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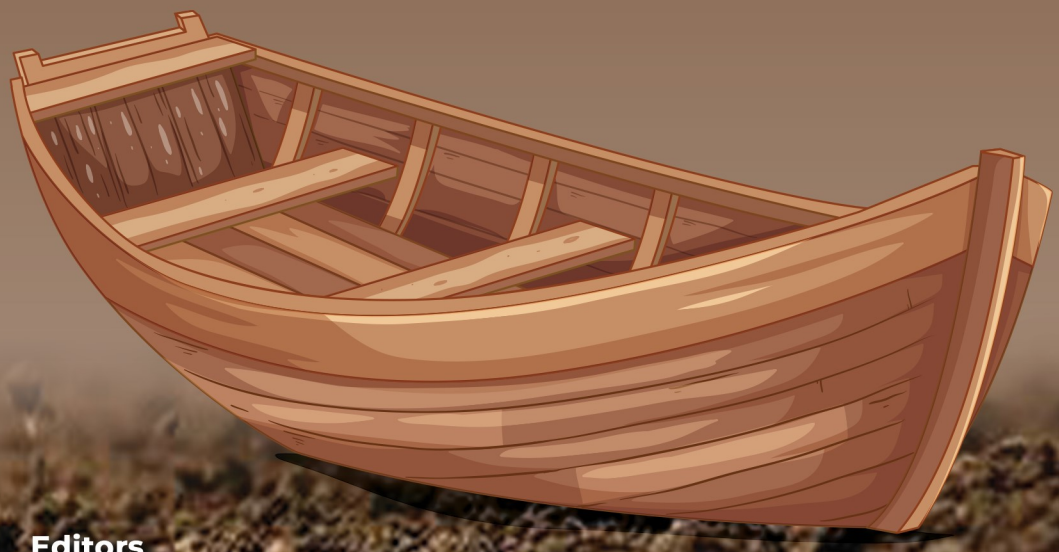
Abstract: Problem-based learning (PBL) is routinely incorporated in students' learning, especially in the core subjects of Civil Engineering Technology. This book tells the stories of students enrolled in the Soil Mechanics & Foundations (BNP20903) class from March till July 2023: On self-reflections, review and experience of the learning process. Assigned a road embankment failure project, the students embarked on an exciting 14-week journey of problem-solving in a structured and guided manner, though with much freedom in the direction and organization of their respective team endeavours. Many have expanded their learning horizons with industrial engagement and interaction, research investigation of archives and past records as well as delving into exploration of other disciplines and areas of study for creative ideas and solutions. THIS is their journey, experience and story.

Keywords: Mechanic, interaction, process, horizon

SOIL ATTACK

A Problem-based Learning Adventure
My Journey, My Adventure, My Story



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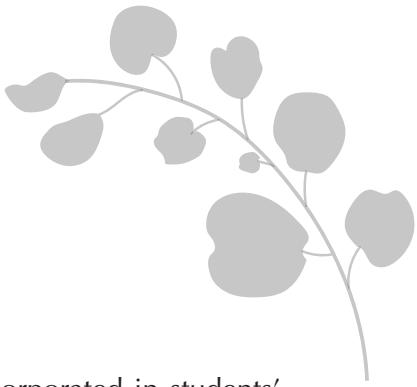
PREFACE



Problem-based learning (PBL) is routinely incorporated in students' learning, especially in the core subjects of Civil Engineering Technology. This book tells the stories of students enrolled in the Soil Mechanics & Foundations (BNP20903) class from March till July 2023: On self-reflections, review and experience of the learning process. Assigned a road embankment failure project, the students embarked on an exciting 14-week journey of problem-solving in a structured and guided manner, though with much freedom in the direction and organization of their respective team endeavours. Many have expanded their learning horizons with industrial engagement and interaction, research investigation of archives and past records as well as delving into exploration of other disciplines and areas of study for creative ideas and solutions. THIS is their journey, experience and story.

1 Success is a Journey, Not a Destination

Batrisyia Aina Kamaruzaini

From week one to week fourteen of this semester, this subject gave me a lot of experience, whether in class, in the lab, or while working on assignments related to this subject. Running the entire laboratory was a learning experience because it allowed me to know, understand, and experience things firsthand. We now exclusively conduct our business online. By completing this lab work with them, I can cooperate with my group members to finish it within the allotted time. I better understand the lab procedures because I have done a lot of practical work this semester. The journey of completing the report "The Effectiveness of Vibroflotation Stabilizer for Road Failure Prevention" was a challenging yet rewarding experience. As a civil engineering student, I was excited to explore new ideas and contribute to the development of sustainable road infrastructure. However, I also felt the pressure of producing a high-quality report that would meet the expectations of my lecturers and external panelists.

Next, it was apparent to me as I was aware of my current level of strength. I can determine my ability to obtain marks during the tests by using the already done tests. If I have trouble remembering something, I will repeat it as often as necessary. Furthermore, I always prepare notes and repeatedly copy them to help me remember and memorize all of the notes given. I also admit that I have terrible math skills. Throughout the learning process, I'll try to perform calculation exercises to help me memorize the steps involved in calculations. I also learned that my performance increased if I consistently completed the exercises and followed the instructions in the notes. At the beginning of the project, I felt a sense of fear and worry about the research's

2 Success is the Sum of Small Efforts that are Repeated

Farah Aisyah Mohamed Kamal

The first time I registered for this subject, I was surprised to find out how complex this subject would be. The word 'SOIL' looks pretty general and environmental too. Perhaps students in Environmental Engineering Technology would be able to score in this subject. But it seems otherwise. Rather than score, I would say this subject is quite challenging even to gain some marks. From the subject name itself, I knew that we would be learning about soils, such as soil properties, soil mechanism, and the type of it. I did learn some basics when I was studying for my diploma. We do know about it, but only in the beginning. It's in-depth about soil, including calculations, theories, and labs. The calculation and theory class is challenging because it needs 100% concentration and focus. Meanwhile, the laboratory is more technical and hands-on. Students will enjoy doing the laboratory (not much for the report) as we can see the results from following the proper procedures. Besides that, laboratory work involves groups, too. Our lecturers picked our group, so some groups are strangers to each other, having to get to know and build teamwork from the start. Groupmates are essential to build trust and teamwork from it. Quotes were saying, ('No one can whistle a symphony; it takes a whole orchestra to play it').

Next, aside from the test, submission of the laboratory report, and tasks given by the lecturer, this subject has a project. This project carries a massive mark for students. I was always familiar with doing projects under a subject, but this was very different. The project instructions, in the beginning, were already hard to understand. With only a picture of road failure, we must make it happen for the project.

3 We Learn and We Grow

Julia Elisya Mohd Azman

Despite the challenges we have encountered along the way, I am thrilled to be part of this project. It has been an incredible journey, filled with moments of stress and pressure (not really, but yeah, just a little). However, it is precisely through these challenges that we learn and grow, both as individuals and team members (Akmal Hafiz, Farah Aisyah, Amirul Azril, and Batrisyia Aina). The opportunity to apply our knowledge and skills to solve real-life cases has been enriching, and it fills me with a sense of fulfillment, knowing that we are contributing to a positive impact. I am excited to continue pushing forward, overcoming obstacles, and achieving success as a team. Despite any difficulties, I am confident in our ability to work together and accomplish great things in the future.

The moments when we are pushed to do more force us to tap into our creativity, innovation, and resilience. We learn to think outside the box, finding unique solutions to overcome obstacles. These experiences allow us to grow personally and professionally, expanding our horizons and unlocking our true potential. So, embrace the challenges that come your way, for they are opportunities in disguise. With determination and perseverance, there is no limit to what we can achieve and the incredible things we can do.

Finally, when working in a team, be selfish. We are in the same team, completing each other's gaps. One may be shy and introverted, while the other is extroverted and converted; together, we work to make things come true and be the better version of ourselves.

4 Journey, Experiences, and Challenges

Muhammad Aqil Qayyum Samsudin
Nurul Puteri Zulaikha Mohd Zulkipli
Nurul Syakirah Mohd Yazid
Nurul Syahzanani Akmaludin
Muhammad Fahmi Idham Che Lah

This course gave me a wealth of experience from week one to week fourteen this semester. Whether in class, in the lab, or while doing the group project connected to this course. Running the entire laboratory was a learning experience because it allowed me to see, hear, and feel everything hands-on. I need to work with my group members to complete it in the allocated time. Because I have done so much practical work this semester, I have a more excellent knowledge of the lab procedures and a further understanding of their application in our group project.

The task of completing the group project may be both exciting and challenging. Collaboration, communication, and a shared vision are required to overcome barriers and accomplish the intended result. This essay chronicles my experience and journey of completing a soil mechanics group project, emphasizing the lessons I learned, the difficulties I encountered, and the eventual sense of accomplishment through teamwork and determination. The establishment of our group was the initial stage of our adventure. Our professor divided us into groups with people from all backgrounds and skill sets. The various perspectives, experiences, and information were critical to the project's success. Early on, we recognized that excellent teamwork would be essential to tackle the complexity of soil mechanics. From my perspective, we expected some difficulties as previously; we had never worked as a team together as the group Contained students from other courses and subjects, so new people meant new challenges.

5 Combatting Problems using Teamwork

Irfan Amzar Sulaimi
Kendrik Anak Kungo
Nur Ar-Raudatul Husna Mohamad Nasseri
Nur Ellissa Anis Azli
Nur Athirah Mohd Anuar

The Soil group project was an adventure for us. What made it feel adventurous was that we needed to create an innovation for a real problem. This project taught us to write a thesis or report, ideally for other subjects. As Prof Chan taught, we also learned how to solve problems by following the flow. We also knew that to find a solution, you must do some research and not depend on the answers from your lecturers. We must understand all aspects of the proposed solution, including the cost and duration.

We faced some problems, issues, and challenges during this project's journey. One of them is to find a suitable solution for the issue that has been provided. We had proposed many solutions but were rejected due to a lack of understanding. Then, we faced the problem on the day of the presentation. We had not prepared the data for the cost and duration of our solution, and our panels asked for it. We tried to mention it based on our knowledge, but the panels wanted proof of the data, which we did not prepare. Next, the challenge we faced was to create or sketch a model using Sketchup software. We were not experts on the use of the software. So, we needed to learn it in a short period. It was tough for us, but we managed to finish our sketches.

We managed to overcome those issues through teamwork. Our team communicated well and worked hard to finish this project. We also

6 Slope Failure using Mitigation Methods

Muhamad Aidil Ashraf Mohd Rosdi
Mohd Shafiq Azlan
Nur Sabrina Fatini Mohd Haffizam
Nurul Natasha Aina Mohd Zaidi
Nuren Nabilah Md. A' Seri

During this semester, our group of five dedicated individuals embarked on a journey to complete our project on slope failure and mitigation measures. Our group consisted of technology engineering students learning geotechnical engineering: Aidil, Shafiq, Natasha, Sabrina, and Nuren. Our project focused on the Bukit Cincin slope failure at Genting Highland, which was a prime example for our technical paper. We aimed to understand slope failure's causes and explore innovative mitigation measures to prevent and control such incidents effectively.

The journey began with extensive research on slope failures in Malaysia, considering the country's varied topography and climate. We discovered that Malaysia frequently experiences heavy rainfall during the monsoon season, significantly affecting embankment stability. Erosion increased hydrostatic pressure, and raised water levels due to excessive rain posed significant threats to infrastructure systems. Our group delved into the background of the study, specifically focusing on the Genting Highlands to Bukit Cincin route. This route, constructed in 1975, faced multiple road instability and breakdowns during the monsoon season. We analyzed the causes of embankment failure and attributed it to heavy rainfall; the resulting increase in pore water pressure weakened the shear strength of the slope material.

7 Our "Tumultuous" Journey to Better Ourselves

Awang Ismail Mohamed
Muhammad Akmal Sulaiman
Syaidatul Anis Rosman
Tiffenie Rabai Anak Turing
Nik Khaulah Aznan

We had many ups and downs throughout our Soil Mechanics and Foundation project, but overall, it was a great experience that changed us as students and potential professionals. We initially had some fear due to the complexity of the subject and the high standards set by our lecturers, Prof. Chan Chee Ming and Dr. Noor Hasanah. But with tenacity and careful preparation, we overcame the challenges that arose and, in the end, were pleased with our accomplishments. This article describes our incredible trip through the many project stages, emphasizing the difficulties we faced, the innovative solutions we devised, and the significant insights we discovered.

The project's initial research suggested that soil mechanics and foundation would be complex due to its numerous difficulties. Our lecturers emphasized the need for early preparation and requested that we make a timetable (a Gantt chart) to direct our work throughout the semester. This strategy aims to guarantee that our future work complies with the regulations while helping the community. We took on this issue with diligence, a well-thought-out plan, and an eye toward success.

8 My Personalized Growth

Arvin S/O Gopalakrishnan
Danish Alif Akmal bin Hairolnizam
Muhammad Amir Arif bin Mohd Abu Bakar
Nik Nur Syaherah binti Nik Zaiyumi
Syazatul Nazirah binti Saroji

"Each step taken towards your goals, no matter how small, is a testament to your dedication and an integral part of your ultimate success."

Throughout the entire semester, our experience with this subject has been invaluable. From attending lectures, and engaging in lab sessions, to working on assignments, we have gained a wealth of knowledge and practical skills. The hands-on experience of running the laboratory has been particularly enlightening as it provided me with firsthand exposure to various concepts and techniques. Transitioning from online operations has been a unique aspect of this semester. Despite the shift, collaborating with group members in conducting lab work has allowed us to effectively complete tasks within the given timeframe. Personally, I believe that this online approach has its advantages, fostering efficient teamwork and ensuring the timely completion of experiments. Engaging in practical work throughout the semester has significantly enhanced my understanding of lab procedures. The opportunity to apply theoretical knowledge in real-world scenarios has been invaluable. It has not only solidified my comprehension of the subject matter but also instilled a sense of confidence in my practical abilities. Overall, based on our technical paper, this subject has provided us with a well-rounded and comprehensive learning experience. The combination of theoretical teachings, hands-on lab sessions, and online collaboration has

Lessons Learned: My Reflection on Project-Based Learning Journey

Normala Bidin

It would have been an emotional roller coaster ride if I could describe what I'd felt for the whole semester taking the Soil Mechanic and Foundation subject. Having a different background of study level and experience in this field from the others wouldn't make me want to stop halfway, but in fact, it makes the urge to learn more about this subject. From the lecture session to running experiments in the laboratory and working in a group, it was a splendid moment that I had considered when writing the essay. Suppose there was a language in this world that everyone could understand. It was a language of enthusiasm, of things accomplished with love and purpose, and as part of a search for something I believed in and desired, and I think that my confidence in learning the subject takes me to where I am right now.

It all started during week 8; I clearly remember the excitement, joy, and fear of submitting our project's first draft. Having consultation progress with our lecturer, Professor Chan Chee Ming, helps us better understand our project. Do you know what it feels like when we put passion into something, and it doesn't turn how we want because of our overconfidence? It turns our interest into pressure, and it's the perfect picture describing us as a group. We almost reached the top when we submitted the progress report until the last progress, which is the final draft.

I remember breaking down and trying to hold on to a little grasp of the reality of what was going on during our final progress. The feeling

10 Embarking on the Soil Mechanics and Foundations Project: A Journey of Challenges and Triumphs

Muhammad Adam Ghazali
Muhammad Haziq Fitri Hairul
Nur Amnani Ismail
Nur Syazana Mohd Shukri

Introduction:

Our Soil Mechanics and Foundation project was an exciting adventure, filled with ups and downs, but ultimately, it was a rewarding experience that changed us as students and future professionals. Initially, we felt a bit scared of the subject's complexities and the expectations of our teachers, Mr. Noor Hasanah and Prof. Chan Chee Ming. However, with determination and careful planning, we faced the obstacles that came our way and, in the end, felt proud of what we accomplished. This essay tells the story of our fantastic journey through the different stages of the project, highlighting the problems we encountered, the creative solutions we came up with, and the critical lessons we learned.

The First Steps - Planning Ahead:

When we started the project, the topic of Soil Mechanics and Foundation seemed harsh with its many challenges. Our teachers stressed the importance of early planning and asked us to create a schedule (Gantt chart) to guide our progress throughout the semester. This approach ensures our future work meets the requirements and benefits the community. We took on this challenge with hard work and a well-organized plan and aimed for a successful journey.

11 Steps of Our Hustle:A Soil Mechanics Story

Muhammad Adib
Muhammad Izzat Zamir
Nur Aqila Qalissah
Nur Zulaikha Aira

Introduction

For this subject, starting from the first to the fourteenth week, there are a lot of ups and downs we've been through to complete the task, lab work, and project. In my opinion, it's one of the most complex subjects of all, but I think the reason for it is it has no final exam, so it becomes more challenging to score all the assessments to get a good mark. We've been hustling days and nights to finish each goal, as higher marks are needed in the rubrics to get a good score. This subject also trained us not to be selfish and required us to help each other in every way. By working hands-on lab work, this subject is quite fun because there's more than just theoretical learning. Good communication among the group members is essential because if there's any problem, the other members can help me to solve my problem to complete the tasks given. Good leadership by a leader who can distribute the part for each member and give clear instructions so that others can understand and proceed with their work. The challenging part was on the presentation day on week 13th; a few panels from the industries came to evaluate our project. We also got new knowledge and input to improve our project so we can finalize and submit it.

12 Our Three Stages to Success

Muhammad Adam Ghazali
Muhammad Haziq Fitri Hairul
Nur Amnani Ismail
Nur Syazana Mohd Shukri

Introduction

Our Soil Mechanics and Foundation project was about embankment failure. This project had ups and downs, but in the end, we, as students, better understood what soil mechanics and foundation were all about. Initially, we did not take this project seriously and just did it without much thought, but it all changed after our first progress meeting with Prof. Chan Chee Ming. Prof. Chan Chee Ming explained to us in more detail the complexity of the project, and then we realized how important and challenging it was. After that, we planned our journey using the Gantt Chart and began researching this project. Even though this journey was not a smooth one, thankfully, we ended it successfully.

The First Stage

This project started with making a Gantt Chart to build a foundation for this project journey. After making a Gantt Chart, we did a group meeting to get an idea of the solutions and work distribution. At first, we picked the most prominent and easy solution for our project: the gabion wall. After identifying the solution, we constructed a FILA Table for these ideas. We combined it with a box culvert to make water run under the road of our project. Several days later, we met with Prof. Chan Chee Ming about this project. We presented our portfolio and ideas to Prof. Chan Chee Ming. While criticizing our

13 Our Arduous Journey through the Soil Project

Low Yi Yun

Over the 14 weeks of this semester. We had to take the challenging subject of Soil Mechanics and Foundation. We embarked on an academic journey that demanded determination, perseverance, and teamwork. Our project, a daunting task for the entire semester, tested our understanding of soil behavior and its engineering principles. Undeterred by the complexity, we embraced the opportunity to learn and grow together. Countless late nights, heated discussions, and supportive collaborations marked our fantastic efforts throughout the journey. We delved into the depths of soil properties, analyzing complex problems and formulating innovative solutions.

First and foremost, we recognized the significance of early planning and organization. We laid out a detailed timeline from day one, breaking the project into manageable tasks over 14 weeks. This allowed us to stay on track and avoid last-minute rushes. Leveraging each team member's strengths, we divided responsibilities based on expertise, ensuring efficiency and fostering a collaborative atmosphere. We also prioritized delving deep into research, consulting various resources, and seeking guidance from our professor to understand the project comprehensively. We reviewed the literature and studied similar cases to decide the best solution for our project.

14 The Road to Success is Never Easy

Muhammad Khairuddin Md Yusoff
Aiman Iqbal Yusaini
Mohammad Syahir Ismail
Nur Ellya Najwa Abdul Halim
Chelsea Inez Aran Kong

The course Soil Mechanics and Foundation gave us many experiences from week one to week fourteen of this semester. Whether in class, the auditorium, the geotechnics lab, or where we were regarding this subject. Attempting the project was a learning experience because it allowed us to learn, comprehend, and experience new things, for we are now in charge of our project. We were able to finish this project task in the allocated time by working together with members of our group. We have a better understanding of the project procedures and tasks because we completed all the tasks assigned to us by the soil mechanics and Foundation lecturer this semester.

Next, we are now conscious of our current level of strength. Based on the project that we have attempted, we can determine our ability to obtain marks according to the assigned rubric. If we are having difficulty recalling anything, we will commit to repetition as many times as necessary. In addition, we always prepare notes and regularly copy them to help us identify them when needed. We also admit that we know very little about the project's topic. Throughout the learning process and investigation, we strived to complete our assignment within the time frame set. We also discovered that completing the project on time and following the project instructions provided by the lecturer improved our results.

15 A Journey where We Gave Our All

Muhammad Alif Hakimi Mohd Nor
Muhammad Aiman Mian
Nur Athirah Izwanie Mohd Ady Shahrin
Nur Khairunnisa Mohd Yasin
Aqilah Zahirah Mohamad Zin

Our journey while making the project was initially filled with all kinds of unexpected obstacles from the smallest things until it was completed. For the project, communication between each member became our best solution for any problem we encountered. The project this semester is quite challenging for all of us with so little time to do it with our schedule being packed as it is. Every step is filled with joy and sorrow and accompanied by fatigue. The subject of soil is quite difficult to understand and needs very deep research and understood with an open heart.

With all the strength we have, we pour it out, even though it is not complete yet, but it's worth it for us. Even if we didn't win the competition, it was special for us to as a very special memory. Through all the sleep we sacrificed although normal for a student. Thank you to friends who are willing to tire along, together.

16 A Note to the Future: The Minor Steps to Success

Ajmal Zahin Mohd Nazri
Aisyah Loong
Quratuanisa Mohd Zain

The problem-based learning projects for the soil mechanic and foundation subject have been a lifetime journey with challenges, yet we as a group truly learned a lot by the time we accomplished this work for the past week, from week one to week 14 of this semester. As an individual and a group, we managed to learn so many things during this work course, whether in class during lecture sessions, in the lab, or running new experiments with the guidance of a lab assistant or a technician and lecturer. We have been working together as a group for 14 weeks to get the job done for lab experiments and the project. Everyone in the group must know their responsibilities in completing the work given to us. We must respect each other and cooperate to achieve the desirable work. If not, we cannot complete the work given on time or miss the deadline, which can cause reduced marks and a bad reputation for our group.

Next, during this journey, we are aware of our current level of strength when doing tests for this subject. My teammates and I were determined by our ability to obtain good marks during tests held for us. I will study beforehand to ensure we're fully prepared before the test. I need to make notes to take the essence of the topic explained in class. After that, I will read the notes repeatedly so I understand and can memorize all the notes. Not to forget, the calculation part needs to be revised for the tests by doing exercises with my friends to help me understand the topic better. I discovered that if I continuously

17 My Soil-Mate

Ezani Fizafarisha

Figure 1: Faith is a pillar of strength for tough journeys.

Hmmmm, Soil & Foundation. Well, I was not that into this subject at first, actually, cause my PKP FYP project was related to soil, and it is a bit annoying with all the sheer strength and all the related stuff. Honestly, I'm glad that it was not included in a final exam, but I am worried at the same time as it will contribute a lot to the marks assessment. I don't even know which one is better anymore. But still, I'm winging it and just cruising through this semester. I'm a bit worried about the project because I'm not in the same batch as my other classmates, and I don't know how to work with them, but thankfully, that's just my thought. It was not that hard to work together as we had the same thing to achieve. We indeed face lots of difficulties in the process of completing this project. The fights, the emotions, the jokes, the time, and when opinions clash… it does create memories. After the Sem break, I started to feel a lot of pressure.

18 Evolution through Experience: Bettering Yourself is about the Experience, not the Outcome

Muhammad Daniel Hafiz
Putera Amirul Aqtharuddin

From the beginning of this semester, the subject known as soil mechanics and foundation gave me lots of valuable experience, whether in class, in the lab, or while working on related assignments. Utilizing the equipment found within the laboratory to conduct the experiments was a learning experience for me because it allowed me to understand and experience things firsthand. For the minute meetings of the project, we conducted our meetings both face-to-face and online depending on my group's schedule and their free time. From the time spent conducting the project and the lab work with them, I can cooperate and better understand the plights of my group members and how to manage them so that we can finish the work within the allotted time.

At the start of the project, it was evident to me and my group that we didn't have much of an understanding of how and what the flow of the project was. At first, we treated the project as just another assignment. However, after the first progress meeting, realizing how wrong we were from the start. I am finally aware of what the project required: an understanding of how to see a situation and state the problem that is found and to solve the problem, what is the solution for the problem, and which one is the best one via the use of the F.I.L.A. table for listing the information we can find.

19 What I Gained from Soil Mechanics: Success is a Journey, not a Destination

Siti Aminah Ab Malek
Mohammad Haziq Zakwan Mohd Zahari
Kishan A/L Yogeswaran
Siti Nurfarhanah Zaini

When a new session or semester begins, a student's journey officially starts. Life comes with many twists and turns that must be navigated while studying. There is no difference within this semester as well. Several subjects or courses, including theory classes and laboratory, need to be taken this semester. The subject, BNP20903 Soil Mechanics and Foundations, fits the description given in the title above.

This subject gave me lots of experience, starting from the first week of this semester until the last. Whether in the lab, class, or when completing any relevant assignments. The experience I gained in managing the project was a learning experience for me, both in theory and practically. The group project given to us was to identify and provide a solution to the embankment failure. To finish the project, I need to work in a team of 4. Also, from my extensive usage of the SWOT and Fila tables, I have a better understanding of the project instructions.

Throughout the project's implementation, I admitted to several flaws and mistakes. However, with encouragement received from friends and instructional staff, I pushed on. To complete the work, energy and time must be sacrificed, and time management is critical since mental

20 The SWOT Table and Me

Farhan Rahman

From the first week to the fourteenth week of this semester, this course gave me a wealth of experience and knowledge that is very useful to use in understanding soil mechanics. This also gave me some new insights; for example, I notice now that when I am driving, I can understand road conditions better, as previously, when I was on the highway, I never really saw them. Additionally, this subject provides more knowledge and understanding of subsurface disposal, dewatering operations, the concept of dewatering, and soil load-bearing capacity while providing us with new options to divide the work as a team. Whether in the classroom, in the laboratory, or doing activities related to this course. Performing the experiments was a learning experience for me because it allowed me to learn, understand, and experience things from both the theoretical and practical aspects.

The group project was a good starting point for me when I needed to learn how to be a good leader while also being a good lesson and experience for me to divide the tasks equally among my team members along with ways to provide ideas and communicate with my team members. I need to explain what is required for our project and show them a clear picture. Additionally, having the know-how in information gathering can help me apply it to my upcoming final-year project. Through the information given, I can understand the way the embankment gets damaged through the concept of erosion and sedimentation while being related to the concept of rising groundwater as well.

21 My Struggle to Get Where I Am

Muhammad Hakeem Fird
Aus Che Dalim
Muhammad Zaein Yunus
Nur Atiqah Hadirah Ismail
Nur Elya Mashitah Bing Irwan Sutno
Nurul Aqilah Mohd Ali Nashruddin

During this semester, which is semester 2 of the 2022/2023 session, we took a Soil Mechanic and Foundation course. In this course, we were able to learn a lot of lessons, especially ones related to soil. Apart from that, we also gained a lot of valuable experience both in class and in the laboratory. While in the laboratory, we were exposed to various tools to carry out the tasks given, for example, the specific gravity experiment, compaction test, and others. As a student, this kind of experience is very valuable because it reveals to us how to work in a team and handle the tools given responsibly. We were given free rein in choosing group members for our assignments, laboratory, and group projects throughout the semester. For this subject, each group consisted of 5 members. Among the tasks we must do is the group project that is appropriate for this course. Therefore, we have chosen to solve a problem related to embankment failure at Jalan Felda Selancar, Kuantan Pahang. But before we continue with this project, we have to ask for advice from our lecturers about whether the project we want to carry out is accepted. Once accepted, we will carry out the next step by identifying the problem. Within this project, we have listed several factors that caused the incident to occur in the area, among which there was no suitable drainage and caused the water to stagnate; due to stagnant water, the soil structure became weak, along with other consequences that we listed inside our

22 Methodical Approach: Seeking Solutions for Sinkhole Problems

Pui Shi Ying
Syuhada Suzanna Suhaimi
Usaid Abd Majid
Nurul Izzati Othman
Nur Izzah Md Shahran
Farhah Suziyana Ishak

Our project title is 'Sinkhole: A Geotechnical Investigation for Conceptual Solution Implementation.' From this project, we will provide answers as to how sinkholes are formed and what the causes of the sinkholes are. From then on, research must be done to provide better solutions for the ongoing issues. The site location was at the highway of Ipoh, where the sinkhole, which was 2.1m wide and 2.1m deep, can be seen directly. Our project is mainly about learning how the sinkhole impacted the structure of the highway. Sinkholes are caused by weathered rocks, which, in turn, are caused by erosion through existing water, hence creating a large cavity underground. Since Ipoh's topography was made from limestone, its biggest weakness is water, which can erode the limestones bit by bit.

By conducting a geotechnical investigation along with Electrical Resistivity Tomography (ERT) and Seismic Test Geophysics, we can get the overall data of soil strata. The data will help determine the size of the cavity so a solution can be found. In getting a solution to the sinkhole issue, we need to research articles to get what solutions we can provide for this project that are efficient and sustainable in the long term. There were a lot of solutions provided, but we decided between two: the grouting method and compaction.

23 Struggles and Setbacks: A Way to Communicate with Success

Rajaletchumi A/P Kumaran
Siti Nurina Atirah Sha'ari
Adeline Lee Siew Yan
Faris Izwan Shah Afzainizam
Hadfiz Mohd Zaki

This subject offered me much experience from the first week of this semester until the fourteenth. Whether in the lab, in class, or when doing any sort of assignment. I learned a lot while managing the lab since it gave me the chance to see, comprehend, and engage with things firsthand. I must work in a group to complete the lab work within the deadline. I've done a lot of practical work this semester, so I have a better knowledge of the lab processes.

For the project, we established an objective. The project's scope, schedule, milestones, and individual responsibilities should be discussed and agreed upon. We ensure that everyone on the team knows the project's goals and their responsibilities. We find ways to communicate inside the group that are transparent and open. The roles, responsibilities, and project objectives are defined up front when we start the group project. We also try to use project management systems, messaging applications, and Microsoft Teams as communication methods to promote efficient communication, review progress, handle problems, reach consensus, and schedule periodic meetings or check-ins. This encourages teamwork in our group, keeps everyone on the same page, and enables the early detection of any potential problems.

24 Soil Project: Our 14-week of Effort and Journey

Siti Zulaika Mohd Azman
Muhammad Syami Aqil Nazarul'azim
Ahmad Taufiq Hasan Adeli
Puteri Me Aleeyana Ismail
Muhammad Hasif Norlihan

The group's journey to finish the assignment that the lecturer had assigned for 14 weeks began with a visit and a tour of the locale. At the same time, we gather information, concepts, problems with learning, and actions. The influence on the environment, time, money, and issues that the nearby inhabitants will face when this project is completed are just a few of the challenges we must overcome while fixing the problem. We were able to complete it since the lecturer was monitoring every step of the process.

First, soil mechanics is fun to learn. Now, we want to tell a story about our project development, which is to bring excitement to our group. We knew that this project was a common problem at this time. So, we like to solve the problem with our creative solution. But we were not confident about our solution. So, we met our supervisors, Prof Chan and Tuan Dr. Hasanah, to show our weekly progress. From the meeting, we managed to increase our confidence level after all the discussions and lectures. After that, our group generates new ideas about the solution. Each member contributed ideas that we simplified, which is our solution, which is the combination of retaining wall and geogrid whilst using new materials.

25 The Culmination of My Soil Journey: Success Doesn't Come to You, You've to Got to Go for It

Nur Iman Elianie Mustapah
Cheah Shu Qing
Muhammad Ikhwan Arif Zamri
Nur Syafika Sobri
Nur Farhanah Abu Bakar

First, we were going to start with the introduction of the subject, Soil Mechanics and Foundation. This subject is taught by Prof Chan Chee Ming and Dr Tuan Noor Hasanah. Let's start from week one to week fourteen of this semester; this subject has given us a lot of experience. Whether in class, in the laboratory, or when doing external assignments related to this subject. Running the entire lab was a learning experience for us because it allowed me to know, understand, and experience things directly, that is, practically. We are now indirectly able to share our knowledge and opinions. By doing this lab work with them, we can work with our group members to complete it within the allotted time. We understand the laboratory procedures better because we have done a lot of practical work this semester. At the beginning of the semester, we got an assignment for the group where we had to do a project to find a solution for Highway Embankment Failure. Figure 1 shows the site location of our project and its issues.

26 Memories: Travelling through Soil Mechanics

Nur Shazliena Mohd Anuar
Siti Juita Minoor Shaharizal
Normin Anak Minchong
Mohd Shukryn bin Ryme
Kamarul Ridzuan Sulaiman

Looking back on the recently completed project, there is a smile on my face while I am reminiscing about the challenges and hard work in completing the project. It was not an easy task; many nights and sleep were sacrificed to complete the project. With these memories in my mind, I cannot help but journey back to the beginning of this project, where it all started. We opened the project instructions and read them carefully, from one sentence to another sentence. Many questions begin to fill our minds, followed by confusion and fear. What does the project want us to do? What are our plans to complete the project effectively? How could we deliver the best of our abilities to complete the project? These questions keep swirling in our minds, but one thing is for sure: we have to face and complete this difficult task together as a five-member group. Together, our first step was marked by brainstorming sessions, meticulous planning, and countless discussions to complete the project successfully. Not only to complete the project but to score as many marks as possible when we submit the progress. It was a challenging and tough task, but we learned something throughout these hard times, which is to trust the process.

From the early stages of the project, brainstorming sessions were conducted to develop solutions to the given problem. Many ideas

27 Sweet Victory After a Long Struggle

Nurul Rashidah Farhana

Starting from the first lesson on this subject on 29 March 2023, at the geotechnical laboratory, it was the first time I met my new classmates, as I was not familiar yet with their faces (well… some of them I already recognized since they were from my diploma circle). It was also my first experience being in a group with three students from the BNB program. The briefing session was conducted to give us exposure to the laboratory experiment, the assessment week, and the details of the project. After the session, I thought that the project was as easy as pie (umm, not as easy as baking the pie for teatime), but I realized that I was underestimating the task. From the 1st week of the semester until the end of Week 14, this subject gave me lots of experience and chances to fulfill the project requirement and work in a group with 'strangers.' Also, because of this class, I gained lots of new friends and learned laboratory procedures and data analysis, which helped me to prepare myself for the future working environment.

At first, it was hard to communicate with my teammates as they were not too responsive at that moment. It required me to mention everyone in our group chat and give some reminders about the project progress, laboratory report submission, and what should be submitted next week. However, I did not mind if they understood their part and could submit it within the allocated time. (Quite sad as some of them just saw my message without giving any response… huhu….). It was quite stressful because after one task was submitted, another task came to us, just like the domino blocks shown below (Figure 1).

EDITOR'S BIOGRAPHY

CHEE-MING CHAN

I am Chee-Ming, the Soil Class professor who had the great pleasure of working with Daniel in compiling and editing this most interesting book. This is the students' stories of their respective adventure in the class project running throughout the semester (March - July 2023). Having taught the course for over 6 years now, while the *Soil Mechanics and Foundations* fundamentals and underpinning principles remain unchanged, the rapid advancement of geo-technology coupled with the evolving global outlook on conscientious construction in general have made it more challenging for students to relate, contextualize and translate textbook materials into effective real-life applications. Hence the Problem-based Learning approach was introduced this semester, in the form of a 14-week group project of seeking geotechnical solutions for a failed embankment, encompassing considerations from all aspects of socio-environment, economy-livelihood and sustainable development.

MUHAMMAD DANIEL HAFIZ BIN ABU AMRIN

Assalammualaikum to fellow readers of this book, my name is Muhammad Daniel Hafiz Bin Abu Amrin. I am from Shah Alam, Selangor. I graduated from Politeknik Sultan Salahuddin Abdul Aziz Shah on the academic year of 2021. I pursued my next level of education at Universiti Tun Hussein Onn Malaysia in the Bachelor of Civil Engineering Technology Program (Construction). As of current, I am a 3rd year student of the programme. Believe it or not, with limited experience and know-how, this is indeed my FIRST experience in editing a book. However, I am passionate about it and eager to give my best for you, dear readers. I hope you would gain new knowledge and inspiration from this book. Thank you and happy reading everyone. Enjoy!

SOIL ATTACK

A Problem-based Learning Adventure
My Journey, My Adventure, My Story

Problem-based learning (PBL) is routinely incorporated in students' learning, especially in the core subjects of Civil Engineering Technology. This book tells the stories of students enrolled in the Soil Mechanics & Foundations (BNP20903) class from March till July 2023: On self-reflections, review and experience of the learning process. Assigned a road embankment failure project, the students embarked on an exciting 14-week journey of problem-solving in a structured and guided manner, though with much freedom in the direction and organization of their respective team endeavours. Many have expanded their learning horizons with industrial engagement and interaction, research investigation of archives and past records as well as delving into exploration of other disciplines and areas of study for creative ideas and solutions. THIS is their journey, experience and story.

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