IMPLEMENTATION OF CDIO SKILLS IN INFO-COMMUNICATION TECHNOLOGIES DESIGN-IMPLEMENT PROJECTS

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ABSTRACT

The School of Digital Media and Infocomm Technology (DMIT) has a final year capstone design-implement course that involves teams of students working on industry-based problems. The aim of the course is to prepare students for the transition to the workforce by allowing them to experience real world business information technology projects. The capstone project provides students with the opportunity to integrate the technical knowledge and skills they have acquired in their program of study to develop industry sponsored IT applications. For the project, students are required to work in teams to analyse the system requirements of a business, describe a proposed system and business model, design the system specification and develop the system. The paper will describe how the project module is implemented to promote the integration of knowledge and skills learnt in the core modules and the application of CDIO skills in design-implement e-Business projects.

The paper will report on a survey conducted on the students' perception of their ability to integrate the knowledge and skills learnt in their core modules and apply them to the project, and their perception of the personal, interpersonal and professional skills required for completing the capstone project successfully. The paper will discuss how these skills can be more effectively developed.

This paper will discuss the challenges the students' faced interacting and working with Clients as well as personal and interpersonal skills needed to overcome these challenges.

Keywords: Info-communication technologies, personal skill, communication skill, Teamwork, conceive and design skills, integration of skills

INTRODUCTION

In the School of Digital Media and Infocomm Technology (DMIT), all third year students are required to complete a project module. The aim of the third year project module is to provide students with an opportunity to integrate the knowledge and technical skills they have acquired from the course to a real world problem. Students will go through the different stages of conceiving, designing and developing a system and in that process strengthen their technical skills as well as soft skills like technical writing and presentation. In the project, the students are expected to apply technologies they have acquired throughout the course such as UML, JSP, XML, and SQL Server technologies.

The module is highly student-centred. Students work in groups of 5 or 6 with a faculty as their project supervisor. The students seek consultations with their respective supervisors. With the assistance of the supervisor, the groups define the project scope, design and construct the project. The supervisor ensured the students were kept on track with the progress of their

project. The groups are encouraged to plan and develop a detailed schedule for their own project.

For Diploma in Business Information Technology (DBIT) students, the third year project module is semester long (120 hrs) module, while for Diploma in Information Communications Technology (DICT) students, the third year project module is year-long (180 hrs) module. For DBIT students, phase one is done in 7 weeks and phase two is done in 8 weeks; while for DICT students, phase one is done in 1 semester, that is 15 weeks and phase two is done is another semester lasting 15 weeks.

For this study, the students worked with a company that specialises in providing software solutions and services such as Technical Training, Consultation and Setting up of Infrastructure for businesses around the world. The students' task was to revamp the company's website. The website helps the company to reach out to its target audience with ease and which, in turn, helps to increase its business globally. The company was searching for solutions that would enhance the following aspects of its website: the look, the business functions, the ease of navigation and the ease of updating the information in the web site.

There are two phases for the third year project. In phase one, the students submit a project proposal that consists of an analysis of the scope and a conceptual design of the project. They also produce the project specification which includes the hardware and software costing. Some of the users' requirements included the following:
- To demonstrate products or services using Flash software
- To include discussion forum
- To provide a News section
- To include newsletter subscription.
- To use freeware and free hosting of web application system.

To do the project, it was important that the students understood the client's core business and requirements. After the students had gathered the user's requirements, they had to research possible solutions and make recommendations. In all, they designed 6 different templates (web pages) and the web system using unified modelling diagram (UML). The students had to apply a range of skills like critical and creative thinking, conceiving and designing skills and personal and interpersonal skills.

The project also involved the students communicating through electronic means with a technical team in another country. The templates and the UML diagrams that were designed by the students in Singapore were forwarded to the technical team members in India via email or posted in a blog. Feedback from the technical team in India was used to revise the web page and system designs. At the end of phase one, the students are required to present their analysis and proposals to the client.

When the design is finalised, students proceeded with phase 2. For phase 2, the students developed a new web site for the company. The students used programming languages such as PHP, Action Script 3.0, JavaScript, HTML and mySQL. The students highlighted that their technical skills were greatly enhanced by the opportunity to apply their programming knowledge in a real world task.

In phase two, the students produce the user and administrator guides, program listings, test plan and test results, and a deployment kit. At the end of phase two, the students are required to demonstrate the IT application system to their clients.

In this paper, we review the final year project module to determine if it provides students with the opportunity to integrate the technical knowledge and skills they have acquired in their

program of study to develop industry sponsored IT applications. We will report on a survey conducted on the students' perception of their ability to integrate the knowledge and skills learnt in their core modules and apply them to the project, and their perception of the personal, interpersonal and professional skills required for completing the capstone project successfully. The paper will discuss how these skills can be more effectively developed.

LITERATURE REVIEW

There is a growing recognition that besides a good command of technical knowledge, our graduates must also be equipped with a range of personal, interpersonal, professional, product and system building skills and knowledge (Crawley et al, 2007). The CDIO syllabus, a key document in the CDIO initiative, specifies the knowledge and skills an engineer should possess to function at the work place. They are categorized into Personal and Professional Skills and Attributes (section 2), Interpersonal Skills of Teamwork and Communication (section 3) and Conceiving, Designing, Implementing, and Operating Systems in the enterprise and societal context (section 4). In Singapore Polytechnic, we have adapted the syllabus for our context and students. A cross-disciplinary team identified the skills that are most appropriate to Singapore Polyechnic's context, decided on the proficiency levels and wrote specific learning objectives that are measurable and achievable for the skills (Table 1).

Modules with design build projects at the advanced levels provide the opportunities for a wide variety of CDIO skills to be developed. A design build experiences can be defined as a "learning event where the learning takes place through the creation of a product or system. The product that is created in the learning event should be developed and implemented to a state where it is operationally testable by students in order to verify that it meets its requirements and to identify possible improvements." (Malmqvist, 2004). In generating and realizing solutions to a client's requirements, students apply the skills of conceiving, designing and implementing new products and systems while developing personal attributes like creative and critical thinking, initiative, perseverance and successful time and resource management.

However, the design build experiences have to be carefully planned and structured to ensure that the development of the CDIO skills. One of the key ideas in the CDIO initiative is that the personal and interpersonal knowledge, skills and attitudes should be integrated into the curriculum (standard 3). This means providing students with the opportunities to learn the skills together with disciplinary knowledge (Edstrom et al., 2005). For example, the roles within the team and with respect to the customer, technical experts, etc, should be defined. Communication is another essential skill in the project, both within the project group and with the client or user. By presenting their ideas and solutions to each other and their client or user and writing team and individual reports, students acquire the ability to communicate technically, and develop the confidence to express themselves within their field of work.

Design build projects also help students to integrate knowledge and skills acquired in proceeding modules and learning activities. Industry commissioned projects, in addition, expose students to work methods used in industry and also provide students with the opportunity to make connections between the technical content they are learning and their professional and career interests (standard 5).

METHODOLOGY

A questionnaire was administered to 21 and 25 third year DBIT and DICT students from the School of Digital Media and Infocomm Technology at the end of module (Refer to Appendix A for the questionnaire). Students who participated in the survey were told that the information provided by them would be kept confidential. They were also informed that the data would be collated, analysed and used to improve future teaching.

The primary aim of the survey was to find out the students' perception on the application of the personal, interpersonal, conceiving and designing skills to the third year project. The research questions for the study were: The percentage of year 3 polytechnic students in DBIT and DICT courses who are able to

(a) apply personal skills and attributes to their project?
(b) apply interpersonal skills to their project?
(c) conceive the project scope?
(d) design and implement the project?

For the questionnaire, there were 24 questions on a 5 different proficiency levels and 2 open-ended questions. The questionnaire was based on the following CDIO skills:
1. Personal skills and attitudes (Section 2.4),
2. Teamwork (Section 3.1),
3. Communications (Section 3.2),
4. Conceiving (Section 4.3),
5. Designing (Section 4.4) and Implementing (Section 4.5).

For each of the CDIO skills above, a set of behaviour manifestation statements were generated. The behaviours for the statements were obtained from the CDIO syllabus used in Singapore Polytechnic (SP). The syllabus, a product of many months of work by a cross disciplinary team, defines the outcomes for the CDIO skills implemented in SP. For example, the set of statements under Teamwork were:
1. I collaborated with my team members to ensure the project's success.
2. I analysed the different roles of my team members and their impact on our performance.
3. My team members and I agreed on common goals and ground rules.
4. I planned and facilitated team meetings.

Each question for one skill was followed by another question for the next skill. This was to avoid probable response set for the same CDIO skill. For each question, students had to choose from 5 different proficiency levels as follows:
1. Not applicable.
2. I am aware of the skill.
3. I am able to understand and explain the skill.
4. I am able to apply the skill well in the project.
5. I am able to apply the skill in my other modules and projects

A questionnaire can be found at Appendix A

RESULTS
The frequency distribution and means of the students' perception of their proficiency levels for the 5 types of skills are presented in Table 1. Detailed information for the various categories are illustrated in tables 2 to 6.

Table 1: Frequency distribution (with percentages in parenthesis) and means of students' perception of their proficiency levels for the 5 skills (n=46)

Proficiency Level / Skills	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects.	Mean
Teamwork Skill	0	7 (3.8%)	45 (24.46%)	73 (39.67%)	59 (32.07%)	4.00

	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects	Mean
Communications Skill	1 (0.43%)	6 (2.61%)	60 (26.09%)	90 (43.48%)	63 (27.39%)	3.95
Personal Skill and Attitude	0	14 (3.8%)	97 (26.4%)	182 (49.5%)	75 (20.4%)	3.86
Conceive Skill	0	6 (3.26%)	58 (31.52%)	84 (45.65%)	36 (19.57%)	3.82
Design Skill	0	4 (1.45%)	89 (35.51%)	122 (44.20%)	52 (18.84%)	3.80
Overall	1 (0.08%)	37 (3.0%)	349 (28.5%)	551 (45.1%)	285 (23.3%)	3.89

NB: Each category of skill may have 3 to 7 questions (refer to Table 2 to 6 for a list of questions for each category).

Majority of the students felt they were able to apply teamwork (freq = 71.7%, mean = 4.0) and communication (freq = 70.7%, mean = 3.95) skills well in their projects and as well as in other projects and modules (Table 3). These skills are generally utilised in the assessments of many modules in the polytechnic providing students with ample opportunities to apply and practice the skills. In addition, there are specific core modules for communication skills that are taught to the students. Teamwork is also an important assessment component of many modules throughout the 3 years of study. Students were constantly reminded and assessed on the impact of team dynamics and team work on the success of group projects

In contrast, 65.2% (mean = 3.82) and 62.0% (mean = 3.80) students were positive about their ability to apply conceive and design skills in their projects (Table 3). These results are a reflection of the fact that the third year project is the only module where students need to apply these skills in industry projects. The students hence lack sufficient practice to feel confident about their competence in applying the skills in projects. This can also be attributed to minimal exposure to the explicit teaching of conceiving and designing skills in the 3 years of the students' study.

 (a)   What % of yr 3 polytechnic students applied personal skill and attitude to their project?
Table 2: Frequency distribution (with percentages in parenthesis) and means of students' perception of their proficiency levels for Personal skills and attributes (n=46)

Proficiency Level / Skills	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects	Mean
7. I identified areas of self-improvement.	0	2 (4.35%)	10 (21.74%)	24 (52.17%)	10 (21.74%)	4.02
11. I used a range of critical thinking skills (e.g., analysis, comparison and contrast, inference and interpretation, & evaluation).	0	1 (4.35%)	10 (21.74%)	25 (54.35%)	10 (21.74%)	3.96
1. I identified key issues and problems to be solved.	0	2 (4.35%)	10 (21.74%)	24 (52.17%)	10 (21.74%)	3.91
22. I had the opportunity to demonstrate perseverance and flexibility.	0	1 (4.35%)	12 (26.09%)	24 (52.17%)	9 (19.57%)	3.89
17. I had the opportunity to show initiative.	0	1 (4.35%)	15 (32.61%)	19 (41.30%)	11 (23.91%)	3.87
12. I had the opportunity to demonstrate professionalism and integrity.	0	2 (4.35%)	13 (28.26%)	22 (47.83%)	9 (19.57%)	3.83
16. I used a range of creative thinking tools and techniques (e.g., Brainstorming).	0	1 (4.35%)	14 (30.43%)	23 (50.0%)	8 (17.39%)	3.83
2. I managed my time and resources well.	0	6 (13.04%)	11 (23.91%)	24 (52.17%)	5 (10.87%)	3.61

Overall	0	14 (3.8%)	97 (26.4%)	182 (49.5%)	75 (20.4%)	3.96

Self improvement (freq = 73.9%, mean = 4.02), critical thinking (freq = 76.1%, mean = 3.96) and identifying problems (freq = 73.9%, mean = 3.91) were three personal skills and attitudes that the students felt that they applied well in their projects and other modules (Table 2). In contrast, the students' rated their ability to apply the skills of demonstrating professionalism and integrity (freq = 67.4%, mean = 3.83) and the use of creative thinking (freq = 67.4%, mean = 3.83) and time management (freq = 63.0%, mean = 3.61) lower.

(b) What % of yr 3 polytechnic students displayed interpersonal skills when they were working on the project?

(i) Teamwork
Table 3: Frequency distribution (with percentages in parenthesis) and means of students' perception of their proficiency levels for Teamwork (n=46)

Proficiency Level Skills	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects	Mean
3. I collaborated with my team members to ensure the project's success.	0	1 (2.17%)	10 (21.7%)	17 (36.9%)	18 (39.1%)	4.13
8. I analysed the different roles of my team members and their impact on our performance.	0	0	11 (23.9%)	18 (39.1%)	17 (36.9%)	4.13
13. My team members and I agreed on common goals and ground rules.	0	3 (6.5%)	10 (21.7%)	18 (39.1%)	15 (32.6%)	3.98
18. I planned and facilitated team meetings.	0	3 (6.5%)	14 (30.4%)	20 (43.5%)	9 (19.6%)	3.76
Overall	0	7 (3.8%)	45 (24.5%)	73 (39.7%)	59 (32.1%)	4.00

The students gave the highest mean rating of 4.13 (Table 3) for two questions; one question was "I collaborated with my team members to ensure the project's success" and the other question was "I analysed the different roles of team members and their impact on our performance". For question 3, only 1 student mentioned that he is aware of the teamwork skill. For question 8, all students mentioned that they were able to understand and explain the skill or apply the skill in the project or apply the skill in other modules and in the project.

Students gave a mean rating of 3.98 for question 13.This may be due to the fact that the goals and ground rules were not clearly spelt out among team members. Question 18 has the lowest mean rating of 3.76. Students felt that they did not plan and facilitate team meetings. Perhaps, project supervisor could re-enforce the importance of planning and facilitating team meetings.

(ii) Communication skills
Table 4: Frequency distribution (with percentages in parenthesis) and means of students' perception of their proficiency levels for Communication skills (n=46)

Proficiency Level Skills	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects	Mean
19. I listened carefully when	0	0	10 (21.7%)	19 (41.3%)	17 (36.9%)	4.15

	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill in the project.	I am able to apply the skill in my other modules and projects	Mean
my team members and user were speaking to me.						
14. I organised my ideas and opinions in a clear structured manner when I shared them with my user and team members.	0	0	14 (30.4%)	20 (43.5%)	12 (26.1%)	3.96
9. I selected appropriate graphical tools (e.g. UML design, ERD & Flow Chart) to communicate my ideas to my users.	0	1 (2.2%)	13 (28.3%)	20 (43.5%)	12 (26.1%)	3.93
23. I observed the body language of my team members and user when we discussed issues.	1(2.17%)	2 (4.35%)	10 (21.7%)	11 (23.9%)	12 (26.1%)	3.89
4. I designed appropriate communication strategies (e.g. when making presentations) according to the purpose, audience & context.	0	3 (6.5%)	13 (28.3%)	20 (43.5%)	10 (21.7%)	3.80
Overall	1 (0.45%)	6 (2.72%)	60 (27.3%)	90 (40.9%)	63 (28.6%)	3.95

For communication skills, students gave the highest mean rating of 4.15 (78.2%) to the question on the ability to listen carefully to their team members and user. They also rated the ability to organise their ideas and opinions in a clear structured manner when they shared them with my user and team members (mean = 3.96, freq = 69.6%) and the use of tools such as Entity Relationship Diagram software and Rational Rose software to design the web application system highly (mean = 3.96, freq = 69.6%). Students gave the lowest mean rating of 3.80 (65.2%) for the ability to design appropriate communication strategies (e.g. when making presentations) according to the purpose, audience & context.

The overall mean for the communication skill category is the next highest mean of 3.95. There were some core communication modules in the 3-year course and students might have learnt them well and realised that ability to communicate ideas in a clear manner to team members and users are important.

(c) What % of yr 3 polytechnic students were able to conceive the project scope?
Table 5: Frequency distribution (with percentages in parenthesis) and means of students' perception of their proficiency levels for Conceiving skills (n=46)

Proficiency Level / Skills	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill in the project.	I am able to apply the skill in my other modules and projects	Mean
5. I had to understand my client's core business and requirements.	0	1 (2.17%)	14 (30.4%)	17 (37.0%)	14 (30.4%)	3.96
10. I elicited and interpreted the user needs	0	2 (4.3%)	10 (21.7%)	25 (54.3%)	9 (19.6%)	3.89
20. I identified project resources (e.g. cost, manpower, facilities, etc)	0	0	16 (34.8%)	20 (43.5%)	10 (21.7%)	3.87
15. I prepared a project plan and a project schedule.	0	3 (6.5%)	18 (39.1%)	22 (47.8%)	3 (6.5%)	3.54
Overall	0	6 (3.3%)	58 (31.5%)	84 (45.7%)	36 (19.6%)	3.82

Students realised that understanding their client's core business and requirements (mean = 3.96, freq = 67.4%) and eliciting and interpreting the users' needs (mean = 3.89, freq = 73.9%) were important for the success of a project. The students however rated their ability to prepare a project plan and a project schedule (mean = 3.83, freq = 54.3%) and to identify

project resources (mean = 3.87, freq = 65.2%) relatively lower. Students were rather weak in project planning and project schedule because they were new to project planning and schedule. Students were also new to identification of project resources. The overall mean for this category is second lowest of 3.82 as compared to other 5 categories.

(d) <u>What % of yr 3 polytechnic students were able to design and implement the project?</u>
Table 6: Frequency distribution (with percentages in parenthesis) and means of students' perception of their proficiency levels for Designing skills (n=46)

Proficiency Level Skills	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects	Mean
24. I selected appropriate techniques, tools, and processes for the project.	0	1 (2.2%)	17 (37.0%)	17 (37.0%)	11 (23.9%)	3.83
21. I provided new and advanced IT solutions to my users.	0	1 (2.2%)	17 (37.0%)	18 (39.1%)	10 (21.7%)	3.80
6. I analyzed and proposed alternative designs and solutions to my users.	0	0	15 (32.6%)	26 (56.5%)	5 (10.9%)	3.78
Overall	0	2 (1.4%)	49 (35.5%)	61 (44.2%)	26 (18.8%)	3.80

Students gave a mean rating of 3.83 (freq = 60.9%) for the ability to select appropriate techniques, tools and processes for the project and a mean of 3.80 (freq = 67.4%) to the skills of providing new and advanced IT solutions to their users.

The students rated their ability to propose alternative designs and solutions to clients as the lowest in the category (mean = 3.78, freq = 67.4%). The overall mean for this category is the lowest of 3.80 as compared to the other 4 categories. This could be due to the fact that the final year project is the only project whereby students were required to propose alternative designs and solutions for the project.

Open-ended questions
Here is a summary of the students' perception on the range of skills used when working on the final year project. Question 25 asked students to identify three important skills they learnt in the module and Question 26 asked students to suggest three challenges they faced when they work on the module.

(A) <u>DBIT: Identify three important skills you learnt and the challenges faced while working on the project</u>

Table 7: A list of important skills learnt and the challenges faced by DBIT students

Important skills learnt in the module		Challenges faced	
Skills learnt in the module	No. of response	Challenges face in the module	No. of response
Teamwork & collaboration	19	Time constraints	21
Communications skill	11	Resources constraints	10
Presentation skill	11	Troubleshoot program codes	8
Time Management	11	Unclear users' requirements	6
Programming skill	8	Design interfaces	3
Others – project management & initiative	2	Others-planning & common goal	2

From the survey results, it is noted that there were 19, 11 and 11 DBIT students who perceived that they learnt Interpersonal skills such as teamwork and collaboration, communication and presentation skills, and time management. There were 8 students who mentioned that they learnt new programming languages such as PHP, Yahoo Mobile Client and Action script 3.0. Only one student mentioned that he learnt project management skill and learnt to take initiative during project meetings.

As for challenges faced by the DBIT students, 21 students mentioned that there was a big challenge in having to complete the project and having to complete the assignments of their other modules at the same time. There were 10 students who mentioned that resources such as venue and the notebooks were a constraint. The third year project groups were allocated certain time slots in a lecture hall to work on their project. The students felt that it was difficult to discuss in a lecture hall. As for notebooks, each group was allocated a notebook each to work on the third year project. The students felt that every student in a group should be given a notebook each. The group that worked on mobile applications commented that there were insufficient Wi-Fi mobile phones.

There were 6 students who commented that the clients' requirements were unclear and hence there were difficulties in designing the IT application system. The group who were working on the mobile application system felt that it was challenging to design the interfaces on mobile phones because it required proper design for the various functions.

(B) DICT: Identify three important skills you learnt and challenges faced while working on the project

Table 8: A list of important skills learnt and the challenges faced by DICT students

Important skills learnt in the module		Challenges faced	
Skills learnt in the module	No. of response	Challenges faced in the module	No. of response
Teamwork & collaboration	13	Troubleshoot program codes	12
Presentation skills	3	Teamwork coordination	8
Personal skills	11	Time constraints	6
Programming skill	6	Planning skill (meeting deadlines)	3
		Idea design	3
	33		32

From the survey results, it is shown that there were 13 and three DICT students who mentioned that they learnt interpersonal skill such as teamwork and collaboration and presentation skills respectively. There were 11 students who perceived that they learnt personal skills such as ability to identify key issues and problems, take initiative during meetings, perseverance and endurance.

For challenges faced while working on the final year project, there were 12 DICT students who reported that they needed to troubleshoot program codes. There were eight who reported that the challenges they faced were related to the interpersonal skills of teamwork and collaboration. There were six who perceived that their personal skills of managing time was a challenge to them and three who reported that they lacked planning skills. Three of them mentioned that they found designing the system challenging.

Since the DICT students were given more time (2 semesters) to work on the project, fewer students (6) found time a constraint. For DBIT students were only given 1 semester to work on the project. In that semester they also had to complete the assignments of four other modules. As such, all 21 (100 %) students commented that time was a constraint for this

module. Both group of students reported that they learnt soft skills such as teamwork and collaboration, presentation and communications skills. Both groups, however, commented that troubleshooting program codes, planning, conceiving and designing of project were challenges they faced in doing their projects.

CONCLUSION

The findings show that students perceived that they used a range of skills when they were working on the final year project. Only 3% of the students mentioned that they were aware of the 5 types of skills. Slightly more than a quarter (28.5%) of the students mentioned that they could understand and explain the 5 types of skills. 45.1% the students reported that they were able to apply the skills well in their projects. About another quarter (23.3%) of the students reported that they could apply the 5 types of skills in other modules and in projects.

The findings also showed that students perceived that they had the ability to apply personal and interpersonal skills to the third year project. The conceive and design skills were ranked lower in terms of the mean scores. As the conceive and design skills are core to generating and developing IT solutions for industry, there is a need to review the curriculum and incorporate more conceive and design skills earlier, perhaps in the 1st year and 2nd year of the course curriculum, to provide more opportunities for students to acquire and practice them.

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Survey on adoption of Conceive, Design, Implement & Operate skills (CDIO) for Final Year Project

Class Group:_____Date:_____Admin. No: _____Name: _____

The statements below reflect the range of skills used when doing projects involving conceiving, designing, implementing and operating (CDIO) products and systems. The purpose of this survey is to gather your perception of the skills you used when working on the Final Year Project (FYP) module. Please note that all information provided will be kept confidential.

Please put a tick (✓) in the appropriate box for each question where

"Not applicable (NA)" means the skill was not required in your project;

"I am aware of the skill" means that as a result of the project, your awareness of the skill has increased;

"I am able to explain the skill" means that as a result of the project, your understanding of the skill has increased and you are able to explain it;

"I am able to apply the skill well in the project" means that as a result of the project, you have learnt to apply the skill well;

"I am able to apply the skill in my other modules and projects" means that as a result of the project, you are able to apply the skill to your other work and study areas.

When you answer the questions below, you may start with the following phrase: "**When I worked on the project,** ....".

Items	Levels of Proficiency — For each skill area, please tick (✓) one proficiency level you think you achieved through the project.				
	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects
1. I identified key issues and problems to be solved.					
2. I managed my time and resources well.					
3. I collaborated with my team members to ensure the project's success.					
4. I designed appropriate communication strategies (e.g. when making presentations) according to the purpose, audience & context.					
5. I had to understand my client's core business and requirements.					
6. I analyzed and proposed alternative designs and solutions to my users.					
7. I identified areas of self-improvement.					
8. I analysed the different roles of my team members and their impact on our performance.					
9. I selected appropriate graphical tools (e.g. UML design, ERD & Flow Chart) to communicate my ideas to my users.					
10. I elicited and interpreted the user needs					
11. I used a range of critical thinking skills (e.g., analysis, comparison and contrast, inference and interpretation, & evaluation).					
	Levels of Proficiency				

Items	For each skill area, please tick (✓) one proficiency level you think you achieved through the project.				
	NA	I am aware of the skill.	I am able to understand and explain the skill.	I am able to apply the skill well in the project.	I am able to apply the skill in my other modules and projects
12. I had the opportunity to demonstrate professionalism and integrity.					
13. My team members and I agreed on common goals and ground rules.					
14. I organised my ideas and opinions in a clear structured manner when I shared them with my user and team members.					
15. I prepared a project plan and a project schedule.					
16. I used a range of creative thinking tools and techniques (e.g., Brainstorming).					
17. I had the opportunity to show initiative.					
18. I planned and facilitated team meetings.					
19. I listened carefully when my team members and user were speaking to me					
20. I identified project resources (e.g. cost, manpower, facilities, etc)					
21. I provided new and advanced IT solutions to my users.					
22. I had the opportunity to demonstrate perseverance and flexibility.					
23. I observed the body language of my team members and user when we discussed issues.					
24. I selected appropriate techniques, tools, and processes for the project.					

25. Identify three important skills you learnt in this module. You may rank them in order of importance. a. being the most important, b. being less important and so on:

    a. _____

    b. _____

    c. _____

26. Suggest three challenges you faced doing the Final Year Project.

    a. _____

    b. _____

    c. _____

---THANK YOU for your participation...