



**Real Application of
Transformative Approaches for**

Teaching and Learning in the 21st Century

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Special Dedication

This book is dedicated to UNIMAS academicians who work hard in conducting the best teaching and learning experience. This book is hoped to be an inspiration to educators on how to implement the teaching and learning process more effectively.

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Published in Malaysia by
UNIMAS Publisher,
Universiti Malaysia Sarawak,
94300 Kota Samarahan,
Sarawak, Malaysia.



Cataloguing-in-Publication Data

Perpustakaan Negara Malaysia

A catalogue record for this book is available
from the National Library of Malaysia

eISBN 978-967-0054-23-0

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Preface

“It’s not just learning that’s important. It’s learning what to do with what you learn and learning why you learn things that matter.” -Norton Juster

The Real Application of Transformative Approaches for Teaching and Learning in the 21st Century book was produced to appreciate the transformative work of lecturers in teaching and learning. This book is expected to serve as a guide to other lecturers in helping them to improve their teaching approach, delivery, and assessment of their courses. Lecturers can also use this book to develop their ideas and creativity in designing teaching and learning according to current needs and align with the learning outcomes of the course.

Global changes in the twenty-first century have altered the landscape of teaching and learning, particularly in delivery methods, approaches, and assessments. This is due to the fact that the student body is made up of generation Z, who have different styles of learning than that of the lecturers. Conventional methods used by lecturers are no longer an option for today’s students. Therefore, lecturers must transform their teaching and learning in order to be relevant to today’s students.

The combination of transformative approaches introduced becomes the strength of this book's content. Authors combine diverse approaches, delivery, and assessment in teaching to ensure the effectiveness of teaching to students. Moreover, the collaborative approach used provides an alternative for lecturers to minimize the burden on students for courses taken. This approach has the potential to have a greater impact, particularly in terms of student understanding of learning.

The element of creativity incorporated is also a strength of this book. Authors explain some terms and concepts using diagrams and figures to help the reader understand. The steps and procedures for carrying out teaching and transformative approaches are stated in a systematic manner to help the reader understand what is being conveyed.

The book also includes writers from various backgrounds. This distinguishes it as a unique and comprehensive manuscript. Readers are guided through conceptual and practical understanding of teaching and learning methods. The author's presentation of basic concepts and applications can help the reader understand knowledge more deeply and broadly.

Crafting a learning environment where students are able to explore and understand how the physical world works, and to connect complex scientific concepts to their daily lives is vital. It also includes building students' confidence in their ability to solve challenging problems and empowering them to build a better future for themselves and others. CTS is one of a better way of learning that will prepare students towards focusing on being very collaborative, self-motivated and self-directed all the time staying true to the lifelong learning values, which are imperative to carve a better future for the students in their field of choice.

The next project is related to the environmental issues relating to solid waste, wastewater, and hazardous waste viewed in the context of their treatments. This course has been implementing service learning (SULAM) as a part of an immersive learning approach since Semester 2, 2017/2018. In the previous years, i.e. 2017/2018, and 2018/2019, the

course assessment included either a final examination (40%, session 2017/2018), or a mid-term examination (30%, session 2018/2019). Although SULAM implementation in this course has generally improved the CLO achievement since 2017/2018, the pen and paper examination has resulted in some students not achieving the intended CLOs. Instructors were not sure on the effectiveness of examination in creating a deep learning experience for students.

Therefore, in semester 2, 2019/2020, mid-term examination was replaced with case-study analysis to (1) encourage higher order thinking skills among students and (2) cultivate the sense of commitment and responsibility among students to find innovative solutions towards waste management issues. In addition, students' e- SULAM projects as well as group discussion and engagement with target community were implemented on online platforms. Students' reflection on their e-SULAM projects was recorded on their e-portfolio. Implementation of immersive learning through blended learning in this course has resulted in improved CLO achievement as compared to the past two years. Students' reflection on their learning experience in this course implied the effectiveness of immersive learning (blended learning) approach in this course.

Besides that, the project involved transforming the typical class lecture into an interactive scientific communication environment. Students were exposed to the real scientific communication via workshop-style delivery, project-oriented problem-based learning (PoPBL) on proposal writing projects, and brainstorming/discussion activities during weekly meetings. The initiative eliminated the traditional lecture and end-of-semester assignment practices.

Another project is MATHX Project, a new project-based learning instrument that allows digital students to work collaboratively, purposely implemented to develop teamwork and student's management skills. Students translated acquired knowledge to applications and STEM projects. The integration of digital technology used in this project helps students create meaningful and enjoyable learning experiences in Mathematics.

The following project is related to the assessment in learning. In order to improve learning via assessment conduct, assessment must be objective, significant, and magnitude. OSPE has/have been adapted and implemented for Biology students in Centre for Pre-University Studies to assess know-what and know-how practical competencies following the objective and structured manner with direct observation of the students' performance. The assessment provides meaningful learning experience to the students as it can assess all three domains (cognitive, affective, and psychomotor).

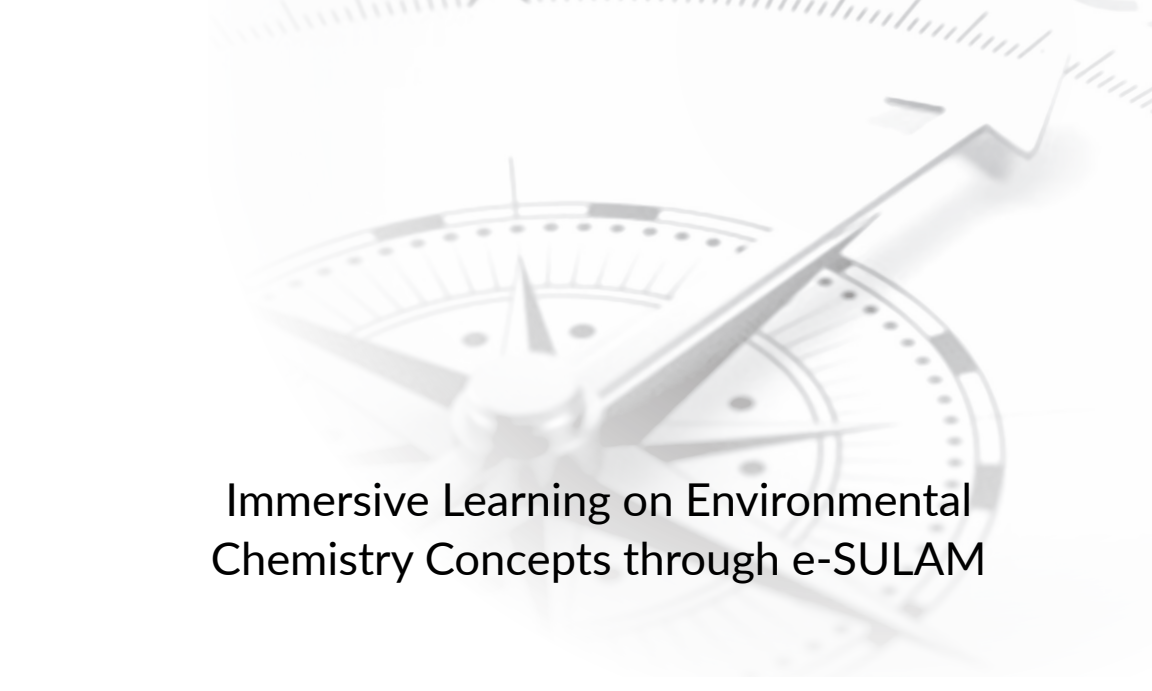
Furthermore, the enriching immersive learning experience during movement control order (MCO) was possible through blended learning substitution method. Finally, one project is related to social media and animation software offering several attractive features that may overcome the limitations of the existing educational portals. The team introduced the use of YouTube, Instagram, and Doodly as supplementary platforms for teaching Environmental Biotechnology in Semester 2 2019/2020 which resulted in excellent academic performance and positive feedbacks from the students.

Finally, this book discussed also describe the course MDP30609 Community Medicine and Public Health posting, the assessment has been modified by adopting the Alternative Assessment method. The Alternative Assessment is regarded as comprehensive, where it assesses the candidates' ability to integrate writing task and performance, divergent thinking in solving problems and enhancement of meaning skills.

Acknowledgement

First of all, we are very grateful to the Deputy Chancellor Prof Datuk Dr Mohamad Kadim bin Suaidi and Deputy Vice Chancellor (Academic and International) Professor Dr Ahmad Hata bin Rasit for their support and opportunity in producing this book. This gratitude also goes to the Director of CALM, Dr Kartini binti Abd Ghani for her encouragement throughout the journey of realizing this book. We would also like to extend our acknowledgments to the Deputy Directors (Teaching Advancement), (Learning Technology), Coordinators and all administrative staffs in CALM for the support.

Thanks to all award recipients who have contributed to the chapters of the book. They are Associate Professor Dr Cheah Whye Lian, Dr Kuryati binti Kipli, Dr Melody Kimi, Mohamad Faizuan bin Mat, Abdul Halim bin Hashim, Dr Chung Hung Hui, Dr Norazlina binti Bateni, Ahmad Alif bin Kamal, Dr Yvonne Michelle Campbell, Nor Hayati binti Jaya, Dr Rafeah Wahi, Professor Dr Zainab binti Ngaini, Norhunaini binti Mohd Shaifullah, Rohaiza binti Daud, Associate Professor Dr Afzan binti Ahmad Zaini, and Dr Nurashikin binti Suhaili. Not to forget to everyone who have been involved directly or indirectly in producing this book, our deepest appreciation goes to all of you.



Immersive Learning on Environmental Chemistry Concepts through e-SULAM

Rafeah Wahi, Showkat Ahmad Bhawani

Summary/Synopsis of Project/Initiative

Environmental Chemistry 2 (STK2063) is offered in semester 2 for Year 2 students in BSc (Hons) Resource Chemistry. In this course environmental issues relating to solid waste, wastewater and hazardous waste are viewed in the context of their treatments. This course has been implementing service learning (SULAM) as a part of immersive learning approach since Semester 2, 2017/2018. In previous years, i.e. 2017/2018, and 2018/2019, the course assessment includes either final examination (40%, session 2017/2018), or mid-term examination (30%, session 2018/2019). Although SULAM implementation has generally improved the CLO achievement throughout the years, the pen and paper examination was found to be one of the reason to why some of the students were not able to achieve the intended CLOs. Instructors were not sure on the effectiveness of such examination in creating a deep learning experience for students. Therefore, in semester 2, 2019/2020, the mid-term examination was replaced with case-study analysis to (1) encourage higher order thinking skills among students, and (2) cultivate the sense of commitment and responsibility among students to find innovative solutions to waste management issues. In addition, students'

e- SULAM projects including group discussion and engagement with target community were implemented on online platforms. Students' reflection on their e-SULAM projects was recorded on their e-portfolio. Implementation of immersive learning through blended learning in this course has resulted in improved CLO achievement as compared to the past two years. Students' reflection on their learning experience in this course implied the effectiveness of immersive learning (blended learning) approach in this course.

Project Rationale

- **Learning Problem/Issues**

In previous years, i.e. 2017/2018, and 2018/2019, the course assessment includes either final examination (40%, session 2017/2018), or mid-term examination (30%, session 2018/2019). Although SULAM implementation in this course has generally improve CLO achievement since 2017/2018, the pen and paper examination has resulted in some students who did not achieved the intended CLOs. Instructors were not sure on the effectiveness of examination in creating a deep learning experience for students.

- **Philosophy of Teaching and Learning**

The learning theory that guides the designing of this project is the immersive learning theory. The design of this course emphasized on the learning environment that encompasses three of the most essential learning elements: immersion, engagement and active learning. We created a purpose-specific learning environment to enhance students' deep learning experience. It was hoped that through this immersive learning environment, students developed critical and innovative thinking towards waste treatment issues, and a sense of realization on their role not only for the environment, but also as people working for them and the community.

Approach

The main approach in the course delivery is as follows and described in Figure 1.

1. Interactive lecture to introduce important concepts and theories (physical classroom).
2. Group discussion (physical classroom), knowledge curation (online), and presentation (physical classroom).
3. Case study analysis (individual, open book online assessment)
4. e-SULAM (service learning project conducted online, in groups)
5. Reflection (deep, structured reflection before, during and after e-SULAM project).

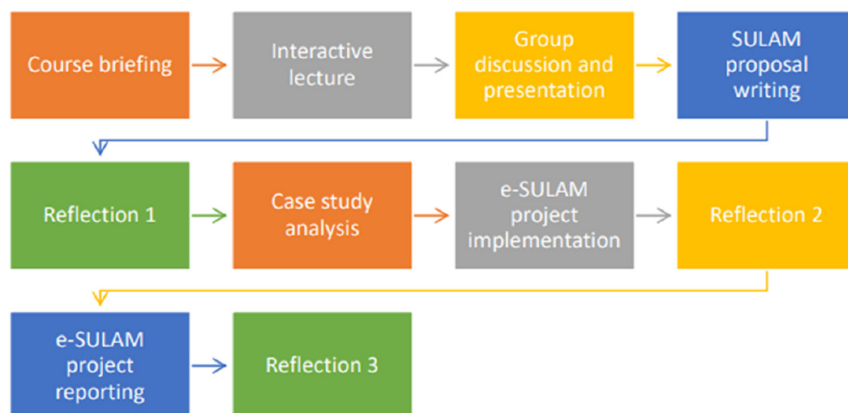


Figure 1 - Flowchart of the teaching and learning implementation for Environmental Chemistry 2

The approach used in this course provides meaningful learning experience to students through immersive, active learning. For example, students were given general topic and timeline to work for their e-SULAM project, but their liberty to implement the project is within the boundaries set by the instructors. Students initiated their own group meetings, outlined a specific timeline for their project, their target community and type of online platform for conducting their project. They also designed their own campaign, copywriting and promote their activities to engage communities. Afterwards, they conducted analysis on community perception on specific issues, and community feedbacks.

In this course, students were given specific topic for presentation. Students collaborate with their peers in searching, discussion and presentation, and they chose and designed their own online tools for curating knowledge and creating a presentation slide/video. Students were given a case study to work individually in a limited duration (24 hours), in an open book assessment. They actively learned to search, filter, and construct knowledge during the process of finding innovative solution to issues given in the case study.

Finally, the reflection activities enable students to critically analyze their learning, relate theories with real waste treatment issues. Reflection allowed students to develop a sense of commitment and responsibility not only towards their project, but also teammates, the environment and the community.

Students' Engagement/Involvement

Implementation of immersive learning through blended learning in this course has resulted in improved CLO achievement as compared to the past two years (Appendix 1A). The CLO achievement reflects students' learning in terms of cognitive, psychomotor and affective abilities. The summary is as depicted in Table 1:

Table 1 - Related Learning Outcome

CLO	2017/2018	2018/2019	2019/2020
CLO1 (C4)	56.5%	91.7%	100.0%
CLO2 (C4)	88.6%	81.0%	93.3%
CLO3 (P7)	100.0%	82.6%	94.1%
CLO4 (A3)	99.2%	99.2%	100.0%
Failure	0	1	0

Samples of students' reflection and comments in course evaluation form are shown in Figure 2 and Figure 3, respectively. Students' feedback on their learning experience in this course also implied the effectiveness of immersive learning (blended learning) approach in this course. Students' reflection and comments shows that the activities designed in this course have helped them to relate theories learned with real waste treatment issues which need innovative solution. They also find this approach enjoyable and engaging both in the physical and online classroom. Many students mentioned about the realization on their responsibility to contribute to the environment and community after conducting the e-SULAM project.

Please answer all FOUR (4) questions.

1. Why is there a need for you to conduct SULAM for the course STK2063 Environmental Chemistry 2? (30-50 words)

Maria Montessori had said that 'Only practical work and experience can lead young to maturity'. Since we are learning something that related to environment, we need to try to apply the knowledge that we learned in class in realistic world. We can learn communication technique and learn to organize an event so that we can become an all-rounder person.

2. Single Use of Plastic: What do you perceive as the underlying issue, and why does it exist? (30-50 words)

Single use of plastic increase the adverse effect bring to the earth as they are not biodegradable and very wasteful. This pollution can deteriorates the condition of the earth and cause more natural disasters. People has no or little awareness about the effects brought by the dispose of plastic. Therefore, they throw the plastic bag after single use without reuse it.

HOME

ABOUT

CONTACT

Reflection II

1. Describe the stage of your SULAM project at this time.

Our project's Instagram page has been launched on last 02/07/2020 and today(17/07/2020) is the last day for our "Bring Your Own Grocery Bag" contest that has been started since 03/07/2020. We have received quite a number of participation from the public. Furthermore, we will choose the top 3 winners for the contest based on the designed terms and conditions which are the contestants must leave an impactful comment on the campaign video, repost the campaign video on their Instagram page and tag us along with filling in our feedback form.



2. While doing your SULAM Project implementation, what is your perception of the underlying issue of Single Use of Plastic among public/community partners that you are dealing with?

While doing the project, I realized that the community partners were initially not well aware of the negative effects of the single-use plastic that is widely used. Based on the comments on the campaign video, most of the community partners stated that they just realized the importance of avoiding the usage of single-use plastic and its harmful effects on sea life.

Reflection 3



I was the leader of this project and I was responsible to guide and help my team as much as I can in completing this project. Since the project changed to online-oriented due to COVID-19, I was the editor for our main campaign video. To be honest, I am not that satisfied with my contribution since I still lack in a lot of things as a leader if not we would not have issues or some big misunderstanding in the group. This proves I still have a lot to improve to be come a good leader. If I would be given another chance, I will try my best to do better in the future. However, I am so grateful for having my

team because most of them helped me a lot in this project.

Our SULAM project went as planned. We achieved quite number of response and followers on our Instagram page which we not expected. The responses are awesome on the first week but soon we faced some challenges on the next week as lesser people joining in because they thought our terms are quite hard to follow. If I was given a chance to handle the project differently, I will change the way of campaign marketing to get more engagements. I thought of maybe getting helps from some of public figures to help in promoting our campaign and also look for some creative contents to post in the page such as type of grocery bag that suit your style or making a DIY grocery bag.

Figure 2 - Samples of students' reflection

Table 1 - Samples of students' comments in course evaluation form

Comments/Suggestion for Improvements	
1	Effective way of teaching!
2	Dr is so nice to all of the students.
3	my lecturer is the best.
4	Thank you
5	nice person.very i am inspired by.bring me some good in life
6	need more tutorial
7	I really enjoyed all learning processes held by my lecturer, despite the pandemic going on we managed to still have classes online and have all students participated in lectures. Thank you
8	Everything just fine
9	My course instructor is very good at approaching the student and gives a lot of attention regarding students work.
10	Overall is okay
11	i dont know what is happening
12	None
13	No comment
14	Good ThankYou
15	i enjoyed this course.
16	Even i felt kind of sad because we cannot hold SULAM program verbally due to pandemic, but overall I really enjoy this course, plus Dr. Rafeah you are so kind and very understanding towards your student I appreciate that and you always respond towards our dm effortlessly and I very adore you. thank you for teaching us throughout the semester.
17	no comment
18	Encourage to do quizzes and other fun activities (crossword puzzles, Kahoot online quiz game, etc.) for better understanding and gain more interest from students.
19	no comment
20	lecturer is very active during class . good way of teaching :)
21	Good

Impact on Students' Learning

The activities designed in this course helped students to relate the theories learned with real waste treatment issues that need innovative solution. Students' performances are reflected in the CLO achievement report, which can be summarized as in Table 1. Meanwhile, the activities designed in this course not only improved students' knowledge as reflected in CLO achievement report, but also enabled students to learn important work skills, as in Table 2:

Table 2 - Impact of teaching-learning approach on students' performance in terms of skills relevant to the students' reflection and comments

Activity	Skills
Group discussion and presentation	Interpersonal skills, communication skill, lifelong learning skills and content creating skill
Case study analysis	Lifelong learning skill, critical thinking and problem solving skill
Reflection	Critical thinking, personal skill
e-SULAM	Interpersonal skills, communication skill, lifelong learning skills, critical thinking and problem solving skill, digital skill and content creating skill

Students' reflection and comments (Figure 2) shows that the activities designed in this course helps them to relate theories learned with real waste treatment issues that need innovative solution. Many students mentioned about the realization on their responsibility to contribute to the environment and community after conducting the e-SULAM project. Students developed a sense of commitment and responsibility not only towards their project, but also towards their teammates, the environment and the community.

Improvement Project/Initiative in Future

This project can be further improved by making the case study analysis as a part of problem-based learning (PBL) strategy during classroom, instead of implementing it as a one-off assessment approach.

Related Learning Outcome Clusters MQF 2.0

Cluster 2 Cognitive skills, Cluster 3B Interpersonal skills, 3C Communication skills, 3D Digital skills, and 3F Leadership, autonomy and responsibility.

Acknowledgement

The course instructors would like to thank Faculty of Resource Science and Technology for support given to the implementation of immersive blended learning in this course.

Keywords

Blended learning, immersive learning, service learning, experiential learning, reflective learning; functional work skill

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