



**Real Application of  
Transformative Approaches for**

# **Teaching and Learning in the 21<sup>st</sup> 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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# 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.







# Teaching and Learning activities for Environmental Biotechnology

Nurashikin Suhaili, Awang Ahmad Sallehin Awang Husaini,  
Dayang Salwani Awang Adeni

## **Summary/Synopsis of Project/Initiative**

Despite numerous advantages offered by the existing educational portals such as eLEAP, the platform somehow has some inadequacies such as small upload file size and limited attractive features for content creation. As a result, these have limited some activities of remote teaching and learning (T & L). Social media and animation software offer several attractive features that may overcome the aforementioned problems. In this project, we introduced the use of YouTube, Instagram and an animated doodle software, Doodly to support remote T & L activities for STB3022 Environmental Biotechnology, which was taken by 134 students in Semester 2, 2019/2020. A YouTube channel was created and used as a platform for students' presentation and for posting Doodly videos created by the instructors. The links of the Doodly videos were also embedded in eLEAP. Additionally, the delivery of the course was boosted by an Instagram page, Biotechnologists at UNIMAS, which acted as a platform for fostering 'learning during leisure time' culture amongst the students. Overall, the approach resulted in excellent academic performance and positive feedbacks from the students. Although the

approach was demonstrated within a Biotechnology context, the utility of the approaches is applicable for other science or non-science courses.

### **Project Rationale**

The initiatives of this project were based on the following principles:

1. Create an active learning environment
2. Communicate message in a variety of ways
3. Enhance motivation to learn

Social media such as YouTube and Instagram offer several attractive features that may overcome the limitations of typical E-learning portals. The use of YouTube, which is the world's most popular online video repository, as an educational tool is seen as attractive and contemporary. It is reported that YouTube has 2 billion users worldwide and 1 billion hours of videos watched daily (YouTube, 2020). The choice of T&L platforms plays an important role in students' enthusiasm in learning. Thus, with the exceptional acceptance of YouTube worldwide, the initiative to leverage its use is seen as timely and promising.

The use of YouTube as a platform for students' online presentation can overcome the limitation of the typical E-learning portals, which normally do not support submission of files with big size. With the availability of the channel feature in YouTube, students can upload their pre-recorded video presentations to the prescribed channel. This is also an alternative to the conventional way of submitting the video presentations to the teachers through emails. Moreover, YouTube promotes collaborative and interactive environment making the science communication more effective and meaningful. This is in line with the model suggested by Ansari and Khan (2020) that stated the positive relationship between students' academic performance and students' engagement where the latter can be resulted from the interactivity of students with peers and teachers using social media for knowledge sharing.

Fostering the culture of learning during leisure time can be made feasible by manipulating social media as educational tools. In a survey conducted before the course, Instagram was voted as the most accessed social medium by the students, outperforming Facebook and Twitter. Instagram allows the users to save the posts, repost and interact with other users. These can help to facilitate science communication in a non-formal and less stressful way as most social media are normally accessed during leisure time. Moreover, the use of hashtags on Instagram can be utilised as a searching tool for specific topics including educational topics.

Animated doodle videos can overcome the problem of monotonous delivery of information. With the simulation feature in the videos, complex mechanism or processes can be made simpler, more organised and attractive. Pictures may speak louder than words but videos can speak louder than pictures. Animated tools are seen as ideal platforms for presenting complex information rather than static pictures. To date, the use of animated doodle videos for communicating Biotechnology remains limited hence triggering for its in-depth evaluation.

## **Approach**

In this project, social media namely YouTube, Instagram and an animated software, Doodly, were used as supplementary tools for supporting T&L activities of STB3022 Environmental Biotechnology. The methods were adapted and redesigned according to the needs of the course. A YouTube channel, Trust Us We Are Biotechnologists (TUWAB), was created to cater the need for oral presentations. The channel was also used as a platform for posting animated doodle videos, which were created by the instructors using Doodly software. All the animated videos were self-made according to the topics related to the course. The links of the videos were also embedded in the eLEAP page of the course. Additionally, the delivery of the course content was also supported by an Instagram page, entitled Biotechnologists at UNIMAS, which was used to post infographics and quizzes in order encourage students to learn during their leisure time.

### ***YouTube channel***

The access of the YouTube channel, TUWAB, was given to 10 groups at a time for them to upload the video presentations with ease and to avoid being prompted with security measures (security code via mobile). Animated doodle videos were posted on the YouTube channel by the instructors. The link to the YouTube channel is as follows: <https://www.youtube.com/channel/UCNAtgoLesEt5D1UcQjtsXew>

### ***Animated doodle videos using Doodly software***

Videos with a maximum duration of 5 minutes each were prepared by the instructors based on the topics related to the course. Some videos were included voiceovers to facilitate the explanation. The videos were then uploaded on the YouTube channel and Instagram account. The video links were also embedded in the eLEAP under specified section for every topic. Figure 1 shows a Doodly video posted on the Instagram page of the course.

### ***Instagram***

The Instagram page of the course, Biotechnologists at UNIMAS, was used to repost the animated doodle videos and related current issues. Some activities such as polls and quizzes were also posted on Instagram story periodically. The link to the Instagram page is as follows: <https://www.instagram.com/biotechnologistsatunimas/?igshid=1quaq7ukv1b6q>

A post-course survey was conducted to assess the efficacy of the approaches. All the approaches used were generic and applicable to other courses regardless of the group size.

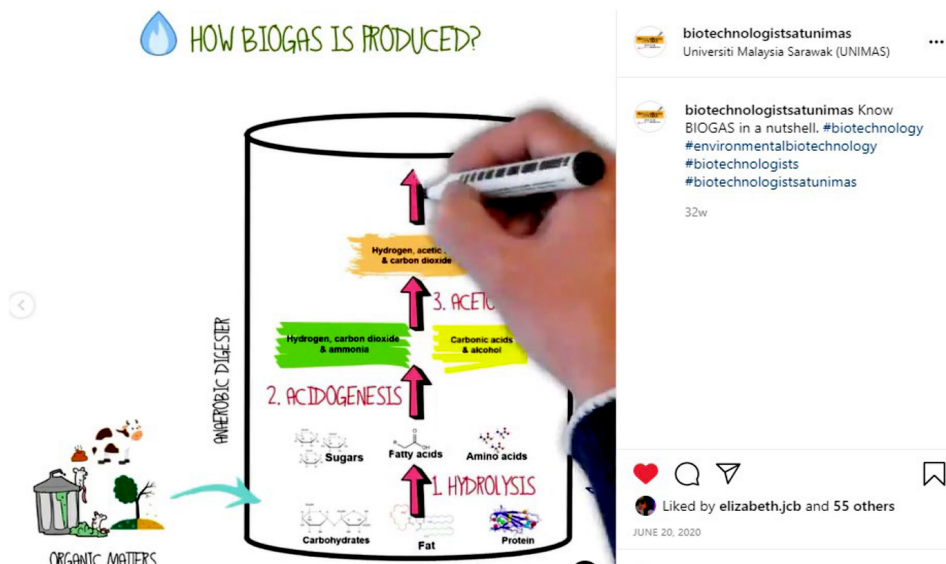


Figure 1 - Doodly video posted on the Instagram page, biotechnologists at UNIMAS

### Students' Engagement/Involvement

The students showed good turnout of participation in the T&L activities conducted throughout the course. The use of YouTube as a platform for the students' presentation gave an opportunity for the students to present their reflections. The turnout percentage for the group presentation on YouTube was 100%. The access to the students' reflection presentations on the YouTube channel is as follows:

[https://www.youtube.com/channel/UCNAtgoLesEt5D1UcQjtsXew/videos?view\\_as=subscriber](https://www.youtube.com/channel/UCNAtgoLesEt5D1UcQjtsXew/videos?view_as=subscriber)

The creation of Doodly videos enabled the students to be immersed in the animation explaining the processes leading to their better understanding on the topics. The results of the post-course survey showed that 72% of the students watched at least three out of four Doodly videos posted on YouTube, eLEAP and Instagram. Moreover, 62% of the students participated in the non-graded online forum on eLEAP. The students also participated in the non-graded quizzes conducted on Instagram.

### **Impact on Students' Learning**

The approaches used in this project had contributed to the excellent passing rate of the final assessment (94%). The final assessment required the students to apply their knowledge in the course to solve the simulated problems given. The excellent passing rate of the final assessment indicates good problem-solving skills of the students pertaining to Environmental Biotechnology.

All three learning outcomes (CLO) of the course were successfully achieved with the rate ranged from 87-100%. The breakdown of students' performance according to the grades is outlined in Table 1.

Table 1 - Overall performance of Environmental Biotechnology in Semester 2 2019/2020

<b>Grade</b>	<b>Percentage (%)</b>
A and A-	44
B+, B and B-	54.5
C	1.5

Furthermore, the use of social media in T&L activities of the course has also resulted in an increased in the students' performance in certain skills. Based on the post-course survey, 92% of the respondents agreed that the approaches used in the T&L of the course have helped them to improve their digital skill such as video making, digital content creation and social media.

The approaches used in this project have also proven to result in positive outcomes in terms of students' attitudes towards learning. The results of the post-course survey showed that the use of YouTube, Instagram and Doodly as supplementary educational tools in the course has changed their perception that learning Biotechnology courses is not as difficult as what they may have thought before. Based on the survey, 99% of the surveyed students agreed that the use of YouTube and Instagram has facilitated them to understand the course better. In addition, 96% of the respondents agreed that the animated doodle videos have helped them to understand the topics more than if they were relying on the lecture notes alone.

Moreover, the approaches implemented have also resulted in positive impact on students' social skill. Based on the post-course survey, 93% of the respondents agreed that they have improved their social skills such as communication among peers, teamwork and leadership through the tasks assigned in the course. The summary of the students' feedback on the approaches implemented in the course is as shown in Figure 2.

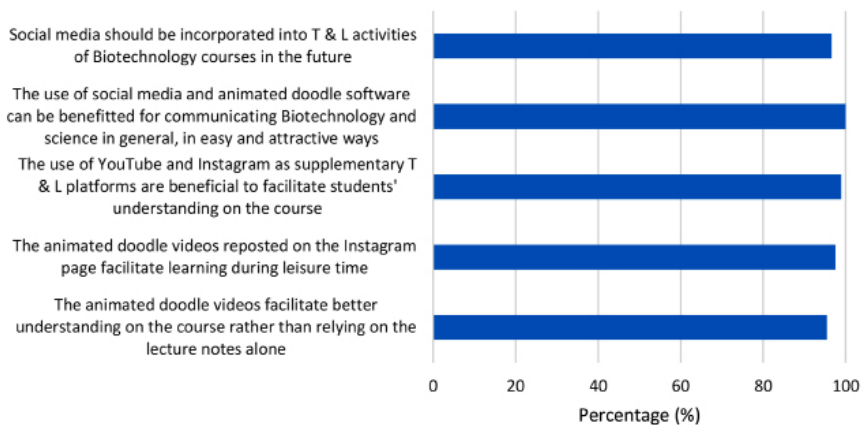


Figure 2 - Perception of the surveyed students on the use of social media and animated doodle software as supplementary tools for Environmental Biotechnology course

### **Improvement Project/Initiative in Future**

It is hoped that in the future, some improvements can be implemented such as more engagement by the students in moderating the contents in social media.

### **Commercial Potential**

The animated doodle videos created by the instructors during this course have the potential to be copyrighted and repackaged as an e-module for reselling.

### **Conclusion**

In conclusion, the initiative presented has given useful insights into the promising role of social media and an animated doodle software in supporting remote T&L. Although we demonstrated the approach within a Biotechnology context, the utility of the tools is considered generally applicable across both science and non-science fields.



## **Related Learning Outcome Clusters MQF 2.0**

Knowledge and understanding.

Cognitive skills.

## **Acknowledgement**

We would like to thank the third-year students of Resource Biotechnology (Semester 2 2019/2020) at UNIMAS who have made valuable contributions to this teaching initiative. We are also grateful for the support given by Faculty of Resource Science and Technology UNIMAS and Centre of Applied Learning and Multimedia (CALM) UNIMAS during this teaching initiative.

## **Keywords**

Animation software, Doodly, Instagram, mobile learning, science communication, social media, YouTube.

## **References**

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