine the type of communication problem that is most common in our CDIO projects at DTU, a set of interview questions were compiled based on the above list. The order of the interview questions, however, does not correspond to the same order of the above list. Rather, the interview questions are arranged in such an order that helps retrieve the most information from our students about Team Learning and Teamwork Failure. Some additional questions about the instructor's role were also added in to assess the effectiveness of our instructors in maintaining the flow of teamwork.

Table 1. Interview Questions for Team Learning Shortcomings at DTU

No.	Questions
1	What do you think about team learning?
2	Do you think team learning is important?
3	How many members do you usually have in your project team? How many males and females?
4	What is the biggest obstacle to team learning in your experience?
5	Do you usually have problems with your team leader? Does he/she have a good management style?
6	Do you usually have "free riders" in your teams?
7	What kind of arguments do you usually run into in your teams? Explain.
8	Do you and your team members share the same goals and vision during the course of the project?
9	Did your instructors help facilitate and support good teamwork practices?
10	What was the biggest shortcoming of your instructors when it comes to team learning effort?

Our interviews were carried out with 100 students from different engineering tracks of Civil Engineering, Electrical Engineering, Environmental, Software Engineering and Information Systems. Among the interviewees, about 65% are males and 35% are females. With the exception of some students who refused to give any answer, most of the interviewees were very willing to offer their opinions. Some of the highlights from the answers we received are as followed:

- Responses to the importance and effectiveness of team learning were usually at the two extremes. While some students are very much satisfied with the team learning environment at Duy Tan University, some others are totally dissatisfied with it to realize any importance.
- The percentiles of males and females in many teams at DTU are usually uneven, usually with more males than females, and most of the time, the opinions of the minority in the teams will be ignored.
- The biggest obstacles that hinders team learning at DTU are:
  - Team members are too busy trying to protect their ideas that the team wastes a lot of time and effort in heated discussions and arguments.
  - Some team members have to do everything while others do nothing.
  - Outstanding team members usually impose their ideas on other members.
  - Team members mostly focus on “getting the project done” that they usually lose track of the shared vision and goals, which require regular discussion and revision.
- There were a big number of complaints about the fact the team leaders were usually chosen because they are good students, but most of the time, these so-called team leaders do not have any experience or training in team management.
- While most students refused to recognize themselves as “free riders”, a number of them complained that they could not catch up with other team members, and became passive in teamwork, as a result.
- Most of the students agreed that instructors at DTU did help foster teamwork activities, but they also believed that there are many aspects that the instructors should improve on to better support team learning.
- A common complaint about the instructors was that they focus so much on the outcomes and quality of the projects that they often ignore team learning, which is also an important learning outcome in the CDIO framework.
- Another complaint about the instructors was that they usually pay extra attention and time with outstanding team members while ignoring other team members.

## **FSNPA MODEL OF TEAM DEVELOPMENT & ITS IMPLICATIONS FOR DTU**

The responses and feedbacks from the interviews gave a lot of insights into what and how we should improve our team learning and teamwork activities at Duy Tan University, especially in three areas of:

- (1) Team communication
- (2) Individual learning and individual participation/presentation in class
- (3) The guiding role of instructors for teamwork activities

While it is crystal clear why we need to improve on the communication skills of our students and the guiding role of our instructors, the reason we put into consideration individual learning and individual participation in class has to do with the fact that by paying too much attention effective team learning, students sometimes forget about their own individual learning quality, which should be their major focus and should be benefactor of team learning activities (Michaelsen et al., 2002). In addition, it appeared that more than often, not all the team members have their fair share of opportunity to present themselves in class. These may also have been the causes as to why some students were very satisfied while some others were very dissatisfied with team learning at Duy Tan University.

Before moving on to our specific proposals for individual and team learning improvement, it is essential to determine that given the types of teamwork problems that students at DTU usually run into, at what stage of the team development process should we focus our improvement effort on? The FSNPA model of Bruce Tuckman as presented in Figure 2 did provide the big picture about what stages of team development need the most attention at DTU.

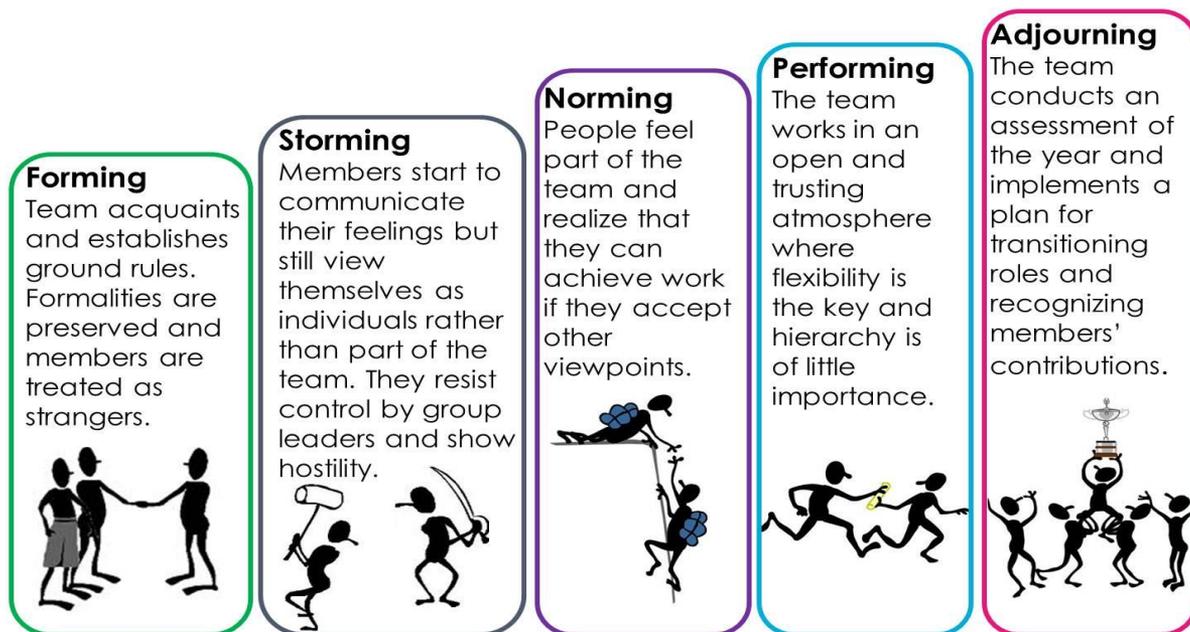


Figure 2. The FSNPA Model of Team Development  
(Image Courtesy: <http://crushtastic.ca/roundball/?p=813>)

Since our focus at DTU is on enhancing team communication and resolving team conflicts while providing equal opportunity for individual learning and participation, we will focus our improvement proposals on the stages of Forming and Storming of the FSNPA model.

## PROPOSALS FOR IMPROVEMENT OF INDIVIDUAL LEARNING & INSTRUCTOR'S ROLE THROUGH THE P-B-P MODEL

Our improvement proposal model for team learning was the result of discussion and creation by a group of instructors from the Faculty of Electrical Engineering and Civil Engineering. The model is called P-B-P model, which stands for Pull-Balance-Push, and

which includes a series of tactics focusing on improving students' communication skill, individual learning and participation, and the instructors' role in guiding teamwork effort. The Push, Balance and Pull tactics will be applied to the Forming, Storming, and the rest of the stages of team development, respectively.

#### **A. PULL Tactics:**

In the Forming stage, since most of the students are new to the project team, they usually are passive and quiet. As a result, the instructor's role is very important in this stage to help team members getting to know each other and participating in interactive team activities. Role assignment should also be administered at the latest by the end of this stage.

- Most of the time, the instructors first introduce themselves and their professional experience to the students, but they usually do not talk about their experience with previous CDIO projects. This actually does not provide the students with a good understanding of specific expectations that a certain instructor may have for them in the project. So, it is important that instructors post their previous CDIO project materials online, and discuss with the students about their experiences in those projects.
- Also, most of the time, the instructors do not allow enough time for students to introduce or talk about themselves in class. Passive and quiet students usually make only one or two statements of introduction about themselves, and this is negative in a way that right from the beginning they have withdrawn to themselves and little attention will be paid to those students by others. The instructors should mandate that students come to class with at least a five-minute introduction about themselves and their technical experiences. Even though this may take up to two class sessions for all the initial introductions, it will help save time later on in other team activities. For example, students will be able to identify the strengths and weaknesses of their team members from the first place for better role assignment later on.
- Many times, the instructors will jump right at the requirements for the big CDIO project as they always mention of the lack of time. But this is actually unhelpful in building the initial team rapport. Across Forming stage (or during the first five to six class sessions), instructors should administer a number of group or team games and activities like Group brainstorming, Role-playing, Think-Pair-Share, etc. to get the students to communicate and interact with each other under the team settings (Kritzerow, 1990).
- Halfway through or by the end of the Forming stage, initial team formation and role assignment should be carried out (though this can be rotated again later on in the Storming or Norming stage). In forming teams, the instructors should make sure that the number of males and females in the same teams are not much different.
- With the team leader positions in place, the instructors can also rely on the team leaders to carry out some Pull tactics. Table 2 presents the checklist to be filled out by the team leaders and submitted to the instructors on a weekly basis. This checklist will be used not only in the Forming stage but also throughout the duration of the project. By using this checklist, team leaders will constantly keep good track of what they need to work on to foster strong teamwork and team learning.

Table 2. Weekly Checklist for Team Leaders in CDIO Projects at DTU

No.	WEEKLY CHECK LIST for TEAM LEADERS	Tick $\checkmark$ (when applied)
1	I have prepared the work assignment schedule for my team members this week.	
2	All or most of the team members agreed that the work assignment schedule is fair.	
3	I have submitted the work assignment schedule of this week to our team's mentors.	
4	The project plan was revised again by the team this week.	
5	<u>Move on to No. 6 if No. 4 is NOT ticked:</u> All or most of the team members agreed with the changes made to project plan.	
6	There was no team conflict this week.	
7	<u>Move on to No. 8 if No. 6 is TICKED:</u> I have sorted out all of the team conflicts in this week.	
8	I have talked to the most quiet and/or passive team members this week.	
9	I keep record of all the good and bad practices the team ran into this week.	
10	My team members also keep record of good and bad practices, which they ran into this week in their field of work.	

Note: For the statements in the above checklist, a tick is equal to a score of 1 while a score of 0 is for no tick. If the total score after the completion of the checklist is less than 5, then the team-management approach of the team leader is having some problem.

## B. BALANCE Tactics:

Coming to the Storming stage, the focus will be placed upon the improvement of team communication, the enhancement of individual learning, and an equal opportunity for team members to present themselves and their ideas. The role of the instructors in this stage is more of a referee to team's conflicts and confrontations.

- Now that the big CDIO project has started, the instructors will need to frequently hold public and private meetings with the CDIO teams to listen to their project plan, goals, and vision so as to provide the teams with direction and advice. It is important that the instructors will not make comments about whether certain ideas or proposals are right or wrong, but rather analysing the advantages and disadvantages of each idea; then, leave the selection of whatever ideas to the teams themselves (Osborn, 1963).
- As for the students, they need to keep good record of whether they are maintaining a good balance between team learning and individual learning for the sake of personal growth and maturity. A weekly Yes/No checklist will be given to

every team member. Again, this individual checklist can be used from the Storming stage till the end of the project.

Table 3. Weekly Checklist for Individual Team Members in CDIO Projects at DTU

No.	WEEKLY CHECK LIST for INDIVIDUAL TEAM MEMBER	YES	NO
1	For every 1 hour of teamwork and meetings this week, I have spent at least between 1.5 to 2 hours in individual learning and preparation.		
	<u>If the answer is NO, please provide the reasons:</u>		
2	I keep record of good and bad practices my team and team members ran into this week so as to use in other courses.		
3	This week, I only work on my team's tasks whenever my team meets up for work and discussion.		
	<u>If the answer is NO, please indicate when and where else you work on the project:</u>		
4	I was left out of the making of some decisions in my team this week.		
	<u>If the answer is YES, please explain:</u>		
5	Other team members found out some errors in my work this week.		
6	I helped other team members with their assigned tasks this week.		
7	I am behind in this project because of the work in other courses.		
	<u>If the answer is YES, please indicate how many projects you are currently working on:</u>		
8	Because of the time and effort spent for this project, I am behind in other courses.		
9	This week, I am in deadlocked conflicts with some of my team members about how to carry out certain tasks.		
	<u>If the answer is YES, please explain:</u>		
10	By the end of this week, our mentors still refused to let us move ahead with our tasks and/or project plan.		

Note: For the statements in the above checklist, YES is equal to a score of 1 while NO is for a score of 0. If the total score of No. 1, 2, 5, 6 and 8 minus the total score of 3, 4, 7, 9,

10 equals zero or less than zero, then the student is not maintaining a good balance between individual learning and team learning. As a result, team learning will not be of benefit to his or her individual learning effort, in particular.

- By keeping track of the checklists of team leaders and individual checklists of their team members, the instructors can quickly identify which teams are having internal conflicts so as to intervene and help resolve problems. During such intervention, the instructors must keep a neutral position, not taking sides with any individual students or groups of students. Instead, the instructors will help with the analysis the conflict problems and encourage team members to reach some resolution through rational reasoning and facts.
- During this stage, in-class team presentations about the project plan and task structures should be a major theme. Through these presentations, every team member will be given an equal opportunity to express his or her ideas. The presentations also will give other teams the opportunity to challenge the approach of a certain team. If the members of any one team do not stick together, usually, these presentations will be in disarray.

A major problem with the Storming stage is that while it will be over quite soon for some teams, for some others, this stage may go on for a long period of time, devastating much of the collective effort and keeping the team far behind its deadlines. Personal confrontations and even hostility between team members may emerge under such circumstances. If that happens, even though it rarely does, the instructors may have to step in and change the team structures or members.

### **C. PUSH Tactics:**

For the remaining stages, when most of the major conflicts have been sorted out and certain norms have been developed for team members to collaborate in their work, we will adopt a number of Push tactics to hasten the team's efforts toward their goals.

- More than often, heavy workload and deadlines are used by the instructors to push teams into the completion of their work. From our experience, heavier workload should not be used because it may affect the overall capacity and performance of the students not only with the project at hand but also in other courses. We do, however, encourage our instructors to check on the overall progress of the teams, and move up the due dates for certain teams if they are doing well. By pushing them to the limits, we will be able to test their capacity and capability besides helping their members of those build skills. Of course, the instructors can always extend the due dates again if those teams cannot keep up with the new deadlines.
- Even after the Forming and Storming stage, passive team members and "free riders" can always be an issue in every team. As a result, the instructors need to pinpoint passive members and "free riders" based on all the information collected, and then, ask them to make a report of their work progress in class. If that does not help change the approach of a passive learner, at least, it will help blow the cover some "free riders", if there is any.

## STUDENTS' FEEDBACKS & DISCUSSION

Thus far, our P-B-P model has been deployed in four engineering classes of Software Engineering, Information System, Electrical Engineering and Civil Engineering at Duy Tan University during the last semester. While it has become widely-appreciated by the Faculty of Electrical Engineering, other faculties like Information Technology and Civil Engineering Engineering are still cautious in their adoption of the model, partly because they have had their own CDIO project structures designed long ago, and also because of other proprietary models, forms and checklists (e.g., from Carnegie Mellon University) already being used. So, in an effort to confirm the values of our model, we have carried out a series of focus group discussions with some 50 students out of the 200 students in the four CDIO project classes that have been administered with our P-B-P model.

Table 4. Questions for Focus Group Discussions about P-B-P Model

No.	Questions for Focus Group Discussions
1	Discuss about 2 to 3 improvements (if there is any) that you noticed in the project and class organization as a result of the adoption of the P-B-P model.
2	Discuss about 2 to 3 improvements (if there is any) that you noticed in the approach of the instructors/mentors as a result of the adoption of the P-B-P model.
3	Discuss about 2 to 3 improvements (if there is any) in the team communication as a result of the adoption of the P-B-P model.
4	Discuss about changes in your individual learning as a result of changes in team learning from new practices of the P-B-P model.
5	Identify and discuss about 2 to 3 major shortcomings of the P-B-P model in terms of individual and team learning.

Most of the engineering students participating in the focus group discussions were actually not aware of the P-B-P model as we deployed it in their CDIO projects during the last semester. As a result, before the focus group discussions started, we had to walk them through all the theories of the P-B-P model. They were then asked if they noticed of any changes or improvements in their CDIO project courses during the last semester, compared to those of the semester before that. Table 4 lists the five questions that we used for our focus group discussions.

The overall feedbacks we got from the focus group discussions were very positive with 88% enjoying the new project and class organization from improvements of more interaction between team members (as guided by the instructors) and more interactive group games. The instructors are generally seen as becoming more pro-active in helping the teams resolve their conflicts and more precise in their information about the status of various tasks being carried out by the teams. 62% of the students participated in the focus group discussions commented that the instructors' support has improved considerably. With respect to team communication, the biggest improvement recognized was the increased amount of respect among team members. Some also stated that reasons are now used more than emotions in team discussions. As for individual and team learning, the majority of students said that they now receive more good-will help and support from their team members, and up to 92% said they would be willing to help their members not only with the tasks of the project but also with any other problem their team members may run into in terms of schoolwork. Responses about the shortcomings of the P-B-P model, however, were mixed with the biggest shortcoming identified as the extra amount of time students now

have to spend for weekly checklists, reports and additional meetings with the instructors or mentors.

Future studies should focus more on the validity of the P-B-P model as well as its sustainability across various engineering disciplines. These, of course, should be measured by means of some statistical surveys. We have already prepared a survey for that purpose (Table 5), but due to the time constraint of the academic calendar in Vietnam, we have not managed to collect all the feedback yet. That should be completed by mid-May of 2014, when the Spring semester at our university comes to an end, for a more or less confirmed level of validity of our P-B-P model.

Table 5. Survey Questions for the Test of Validity and Sustainability of the P-B-P Model

STUDENT'S NAME:		STUDENT'S ID NO.:		
STUDENT'S MAJOR:				
Question No.	Option	WEEKLY CHECK LIST for TEAM LEADERS	Tick <input type="checkbox"/> (when applied)	
1	Did you notice any change or improvement in the CDIO projects of this semester? <i>(Tick only 1 Option)</i>			
	A	YES		
	B	NO		
	C	A LITTLE		
<u>List the changes:</u>				
2	What do you enjoy the most in the new CDIO project settings and class organization? <i>(Tick as many as applicable)</i>			
	A	THERE ARE MORE INTERACTIONS BETWEEN TEAM MEMBERS.		
	B	THERE ARE MORE INTERACTIVE GROUP GAMES & ACTIVITIES.		
	C	THE INSTRUCTOR OFFERS MORE SUPPORT TO GROUP WORK.		
<u>List other things you enjoy:</u>				
3	What do you dislike the most in the new CDIO project settings and class organization? <i>(Tick as many as applicable)</i>			
	A	NOT ALL THE TEAM MEMBERS KEEP GOOD RECORD OF THEIR WORK TO SUPPORT OTHERS.		
	B	I CANNOT MANAGE MY SCHEDULE WELL BECAUSE OF ADDITIONAL REQUIREMENT IN TIME AND EFFORT.		
	C	NOT ALL THE TEAM MEMBERS ARE OPEN TO CONFLICT RESOLUTION PRACTICES.		
<u>List other things you dislike:</u>				

4	How did your instructor/mentor support the work of your team? <i>(Tick only 1 Option)</i>		
	A	THE INSTRUCTOR WAS PROACTIVE IN OFFERING HELP TO THE TEAM.	
	B	THE INSTRUCTOR ONLY OFFERED HELP WHEN ASKED BY THE TEAM.	
	C	THE INSTRUCTOR SEEMED TO UNDERSTAND AHEAD OF TIME OUR TEAM'S PROBLEMS AND OFFERED HELP AS A RESULT.	
	<u>List other ways the instructor supported your team:</u>		
5	Rate your level of commitment and engagement in the CDIO project of this semester. <i>(Tick only 1 Option)</i>		
	1	NOT AT ALL COMMITTED AND ENGAGED	
	2	NOT VERY COMMITTED AND ENGAGED	
	3	MODERATELY COMMITTED AND ENGAGED	
	4	VERY COMMITTED AND ENGAGED	
6	Rate your perceived level of respect by other team members. <i>(Tick only 1 Option)</i>		
	1	NO RESPECT	
	2	LITTLE RESPECT	
	3	MODERATE RESPECT	
	4	MUCH RESPECT	
7	With the adoption of the PBP (Pull-Balance-Push) model in our CDIO projects, how did you get help from your team members? <i>(Tick only 1 Option)</i>		
	A	I STILL HAD TO SEEK FOR HELP FROM MY TEAM MEMBERS WHEN NEEDED.	
	B	I OFFERED HELP TO MY TEAM MEMBERS FIRST AND THEN GOT HELP IN RETURN.	
	C	MY TEAM MEMBERS OFFERED HELP TO ME ANYTIME THEY WERE AVAILABLE OR NOTICED THAT I NEEDED HELP.	
	<u>List other ways you got help or your team members offered help:</u>		
8	Rate your perceived level of usefulness of the P-B-P model to individual learning. <i>(Tick only 1 Option)</i>		
	1	NOT AT ALL USEFUL	

	2	NOT VERY USEFUL	
	3	USEFUL	
	4	VERY USEFUL	
	5	ABSOLUTELY USEFUL	
9	Rate your perceived level of usefulness of the P-B-P model to team learning. <i>(Tick only 1 Option)</i>		
	1	NOT AT ALL USEFUL	
	2	NOT VERY USEFUL	
	3	USEFUL	
	4	VERY USEFUL	
	5	ABSOLUTELY USEFUL	
10	Rate your perceived level of suitability of the P-B-P model for your engineering major. <i>(Tick only 1 Option)</i>		
	1	NOT AT ALL SUITABLE	
	2	NOT VERY SUITABLE	
	3	SUITABLE	
	4	VERY SUITABLE	
11	Which group of tactics in the P-B-P model that was most effective for your CDIO project? <i>(Tick only 1 Option)</i>		
	A	PULL TACTICS	
	B	BALANCE TACTICS	
	C	PUSH TACTICS	
	<u>Provide the reasons for your choice above:</u>		
12	At which stage in the FSNPA model that you managed to learn the most knowledge and skills about your CDIO project? <i>(Tick only 1 Option)</i>		
	A	FORMING	
	B	STORMING	

	C	NORMING	
	D	PERFORMING	
	E	ADJOURNING	
	<u>Provide the reasons for your choice above:</u>		
	Who do you think is the key in resolving group conflicts in your CDIO project?		
13	A	ALL THE TEAM MEMBERS	
	B	THE INSTRUCTOR	
	<u>Other opinions:</u>		
14	<u>List any shortcomings that you noticed about the P-B-P model:</u>		

## CONCLUSION

The problems in team learning faced by engineering students in their CDIO projects at Duy Tan University appear to be common to students at many other universities and institutions deploying the CDIO framework. Communication problems are at the top of the list but problems in the quality of individual learning and instructor's role also add up to the severity of the whole situation. However, we cannot fix those problems piece by piece because of their interrelation. By focusing on the movement of these problems along the different stages of team development of the FSNPA model, our P-B-P model provides a general approach to improve on the general quality of individual and team learning under close guiding and monitoring roles of the instructors. While there are still many issues to sort out with our model, initial positive feedbacks from our students were an important motivation for us to move ahead.

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