UTM
UNIVERSITI TEKNOLOGI MALAYSIA

The 2nd Symposium on

TEACHING AND LEARNING PRACTICES IN ELECTRICAL ENGINEERING 2022

STLEE2022

Theme:

Empowering 21st Century Educators for Electrical Engineering Practices

26TH SEPTEMBER 2022

PROGRAMME BOOK

WELCOME MESSAGE FROM
CHAIR OF SCHOOL OF ELECTRICAL ENGINEERING, UTM

Assalamualaikum wr. wbt & Greetings,

Welcome to the 2nd Symposium on Teaching and Learning Practices in Electrical Engineering (STLEE) 2022. It is a great pleasure for me to welcome all participants in the spirit of knowledge sharing and experience exchange, as a part of our effort in enhancing the quality of teaching and learning in UTM.

The symposium represents an important part of our commitment to provide a platform for practitioners and researchers to interact and discuss on continuing and emerging issues related to electrical engineering education. In line with the theme "Empowering 21st Century Educators for Electrical Engineering Practices", STLEE 2022 aims to inspire participants to share innovations in their teaching & learning journey that can be shared and emulated among academics in higher education as a part of becoming scholarly practitioners. It is our hope that STLEE2022 will bring the opportunities to develop active networking and productive alliances for possible research collaboration among us, and our institutions in the future.

We are currently witnessing a significant transformation in the development of education. The essential and challenging elements of this transformation process that must be tackled in education includes the impact of globalization on all areas of human life, the exponential acceleration of the technology development and the need of flexibility and agility. In response to these transformation process, it is partly our responsibility to provide the direction and the content with which education can help to master future challenges for society. But first, we need to prepare ourselves as educators to these challenges and changes.

We hope the event has served the participants as a scaffolding platform through all the pre-symposium sessions that was held prior to the symposium. As a faculty, we will continue to support similar platforms that promote the advancement of engineering education to ensure continuity in the endeavor for excellence and to strengthen the community of practice that we already have. I would like to acknowledge the organizing committee and hardworking team members for their relentless effort in successfully organizing STLEE2022. To all participants, kindly use this precious opportunity to your fullest and expand your network which may accelerate in building network in your research journey, and I sincerely hope that you will find the conference both valuable and enjoyable.

Thank you all.

Have a great and exciting day

Prof. Ir. Dr. Mohd Wazir Mustafa
Advisor, STLEE 2022
Chair, School of Electrical Engineering Faculty of Engineering, UTM

WELCOME MESSAGE FROM
CHAIR OF THE ORGANIZING COMMITTEE

Assalamualaikum *wr. wbt* & welcome to STLEE 2022

On behalf of the organizing committee and the School of Electrical Engineering, Universiti Teknologi Malaysia, it is my great pleasure to welcome all participants to the 2nd Symposium on Teaching and Learning Practices in Electrical Engineering (STLEE) 2022. This symposium is organized by the School of Electrical Engineering, Faculty of Engineering UTM, which is the 2nd event after a successful one last year.

With the growing awareness of engineering grand challenges that we are facing in the 21st century and the demands of Industry 4.0, we in academia should play the role as transformation drivers to prepare graduates that meet the current and future needs while addressing the challenges. As engineering educators, improvement for a holistic curriculum in the academic programs is required, considering the current changes and demands of the global arena, especially in effective teaching and learning. In response to the global demand, UTM has launched the Future Ready Educators (FREE) aspiration as an initiative to support future ready curriculum for the millennials by developing community of practice in teaching and learning.

Thus, STLEE was first organized last year and continue to be organized again this year which serve as our step forward in making the UTM Future Ready Educators (FREE) aspiration a success. The symposium is initiated by the school's New Academia Learning Innovation (NALI) committee and the Future Ready Educators (FREE) committee to provide a platform for electrical engineering educators and practitioners to share innovations in their teaching & learning journey, towards best practices of the 21st century education. This year, the STLEE 2022 committee has successfully organized four (4) pre-symposium sessions as a scaffolding effort for the participants, with two (2) sessions in collaboration with the IEEE Education Society, Malaysia Chapter. With the theme "Empowering 21st Century Educators for Electrical Engineering Practices", we hope that STLEE2022 can provide a conducive environment for discussion in developing scholarly practitioners among electrical engineering educators.

I would like to express my sincere thanks to our keynote speaker, Professor Khairiyah Mohd. Yusof from the Centre for Engineering Education (CEE), UTM for agreeing to share with us her vast experience in the engineering education field and the direction of becoming a scholarly teacher which is essential in our journey of personal and professional growth. I would also like to extend my gratitude to all pre-symposium speakers for sharing their knowledge prior to the symposium.

Finally, I would like to thank the STLEE 2022 committee for their hard work in organizing the event. The support and commitment from the school's top management, especially our Chair as well as colleagues at the School of Electrical Engineering have made it possible for the 2nd STLEE to become a reality. I would also like to express my deepest appreciation to all authors, participants and attendees for their enthusiasm, commitment, and contribution towards STLEE 2022.

Assoc. Prof. Dr. Mohamed Afendi Mohamed Piah
Chair, STLEE 2022

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KEYNOTE SPEAKER

Prof. Dr. Khairiyah Mohd. Yusof
Professor
Centre for Engineering Education (CEE)
Universiti Teknologi Malaysia

Dr. Khairiyah Mohd Yusof is a Professor at the School of Chemical Engineering and the founding Director of the Centre for Engineering Education (CEE), Universiti Teknologi Malaysia which promotes scholarly and evidence-based practices in engineering education. A practitioner, trainer, and researcher in scholarly engineering education practices, she appreciates the opportunities to share her work locally and globally through invitations to speak and conducting workshops. Her research focuses on innovative teaching and learning practices - particularly in Problem Based Learning (PBL) faculty development, curriculum design, talent pipeline and engineering education for sustainable development. She also conducts research in dynamic process modeling and control.

Prof. Dr. Khairiyah is on the editorial and advisory board of engineering education journals such as the ASEAN Journal of Engineering Education (AJEE), Journal of Engineering Education (JEE), Journal of Education for Chemical Engineering and European Journal of Engineering Education. She leads various funded engineering education projects such as the Consortium Grant on Teaching and Learning for 4IR from the Ministry of Education, the World Bank funded OBE & SCL Training in Higher Education in Afghanistan and Enhancing the Quality of Engineering Education through OBE and SCL from the UK Royal Academy of Engineering (RAE).

Previously, she has led the Society of Engineering Education Malaysia (SEEM), a national organization which envisions to steer the direction of engineering education for national prosperity through evidence-based consultation. For her work, she received several awards including the 2018 IFEES Duncan Fraser Global Award for Excellence in Engineering Education, 2017 Student Platform on Engineering Education Mentoring Award, and 2015 Frank Morton IChemE Global Awards for Chemical Engineering Education Excellence.

PROGRAMME OVERVIEW

Day/Date : **Monday / 26th September 2022**

TIME	DETATILS
8:30 am – 8:45 am	Participants start joining the Welcoming Event Link: https://bit.ly/STLEE2022_SKEUTM
8:45 am – 9:00 am	Welcoming Remarks by **Assoc. Prof. Dr. Mohamed Afendi Mohamed Piah** Chair, STLEE 2022
9:00 am – 9:15 am	Opening Speech by **Prof. Ir. Dr. Mohd Wazir Mustafa** Advisor, STLEE 2022 Chair, School of Electrical Engineering, UTM
9:15 am – 10:00 am	Keynote Address by **Prof. Dr. Khairiyah Mohd. Yusof** Professor, School of Chemical and Energy Engineering Founding Director, Centre for Engineering Education (CEE), UTM ***From Micro to Macro Levels of Practice: A Showcase of A SoTL Journey Within and Beyond Classroom Experiences***
10:00 am – 10:15 am	Break
10:15 am – 12:35 pm	**Session 1: Innovation in Teaching & Learning** Link : https://bit.ly/STLEE2022_SKEUTM
12:35 pm – 2:00 pm	Lunch Break
2:00 pm – 4:20 pm	**Session 2 : Research in Engineering Education Practices** Link : https://bit.ly/STLEE2022_SKEUTM
4.20 pm – 4:40 pm	Award and Closing Ceremony by **Assoc. Prof. Ir. Dr. Muhammad Nadzir Marsono** Associate Chair (Academic and Student Development), School of Electrical Engineering, UTM
4:40 pm – 5:00 pm	Tea Break

PRESENTATION SESSIONS

SESSION 1

Theme : **Innovation in Teaching & Learning**

Day/Date : **Monday / 26th September 2022**

Time : **10:15 am – 12:35 pm**

Webex Link : **https://bit.ly/STLEE2022_SKEUTM**

Chair : **Ts. Dr. Mona Riza Mohd Esa & Dr. Arnidza Ramli**

TIME	SESSION DETAILS
10:15 – 10:35 am	Knowledge Sharing 1 **FLIPPED CLASSROOM TO ENHANCE TEACHING AND LEARNING EXPERIENCE** *Ts. Mohd Zaki Daud.*
10:35 – 10:55 am	2068 **IMPLEMENTATION OF CONCEPT MAPPING AS A FORMATIVE ASSESSMENT IN ELECTROMAGNETIC FIELD THEORY COURSE** *Nurzal Effiyana Ghazali and Norazliani Md. Sapari.*
10:55 – 11:15 am	2818 **COOPERATIVE LEARNING ACTIVITIES USING MICROSOFT TEAMS PLATFORM FOR SYNCHRONOUS ONLINE CLASS** *Nor Aishah Muhammad, Nurul Ashikin Daud, Noorhazirah Sunar, Norazliani Sapari, Nur Najahatul Huda Saris and Nur Haliza Wahab.*
11:15 – 11:35 am	4534 **INFORMAL COOPERATIVE LEARNING FOR SYNCHRONOUS ONLINE LEARNING FOR MICROPROCESSOR COURSE** *Noorhazirah Sunar, Mohd Fua'ad Rahmat, Nurul Adilla Mohd Subha, Nor Aishah Muhammad, Nur Haliza Abdul Wahab, Norazliani Md Sapari, Nurul Ashikin Daud and Nur Najahatul Huda Saris.*
11:35 – 11:55 am	6163 **COOPERATIVE LEARNING IN DIGITAL ELECTRONICS COURSE VIA JIGSAW WITH GALLERY WALK METHOD** *Mohd Saiful Azimi Mahmud.*
11:55 am – 12:15 pm	5067 **EDUMY: WEB-BASED E-LEARING PLATFORM FOR HIGH SCHOOL IN MALAYSIA** *Nur Haliza Abdul Wahab, Nur Adila Farahiyah, Izyan Izzati Kamsani, Noorhazirah Sunar, Nor Aishah Muhammad and Nor Shahida Hasan.*
12:15 – 12:35 pm	7692 **INFORMATIVE OF MAPPING CONCEPTS LEARNING TECHNIQUE IN ELECTRICAL TECHNOLOGY COURSE** *Norazliani Md Sapari, Nurzal Effiyana Ghazali, Nur Najahatul Huda Saris, Zulkarnain Ahmad Noorden and Khairul Huda Yusof.*

SESSION 2

Theme : **Research in Engineering Education Practices**

Day/Date : **Monday / 26th September 2022**

Time : **2:00 pm – 4:20 pm**

Venue : **https://bit.ly/STLEE2022_SKEUTM**

Chair : **Dr. Mohd Rodhi Sahid & Dr. Rasyidah Mohamad Idris**

TIME	SESSION DETAILS
2:00 – 2:20 pm	Knowledge Sharing 2 **GUIDING STUDENTS FOR COMMENDABLE OR EVEN PUBLISHABLE GPPR RESULTS** *Ir. Dr. Mokhtar Harun.*
2:20 – 2:40 pm	0550 **MATHEMATICAL COMPETENCIES AMONG ELECTRICAL ENGINEERING STUDENTS** *Nur Izrah Mohd Puzi, Naziha Ahmad Azli, Sharifah Osman and Yudariah Mohammad Yusof.*
2:40 – 3:00 pm	1480 **ACADEMIC SERVICE-LEARNING OUTCOME ON THE UNIVERSITY STUDENT ATTRIBUTES** *Shahrin Md Ayob, Chee Wei Tan, Razman Ayop and Mohd. Zaki Daud.*
3:00 – 3:20 pm	2948 **ANALYSIS OF STUDENT ENGAGEMENT IN ASYNCHRONOUS ONLINE CLASS** *Shaharin Fadzli Abd Rahman and Mastura Shafinaz Zainal Abidin.*
3:20 – 3:40 pm	4054 **STUDENTS' MOTIVATION IN PROJECT-BASED LEARNING FOR CONTROL ENGINEERING COURSE** *Nurul Adilla Mohd Subha, Fatimah Sham Ismai1, Zaharuddin Mohamed, Shahdan Sudin, Fazilah Hassan, Herman Wahid, Anita Ahmad, and Norikhwan Hamzah.*
3:40 – 4:00 pm	6571 **THE EFFECTIVENESS OF INCORPORATING VIRTUAL MACHINE ON INDUSTRY GRADE MENTOR GRAPHICS TCAD TOOLS IN VLSI PROJECT ASSIGNMENT** *Suhaila Isaak, Jamaluddin Zakaria, Yusmeeraz Yusof, Muhammad Afiq Nurudin Hamzah and Izam Kamisian.*
4:00 – 4:20 pm	6866 **EXPLORING STUDENT PERCEPTION ON ACTIVE LEARNING TECHNIQUE IN GRADUATE SUCCESS ATTRIBUTE COURSE** *Norazliani Md Sapari, Zaharah Johari and Khairul Huda Yusof.*

ABSTRACTS

SESSION 1

Theme : **Innovation in Teaching & Learning**

Knowledge Sharing 1

FLIPPED CLASSROOM TO ENHANCE TEACHING AND LEARNING EXPERIENCE

Ts. Mohd Zaki Daud.

A flipped classroom is an instructional strategy and a type of blended learning that reverses the traditional learning environment by delivering instructional content, often online, outside of the classroom. It moves activities, including those that may have traditionally been considered homework, into the classroom. In a flipped classroom, students watch online lectures, collaborate in online discussions, or carry out research at home while engaging in concepts in the classroom with the guidance of a mentor. Students will perform this task in the same group when they do NALI 1. The output of the task is a 10-minute video (each group will be given the source of electricity generation) and A1-sized poster of the following sources: Nuclear, natural gas, hydroelectric, wind, fuel cell, solar energy, tidal power, and geothermal sources.

2068

IMPLEMENTATION OF CONCEPT MAPPING AS A FORMATIVE ASSESSMENT IN ELECTROMAGNETIC FIELD THEORY COURSE

Nurzal Effiyana Ghazali and Norazliani Md. Sapari.

Electrical engineering students must take an electromagnetic field theory (EMT) course. However, both educators and students are having difficulty either teaching or learning EMT. Therefore, concept maps as a formative assessment had been implemented. The implementation had been done for one semester. Students received immediate feedback based on their concept maps, thus it helps them to reflect on their learning. Results show not all students can accept this new alternative teaching method but those who had tried this new method showed improvement in their understanding.

2818

COOPERATIVE LEARNING ACTIVITIES USING MICROSOFT TEAMS PLATFORM FOR SYNCHRONOUS ONLINE CLASS

Nor Aishah Muhammad, Nurul Ashikin Daud, Noorhazirah Sunar, Norazliani Sapari, Nur Najahatul Huda Saris and Nur Haliza Wahab.

The pandemic coronavirus disease 2019 (COVID-19) has drastically changed the teaching and learning approach from face-to-face classes to online environments. This paper presents the usage of the Microsoft Teams platform for cooperative learning activities conducted in the synchronous online course. Informal cooperative learning is implemented where the students are divided into several groups of three or four members to discuss and solve problems in the breakout

session. Within the breakout session, students can use several Microsoft Teams features such as chat room, file sharing, and screen sharing. Such a cooperative learning activity can enhance student engagement and learning. Responses from students are gathered to get feedback on the conducted activities. It is shown that most of the students agreed that the breakout session is an interesting way of conducting online synchronous class activities.

4534 **INFORMAL COOPERATIVE LEARNING FOR SYNCHRONOUS ONLINE LEARNING FOR MICROPROCESSOR COURSE**

Noorhazirah Sunar, Mohd Fua'Ad Rahmat, Nurul Adilla Mohd Subha, Nor Aishah Muhammad, Nur Haliza Abdul Wahab, Norazliani Md Sapari, Nurul Ashikin Daud and Nur Najahatul Huda Saris.

During pandemic breakdown, online learning is implemented as a delivery method for teaching and learning. However, the engagement of students in class is unsatisfactory compared to face-to-face learning. This paper describes the implementation of informal cooperative learning for synchronous online classes to engage students in actively participating in the teaching and learning process. The activity of informal cooperative learning via Google Jamboard is implemented in conjunction with Microsoft Teams. Several fundamental questions are designed by the lecturer to address one of the course learning outcomes for this course. Students are required to discuss within their group and come up with solutions on their Google Jamboard. They will be observed and facilitated by the lecturer. At the end of the activity, students are required to present and share their solution with all other students. From the lecturer's observation, the level of students' understanding can easily be enhanced and monitored through this activity compared to traditional lecture teaching.

6163 **COOPERATIVE LEARNING IN DIGITAL ELECTRONICS COURSE VIA JIGSAW WITH GALLERY WALK METHOD**

Mohd Saiful Azimi Mahmud.

Student engagement in class is very important to increase their attention and focus in the class and also motivates them into higher thinking skills. Therefore, one of the collaborative ways in teaching and learning is by implementing Jigsaw method. As Digital Electronics course is the first-year course which are taken by students, some students are still not familiarized with each other as they are still new in the class. Therefore, this activity will enhance their interaction with each other and also promote higher thinking skills. During this implementation, topics from chapter 5 (Integrated Circuit) is selected as this chapter is a middle of the total syllabus for this course. To design the activity, students are divided into home and expert group. In expert group, students are given a subtopic in the Characteristics of IC. Then, they will return to their home group to explain about the given topics to their home members using gallery walk. At the end of this session, feedbacks are collected and analyzed. From the feedbacks, students are delighted to conduct the activity and it has proven to be a very effective way to engage students and promote higher thinking skills during the class.

5067 **EDUMY: WEB-BASED E-LEARING PLATFORM FOR HIGH SCHOOL IN MALAYSIA**

Nur Haliza Abdul Wahab, Nur Adila Farahiyah, Izyan Izzati Kamsani, Noorhazirah Sunar, Nor Aishah Muhammad and Nor Shahida Hasan.

With current situation when all around the globe are fighting with Covid-19, students and teachers are also affected by this situation. There are 31,453,440 affected learners around the world since their government advised the school to close down. With this unexpected situation that always circulating around the students and teacher, especially to those who will taking public examination such as Pentaksiran Tingkatan 3 (PT3), Sijil Pelajaran Malaysia (SPM), Sijil Tinggi Pelajaran Malaysia (STPM), they desperately need a quick solution on to continue their syllabus. The teacher come up with the solution on conduction synchronous class online using virtual meeting software such as Google Meet and WEBEX, but the student is not to be expected to sit through the virtual meeting in front of their laptop continuously for 5 hours. Hence, EduMy is developed to carry out the asynchronous online teaching where the student only needs to access the video lecture on the web portal of EduMy rather than sitting continuously for 5 hours straight. It can also help save the bandwidth of the internet for the student who wish to enjoy stable internet connection. The purpose of this project is to ensure the high school students can still get their education rightfully despite with the current situation which forces all the schools around Malaysia to close down.

7692 **INFORMATIVE OF MAPPING CONCEPTS LEARNING TECHNIQUE IN ELECTRICAL TECHNOLOGY COURSE**

Norazliani Md Sapari, Nurzal Effiyana Ghazali, Nur Najahatul Huda Saris, Zulkarnain Ahmad Noorden and Khairul Huda Yusof.

In this paper, concept maps as visual representations of information which is applied in the Electrical Technology course is described. This technique also provides an effective method for teaching, learning, and assessing for this course, where it is a suitable tool to support the learning process in promoting students' comprehension of the course content. Also, it helps students to see what they have acquired from the course content. The students can easily distinguish between the different concepts, compare the relation, and get the similarity between one analysis to another. In this work, the proposed mapping concept is applied to the students with mechanical engineering backgrounds students who are enrolled in Electrical Technology Course. This technique is very beneficial for the students to grab the basic concepts thoroughly, in which the lecturers can show linkages between subtopics in the circuit analyses and given problems. Based on this approach, the students appreciated the mapping concept, where they can easily see the relation of each required preposition, formula, concept, and parameter involved, with less complex and much simpler and more compact informative required information in this course. Also, the students got an idea to apply the mapping concept in their learning process.

SESSION 2

Theme : **Research in Engineering Education Practices**

Knowledge Sharing 2

GUIDING STUDENTS FOR COMMENDABLE OR EVEN PUBLISHABLE GPPR RESULTS

Ir. Dr. Mokhtar Harun.

Group Project (GPPR) in the course SKEE4012 – Professional Engineering Practice responds to PO10 which falls on WK7 – Environment and Sustainability. Under WK7, the students are expected to understand and evaluate sustainability and impacts of engineering professional decision making on society and environment. In a group of six students, the GPPR takes three to four weeks to complete and carries twenty percent of the final marks. The students always incline to choose purpose of the project that begins with the words such as to create awareness, to evaluate the impact or the performance, to identify the factors, and to evaluate the perception. Later, the student prepares the questionnaires to pose questions to groups of respondents for feedback on certain issues. For the groups that choose to acquire data or facts from the literature, they are required to gather enough study cases of the same scopes. The purpose of this presentation is to share the instructor's effort to guide the students to come up with a commendable GPPR results that may even publishable after some editing. Prior to the first meeting between the instructor and the group, the group is required to prepare a one-page proposal that contains the tentative title of the project, its purpose, the method to acquire data and the relevant study cases the groups obtain from the literature study. For the second meeting, the instructor discusses the contents of the questionnaire with the group. For the groups that opt to obtain the facts from the literature, the instructor ensures the issue that they are to explore further has specific concern. For the following meeting, the instructor always guides the groups that are behind either on purpose or the quality of questions in the questionnaire or those groups which are uncertain about identifying relevant study cases. It has been found out that good GPPR results come from the group which has solid and workable purpose of the study. Secondly, the groups that were able to establish set of question that can answer purpose of the study always delivers good GPPR results. In conclusion, even though the students were juggling with other course work, the three-week GPPR work is able to output good results when the students are able to set up specific purpose for the study, to set quality questions in the questionnaires, and to acquire relevant study cases.

0550

MATHEMATICAL COMPETENCIES AMONG ELECTRICAL ENGINEERING STUDENTS

Nur Izrah Mohd Puzi, Naziha Ahmad Azli, Sharifah Osman and Yudariah Mohammad Yusof.

Mathematical competencies (MC) are one of the skills that should be instilled in all engineering students. This skill is collateral with the reputation of the engineering students themselves who are expected to be highly competent in mathematics. It is mandatory for any engineering academic programs to include mathematics courses prior to more advanced engineering courses in its curriculum. This study

aims to determine the acquired and demonstrated MC among electrical engineering students with focus on those who enrolled in an Electromagnetic Field Theory (EMT) course. The preliminary findings of the study have shown that students who scored higher marks in a written test have demonstrated MC which include thinking mathematically, abstracting or generalizing and distinguishing various mathematical statements.

1480 **ACADEMIC SERVICE-LEARNING OUTCOME ON THE UNIVERSITY STUDENT ATTRIBUTES**

Shahrin Md Ayob, Tan Chee Wei, Razman Ayop and Mohd. Zaki Daud.

This paper presents findings from the activities conducted in academic service-learning (ASL). The ASL is implemented in an undergraduate photovoltaic course. The study encompasses surveys conducted on the student on any improvement in their personality, academic, and community communication. The study was conducted upon their graduation. From the study, it was shown that ASL could contribute to enhancing the attributes of engineering students.

2948 **ANALYSIS OF STUDENT ENGAGEMENT IN ASYNCHRONOUS ONLINE CLASS**

Shaharin Fadzli Abd Rahman and Mastura Shafinaz Zainal Abidin.

An asynchronous online class was implemented using a so-called *Lesson* module that are available in the university's learning management system. The *Lesson* which consists of sequential pre-recorded videos with embedded exercises is considered as a direct replacement of the normal two-hour synchronous class. Some simple questions were added into the *Lesson* flow to emphasize (guide) the students on the important concepts covered in the pre-recorded videos they watched, especially for topics related to theoretical context. Features in the *Lesson* module enabled the teacher to manage, monitor and assess the student's participation. This paper also presents analysis on student engagement based on the reports generated by the module. Although the student's participation was satisfactory, the engagement was relatively poor. Students have problem completing theory related *Lessons*. The *Lesson* with longer time duration has indecent outcome. The observed result was discussed based on the cognitive load theory.

4054 **STUDENTS' MOTIVATION IN PROJECT-BASED LEARNING FOR CONTROL ENGINEERING COURSE**

Nurul Adilla Mohd Subha, Fatimah Sham Ismai1, Zaharuddin Mohamed, Shahdan Sudin, Fazilah Hassan, Herman Wahid, Anita Ahmad, and Norikhwan Hamzah.

This paper investigates impact of project-based learning (ProjBL) on students' motivation in learning control engineering course through project-based learning (ProjBL). A brief design and implementation of ProjBL is described for System and Modeling Analysis course, which covers the whole syllabus including modeling,

simulation, control, and analysis. Through the implementation of ProjBL, the students learn the topics while they solve the problem and develop the soft and generic skills needed to face the new challenges of control system development. The project uses peer-assessment and self-assessment activities to evaluate abilities, knowledge, and observe the development of the required skills. The impact of the project implementation is evaluated by using a set of questionnaires given to the students at the mid and end of the semester to collect their reflections. Results are presented based on the mean and standard deviation scores calculated from three categories of motivation, which are intrinsic goal orientation (IGO), extrinsic goal orientation (EGO), and task value (TV). The graphs show that students' motivation increases where the mean score for Phase II is higher than the score for Phase I, with the greatest improvement for IGO, EGO and TV being 16.5%, 7.6% and 8.25%, respectively.

6571 **THE EFFECTIVENESS OF INCORPORATING VIRTUAL MACHINE ON INDUSTRY GRADE MENTOR GRAPHICS TCAD TOOLS IN VLSI PROJECT ASSIGNMENT**

Suhaila Isaak, Jamaluddin Zakaria, Yusmeeraz Yusof, Muhammad Afiq Nurudin Hamzah and Izam Kamisian.

The COVID-19 pandemic led to some changes of online project assignment implementation and evaluation assessment. In this industrial era 4.0, the integration of a streamlined virtualization interface for the industry grade electronic design automation tools is very much needed in project assignment. Hence, the impact of the changes is to revise the process of teaching and learning activities by using an online learning system and definitely puts a strong focus on laboratory workstation access. There was no face-to-face interaction of doing project assignments but through online hands-on tasks and discussion. This paper reports an evaluation performance of an abrupt shift from face-to-face learning to fully online learning within a course on Basic Digital VLSI design remotely access using industry grade Mentor Graphics TCAD tools workstation. The teaching methods employed within the course are also carried out to provide the detail of a project-assignment evaluation accentuated on designing of a full custom CMOS combinational logic circuit. The results showed that students could design CMOS combinational logic circuits and characterization using industry grade Mentor Graphics TCAD tools. Students could actively participate in design and testing activities and obtained course learning outcomes far above the minimum criteria value ≥ 0.65. In conclusion, online project assignments using virtual machines can be an alternative virtual laboratory in situations that require students to be at home.

6866 **EXPLORING STUDENT PERCEPTION ON ACTIVE LEARNING TECHNIQUE IN GRADUATE SUCCESS ATTRIBUTE COURSE**

Norazliani Md Sapari, Zaharah Johari and Khairul Huda Yusof.

This paper presents online active learning as an initiative to develop basic skills for undergraduate students upon graduation. For this purpose, they need to complete themselves with various skills to enhance their capability to be a talented person in

various fields of knowledge. Thus, this paper proposed to engage active learning techniques through cooperative learning for the Graduate Success Attributes course, which is conducted for 51 students from chemical engineering, at the University of Technology Malaysia, Johor Bharu Malaysia. Through this course, a constructive online learning experience allows the students to explore three main skills, which are scholarship, communication, and enterprising skills. The class is designed as an online classroom approach with the involvement of students through lecture and discussion, also social learning experiences based on the interactive activities in a team. The teaching strategy presented in this paper is a first attempt by the instructor and the outcome will guide improvement in future implementation. At the end of the session, the student gets the motivation, skills and content of knowledge based on 3 skills (scholarship, communication, and enterprising) for this course