

INTEGRATED LEARNING TOWARDS A TREND OF THE 21ST CENTURY CLASSROOM

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ABSTRACT

This research aimed to develop and implement an integrated learning model for an engineering course and to assess the impact on engineering students' attitudes and their 21st century skills. Participants were senior manufacturing engineering students, who enrolled in the "Product Design for the Environment" course in the second semester of the 2014 academic year, Faculty of Engineering, Mahasarakham University, Thailand. Contemplative learning, active learning and project based learning was integrated with a traditional learning and used in this class. Evaluation tools were questionnaire instruments. The results showed that students' opinions of a new classroom setting, the use of new approach learning model and the improvement of students' learning skills were mostly positive with a high level of satisfaction.

1. INTRODUCTION

As we move further into the information age, it becomes clear that classroom needs and learning style in the 21st century are very different from those in the 20th century. The 20th century classroom is teacher centered, while the 21st century classroom focuses on student centered learning. In this century, students are learning by doing and the teacher acts as a coach or facilitator, helping them work on their assignment or project and also helping them develop the skills they will need in order to succeed in work, life and as good citizens.

Three types of the 21st century skills are learning skills, literacy skills, and life skills. The learning skills include critical thinking, creative thinking, communicating and collaborating. The literacy skills are information, media and technology literacies. The last of the 21st century skills is life skills which are flexibility, initiative, social

skills, productivity and leadership.

Over the past decades, several learning approaches have been used to enhance students' 21st century skills, including project based learning (Musa, 2012, Johri & Olds, 2011 and Blumenfeld, 1991), problem-based learning (Johri & Olds, 2011), flipped classroom (Pierce, 2012), contemplative learning (Kuroda, 2014 and Khayankij, 2012).

This study integrated traditional learning with project based learning, contemplative learning and active learning in order to help students gain the 21st century skills and enhance their morals and ethics. Project based learning was selected because it is an effective approach to promote student centered and active learning (Mills and Treagust, 2003). Contemplative learning was chosen to help students increase attention, decrease stress and develop communication and collaboration skills. The contemplative practices used in this study were meditation, dialogue and deep listening. The integrated learning model was developed and implemented in classes of a "Product Design for the Environment" course.

2. RESEARCH METHODOLOGY

2.1 Participants and Course Selection

Participants were fourteen senior manufacturing engineering students enrolled in the "Product Design for the Environment" course in the second semester of the 2014 academic year, Faculty of Engineering, Mahasarakham University (MSU), Thailand. This engineering course was selected, because the authors have been teaching this course with a traditional lecture style for four years, and the small number of students in this semester was good for trialing a new teaching and learning approach. Class duration was 16 weeks, 3 hours per week.

2.2 Class Environment and Integrated Learning Model

The classroom setting was changed. There were not only desks and chairs, but also mats for sitting or lying down during class. A safe, supportive, and positive learning classroom for all students was created. For 2-3 weeks, the class was in a computer room for studying a software program for product design. Several learning techniques and assessments were used in this class, including:

Class commitment: Both instructor and students made some commitments in the first day of class including attending class, not using phone or social media in classroom without instructor's permission, participating and cooperating in learning activities.

Class preparation: Every week, the instructor began the class with 5-10 minutes of meditation, body scan or relaxation practices. Students would be asked to sit or lie down, then take a deep breath and pay attention to their breathing or what is going on in their body and mind. These practices aimed to help them focus, calm down and clear their minds for better learning.

Assignment or Report: For 4-5 weeks, students were required to prepare a 5-page report on a selected topic one week prior to the class. They had to use several sources such as text books, journals or internet to find and gather information and then to summarize it in their own words. They also had to list the text books or websites consulted as references. These activities help students improve communicating skills (reading and writing), literacy skills (searching for information and using media and technology).

Active learning and deep listening: The following week, after working on the assigned report, each student was asked to share his or her topic with the class using a paired discussion or a group discussion. In a paired discussion, active listening or deep listening exercise was used. One student talked for several minutes while the other listened, then the listener would repeat what he or she heard "I heard you said that" Then they switched their roles. After that, they could ask for more information. Every student would have an opportunity to learn all assigned topics from their friends. For a group discussion, students who prepared the same topics got together, shared their information, summarized them on a series of flip charts, and then presented them to the class. The other groups would ask questions. This would help students learn how to ask pertinent questions. During these practices, the instructor was coaching, giving advice, and correcting wrong concepts. These activities also helped students gain communication skills (speaking and listening) as well as collaboration and social skills.

Lectures and Demonstration: Traditional learning practices like lecture and demonstration by instructor were still necessary, particularly for specific topics or new design programs. Students were asked to draw a mind map summarizing the lecture. This would help them organize and understand information faster and better.

Project Based Learning (PBL): After the midterm examination, students were assigned to work in groups and choose a small appliance for their term project. They had to apply their knowledge in this course and related engineering courses e.g. engineering materials, computer aided drafting and design, manufacturing processes to assess product life cycle of their appliance and propose a new design for decreasing environmental effects. Instructor would coach them through the final report. A presentation was required on the last week before the final examination. PBL could help students improve almost all types of 21st century skills, such as thinking skills, communication skills, collaboration skills, information and technology literacies, social skills and leadership skills.

Assessment of learning: A variety of learning assessments were used. A test that measured a student's ability to memorize and to recall facts was not the only method to assess learning. Instead, performance-based assessments, including class participation, assignment or report, student project and presentation were also used to evaluate students.

2.3 Research Evaluations

Two questionnaire instruments were used to evaluate students' perception of the new learning model and improvement of student's learning skills. The questionnaires were administered using a 5-point Linkert scale (strongly disagree, disagree, neutral, agree, and strongly agree) on the last day of class before a final examination. Questionnaires were administered in the students' native language (Thai) and translated to English for Tables 1 and 2.

3. RESULT AND DISCUSSION

Table 1 presents students' perceptions about the use of the new learning model and the classroom environment. Survey items for agreement (strongly agree and agree) and disagreement (disagree and strongly disagree) were combined for interpreting results. The results showed that students' opinions about the classroom setting and the learning model were mostly favorable. Most students (93%) felt this classroom setting was dissimilar to other engineering courses in the Faculty of Engineering, MSU; and they enjoyed sitting or lying down on the floor during class. 93% agreed that practicing meditation and relaxation before starting class helped them to be effective and ready for class. All students agreed that this learning model mostly focused on student-centered learning and learning-by-doing rather than teacher-centered learning. 93% felt the instructor was coaching, giving advice, inspiring and encouraging them to work during class and they enjoyed participating in the in-class activities and collaborating with friends. 79% were satisfied with the various learning techniques and course evaluations and expressed a desire for more instructors to use this integrated learning model.

Table 2 shows the improvement of student learning

skills after studying with this integrated learning model. All students felt they could use their different abilities to accomplish class assignments and project; and they had better discipline and responsibility. Most students (93%) agreed that their critical and systematic thinking, teamwork, and problem solving skills were enhanced. 85% felt their leadership and communication skills were improved. 79% agreed that they acquired a creative

thinking model and could create, evaluate and utilize information, media, and technology. It was important to point out that only 64% of students achieved more confidence to work and express their opinions. The reason may be because they were still used to traditional learning, in which instructor talked and they listened most of the time instead of speaking or expressing their opinions in class.

Table 1 Student perceptions on the integrated learning model and classroom environment (N=14)

Item	Satisfactory level				
	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1
<u>Classroom setting and Learning model</u>					
1. This classroom setting was similar to other classes in the Faculty of Engineering, Mahasarakham University.			1(7%)	3(21%)	10(72%)
2. I enjoyed the classroom setting allowing me to sit or lie down during class.	10(72%)	3(21%)	1(7%)		
3. Preparing myself before class by meditating, body scanning or listening to relaxation music, made me be effective and ready for class.	6(43%)	7(50%)	1(7%)		
4. This class mostly focused on student-centered learning and learning-by-doing rather than teacher-centered learning.	6(43%)	8(57%)			
5. The instructor was coaching, giving advice, inspiring and encouraging me to learn during class.	12(86%)	1(7%)	1(7%)		
6. I enjoyed participating in the in-class activities and collaborating with my classmates.	8(57%)	5(36%)	1(7%)		
7. Various learning techniques and assessments were used in this class.	5(36%)	6(43%)	3(21%)		
8. I wish more instructors used this learning model.	1(7%)	10(72%)	2(14%)	1(7%)	

Table 2 Student opinions on the improvement of their learning skills (N=14)

Learning skills	Satisfactory level				
	Strongly agree 5	Agree 4	Neutral 3	Disagree 2	Strongly disagree 1
<u>After studying with this learning model, I found that.....</u>					
1. my classmates and I could use our different abilities to accomplish learning assignments and project.	1(7%)	13(93%)			
2. I had more confidence to work and to express my opinions.	3(21%)	6(43%)	3(21%)	2(14%)	
3. I could work well as a team and was more tolerant.	2(14%)	11(79%)	1(7%)		
4. I had a better critical and systematic thinking.	3(21%)	9(64%)	2(14%)		
5. I had good discipline and responsibility.	9(64%)	5(36%)			
6. I got better communication skills (speaking, listening, reading, and writing).	2(14%)	10(71%)	2(14%)		
7. my leadership skills had been improved.	3(21%)	9(64%)	2(14%)		
8. I acquired a creative thinking model.	6(43%)	5(36%)	3(21%)		
9. I could apply engineering knowledge in problem solving.	2(14%)	11(79%)	1(7%)		
10. I could create, evaluate and utilize information, media, and technology.	3(21%)	8(58%)	3(21%)		

CONCLUSION

This study evaluated the success of new learning approaches on student perception, attitudes and skills in an engineering “Product Design for the Environment” course. Contemplative learning, active learning and project based learning were integrated with traditional lectures in this study. The results showed that most students were happy with the new classroom environment and the integrated learning model. Most of them felt their 21st century skills had been improved.

It was found that using contemplative practices resulted in creating the nurturing, caring, safe and conducive to learning classroom. Furthermore, active learning and project based learning were powerful methods to develop student learning skills. Implementation of the integrated learning model in a bigger class and the impact of this learning model on improved student performance are planned for further studies.

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