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Pusat Asasi

Hybrid Biology Teaching and Learning Module

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ABSTRACT

The global COVID-19 pandemic of 2020 has affected and altered the landscape of the educational system. Online distance learning has become the main method of teaching and learning, as social interactions were required to be drastically reduced. Entering the endemic phase of COVID-19, academia was urged to revert to face-to-face methods, leaving behind the virtual teaching and learning. This study proposed an innovative and comprehensive hybrid teaching and learning module for Biology courses that adapted both methods; Method A (Face-to-face) and Method B (Virtual). The purpose of developing the hybrid teaching and learning module is that it can serve as an academic guideline that can be instantly referred to and applied in the teaching and learning process when encountering the need for teaching and learning in isolation such as the occurrence of sudden catastrophes, another pandemic, or floods. A 5-point Likert scale engagement survey was given to 114 science foundation students of UiTM to evaluate how the hybrid approach affects their cognitive and emotional engagement levels in studying biology subject. The data revealed that 65.8% of students agree that online virtual teaching and learning materials uploaded on the YouTube and UiTM UFuture platforms are convenient and beneficial to aid and complement face-to-face teaching in the classroom.

Keywords: Biology**;** Face-to-face Method; Online Method; Hybrid Method

INTRODUCTION

Diversification in teaching and learning approaches exists as every student has a unique learning nature with diverse personalities, learning wavelengths, and abilities [1]. In every teaching and learning session, the educator aims to ensure all the knowledge is well delivered while the learners perceive, process, store, and recall what they are attempting to learn most efficiently and effectively. However, ironically, there are no specific teaching and learning styles that are relevant to science education, especially in biology education [3].

This hybrid method was introduced to be applied during unexpected situations such as disasters or another pandemic wave that required remote teaching more than face-to-face [3]. The emergence of various online platforms is also considered an advantage in education systems as it integrates student-cantered learning and technology. Other than that, the old traditional way of biology teaching such as giving lectures using PowerPoint slides or memorizing concepts from books and lecture notes is considered mainstream and seems to grasp less students' attention during the learning process. The conventional and passive way of learning in the classrooms where information is organized and presented to the students by their teacher, limit their understanding of Biology without dynamic interaction of thought processes and skills.

As teaching and learning biology at the pre-university level has been taught for more than a decade since new teaching approaches must be adapted to capture Generation Z students' interests in learning biology. The biology subject must be taught creatively, incorporating both the conventional teaching, and learning method and also at the same time making full use of the wide variety of online and digital software and applications that are available for academicians to fully utilized in developing interesting and innovative teaching materials, which at the same time encourages students to engage actively during the learning process.

The use of different constructive tools and online platforms such as Massive Open Online Courses (MOOCs), UFUTURE, YouTube channel offers a wide variety of platforms for instructors to develop various learning activities, for instance, pre-recorded lectures and lab demonstration videos, animation videos, interactive quizzes, and discussion forums. Furthermore, online learning platforms also promote students to have critical and constructive academic discussions among peers and thus, instilled critical thinking among students.

INNOVATION DEVELOPMENT

In teaching biology, there are three crucial teaching modes which include lecturing mode, tutorial mode, and laboratory mode. The lecturing mode requires lecturers to give lectures based on the course outline and syllabus provided by the faculty. For the tutorial mode, it is the session where two ways communication occurs between the lecturer and students to discuss together the topics that were taught during the lecture sessions. During the tutorial session, students were also given exercise questions to practice answers to test their understanding of the topics taught during the lecture. The laboratory mode is the session where students carry out experiments to apply the knowledge that they have gained during the lecture and tutorial sessions.

In the conventional teaching and learning approach, all three modes of teaching were carried out in the classroom and the laboratory. This approach to teaching and learning is designated as Method A – Face to face method.

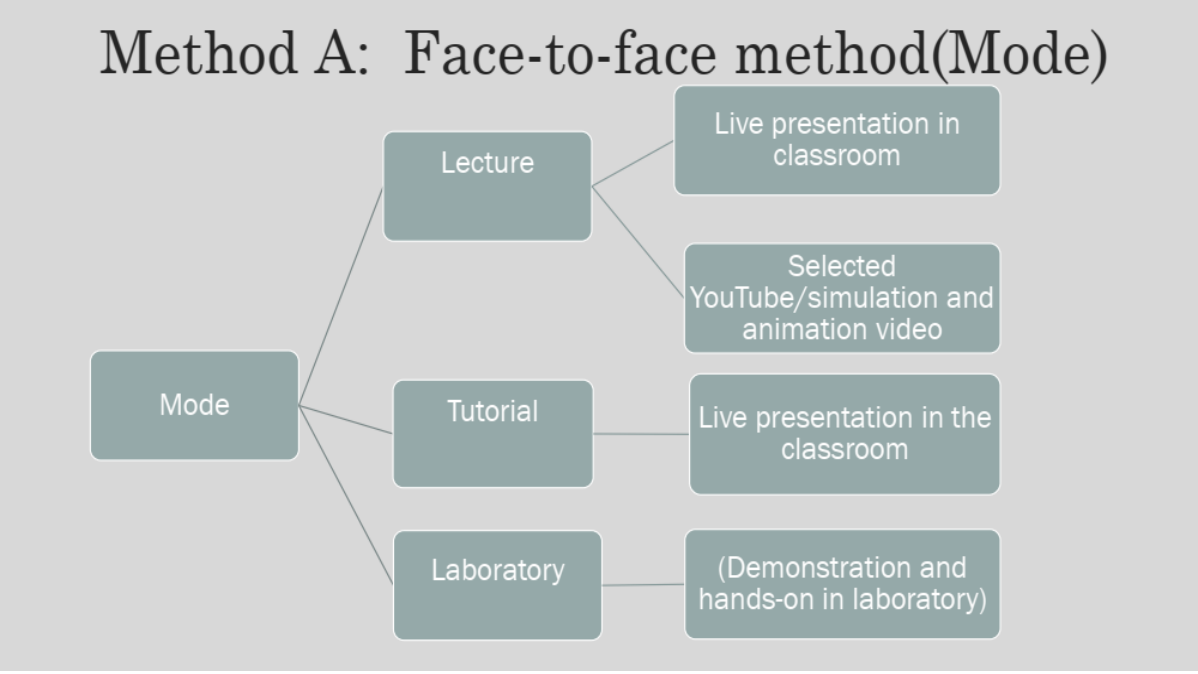

Figure 1: Method A – Face-to-face method to teach and learn biology

The students' assessments for Method B require all the assessments (quizzes, lab reports, tests, presentations, and final examinations) to be carried out virtually. Quizzes were carried out using the UiTM UFUTURE platform. The UFUTURE platform provided by UiTM was convenient to carry out the quizzes, as the system allows students to access the quiz anytime and anywhere. The system also allows the lecturer to monitor and trace students individually whether each student has taken the quiz within the allocated time. Google Classroom was the most used platform to carry out tests and final examinations, as students will submit the softcopy of their answer paper individually using their Student's Google account within the pre-set examination hour. A softcopy of the lab reports was also submitted via Google Classroom.

Throughout the Covid19 period, it was observed that the wastage of using a lot of paper to print out tonnes of test and exam papers to give out during the examination was reduced drastically as these assessments were carried out online. This assessment approach surely saves many trees from being cut down to make paper. This approach would give a positive impact on the environment and reduce the greenhouse effect.

Another positive impact of assessments being carried out via online platforms was that lectures do not have to allocate a lot of rooms to store all the hardcopy of students' answer papers that are private and confidential.

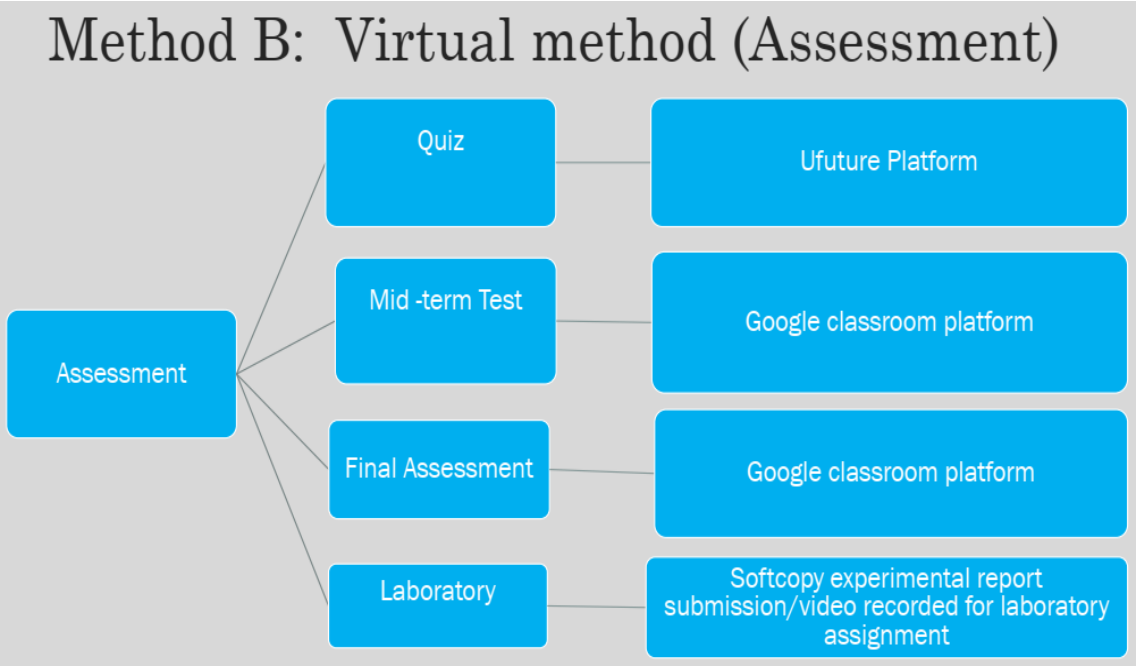

Figure 4: Method A Student Assessment – Face-to-face method

A new innovative approach to teaching and learning biology is developed which combines both Method A (Face-to-face) and Method B (Virtual). This teaching and learning approach is designated as Method C – Hybrid method. The hybrid method of teaching and learning biology offers flexibility for lecturers as academicians to choose the most convenient approach to deliver lectures and tutorials and carried out experiments during the lab sessions. The students' welfare during the learning process also must be highly considered so that the hybrid method will not burden the students and most importantly will give the utmost benefits to students to learn biology in the most convenient, effective, and interactive ways.

The Framework for Method C – Hybrid Method of Teaching and Learning Biology Modul

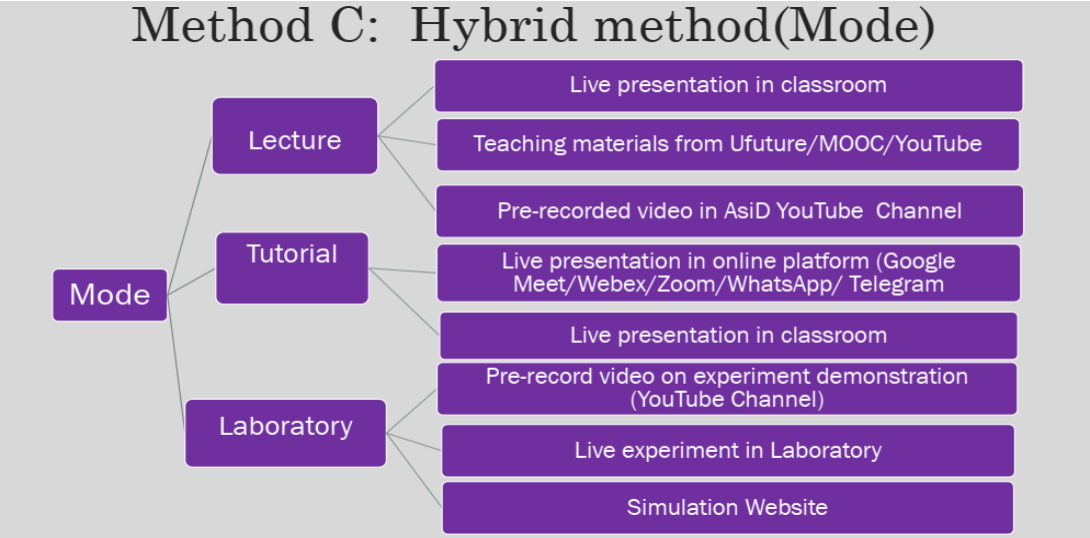

Figure 5: The merge of Method A and B to produce Hybrid Method (C) in teaching and learning mode

The hybrid method introduced from this innovation will be a functional and beneficial module that provides a framework that can serve as an instant guideline to be adapted to teach and learn biology in many circumstances. For example, this hybrid module can be applied during the occurrence of a catastrophe, such as the outbreak of another pandemic, or flood disaster, and all these situations require teaching and learning to be carried out remotely or in isolation [4].

During the Covid-19 pandemic, academicians experienced incredibly challenging situations which requires them to promptly adopt an innovative approach to teaching biology remotely and at the same time make sure that students are also well guided in the learning process from afar. During the initial period of the Covid-19 pandemic, most academicians especially in the field of science were not very aware and familiar with online and virtual learning. They struggle extremely hard to understand and apply all the available software, applications, and platforms to convert all their teaching materials and assessments digitally and virtually. The conversion of all these teaching materials and assessments must also be conveniently and easily accessible to all students.

To have an interactive hybrid mode to aid this unforeseen situation, academician uses a YouTube Channel as a platform to facilitate and enhance the teaching of Biology classes. On this channel, pre-recorded lecture videos and lab demonstration videos are put together and published for respective students. Videos are arranged based on chapters with subtopics looped into playlists. Even though Covid-19 is currently in its endemic phase, these teaching and learning videos are available and easily accessible to students, and this is a huge benefit in that it is an online tool that complements the existing face-to-face classes.

Entering the endemic phase of Covid-19, most academicians were very well knowledgeable and skilful in the adaptation of online distance teaching and learning. Hence this Hybrid Method is advantageous to be adopted in various needed situations to improvise teaching and learning strategies

As academicians, we are required to not also teach but also contribute to the development and spread of new knowledge. Academicians are required to do research, write, and publish to prosper new knowledge to society. To accomplish this, it requires a lot of time and effort. Hence this hybrid method of teaching and learning allows academicians to teach and at the same time achieve the stated goals.

This is because the Hybrid method allows academicians to have the flexibility to choose the appropriate teaching modes, which can be a merge between face-to-face learning and at the same time using online platforms to deliver teaching materials, such as pre-recorded lecture videos uploaded on YouTube. Once the pre-recorded lecture videos are available on YouTube, students can easily access these videos at anytime and anywhere to aid in their revision.

This goes the same for the student's assessments where for example, instead of giving quizzes in the classroom, quizzes can be given via the UFUTURE platforms, but can still maintain the final examination to be carried out face-to-face in the examination hall.

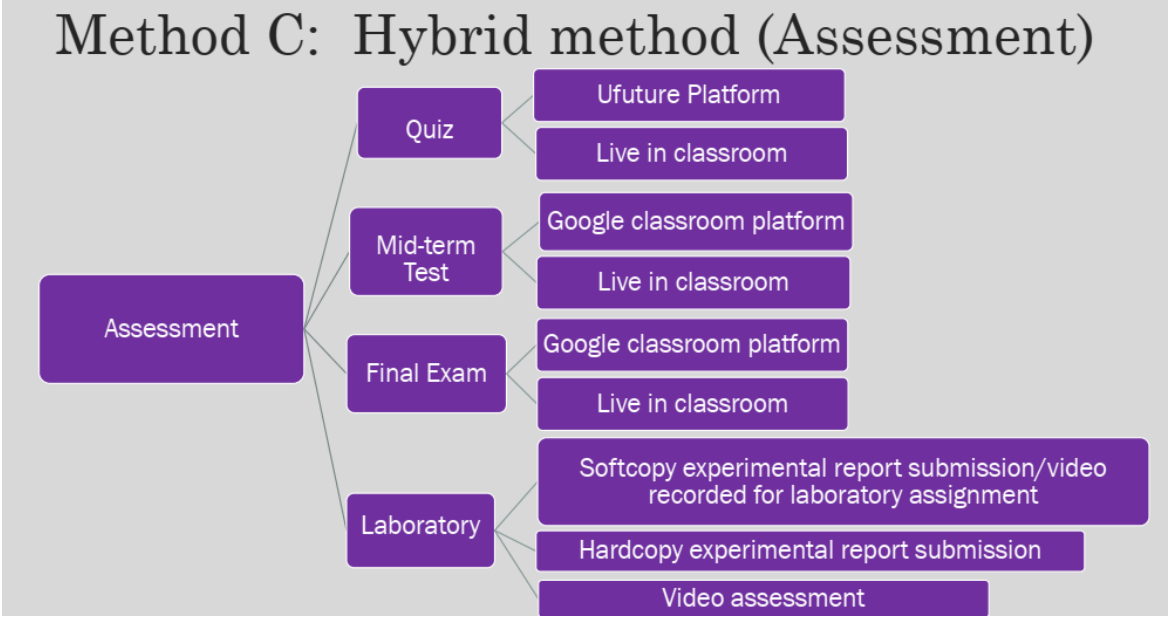

Figure 6: The merge of Method A and B to produce Hybrid Method (C) in the Assessment approach

For the Hybrid method to be efficiently adopted and applied, the lecturers responsible to teach the course must carefully plan the teaching and learning mode and the student assessment approach, making sure both parties; the lecturers and especially the students' welfare will not be jeopardized in any way.

The hybrid approach also highlights the assessment strategy for the students. Academicians and students have the flexibility to choose the easiest and most cost-effective strategy method to execute their assessment. There are plenty of online platforms that provide many friendly users with software and application tools to carry out live presentations creatively and interactively rather than the typical PowerPoint presentation in the classroom.

It is well-known that the challenge for science-based courses like biology is to execute effective laboratory teaching and learning without actual hands-on activity. Thus, an excellent virtual laboratory for certain experiments must be implied, thus students could benefit from the laboratory session even without a face-to-face session. Effective interactive videos for experimental purposes could be beneficial to give an overview of the laboratory work even without actual hands-on activity.

A survey has been done involving 114 science students on their preference for the online method of teaching and learning Biology. Table 1.0 represent the descriptive data. Many of the respondents were female students (n=93, 82.3%) and many of them spent 31 minutes to 1 hour studying using online learning materials. The preference of students drastically changes to choose more face-to-face learning in the classroom during this endemic phase (n-69, 60.5%), however, this is followed by the students' preference for both methods (Method C, a merge between both Face-to-face and Online). The results also show that if a catastrophe were to occur and requires the need to teach and learn remotely, online mode (Method B) is most preferred by the students (n=78,68.4%).

Table 1: Descriptive data of the respondents' preference toward Online Learning

Items		**n**	**Frequency**
Gender	Female	93	82.3
	male	20	17.7
Time Spending for Online Study	<30 minute	27	23.7
	31 minutes -1 hour	46	40.4
	>1 hour	38	33.3
	None	3	2.6
Preference for learning sessions of lecture and Tutorial	Face to Face Classroom	69	60.5
	Online	5	4.4
	Both	40	35.1
Preference for learning sessions of lectures and Tutorial during Catastrophe	Face to Face Classroom	12	10.5
	Online	78	68.4
	Both	24	24.1
Duration of watching ASID BIOLOGY YOUTUBE CHANNEL	<30 minute	37	32.7
	31 minutes -1 hour	45	39.8
	>1 hour	14	12.4
	Not watching	17	15

The data also determined that 65.8% of students agree that online learning videos available on YouTube, and learning materials obtained from the UFUTURE platform are very much useful to the students to aid in their study and revision.

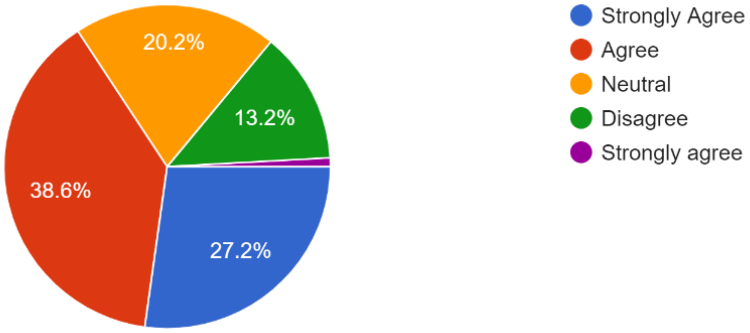

Figure 7: Usefulness of online method

Besides, 50.9% of the respondents agree that they enjoy watching pre-recorded lecture videos that are easily accessible to them from ASiD Biology YouTube Channel.

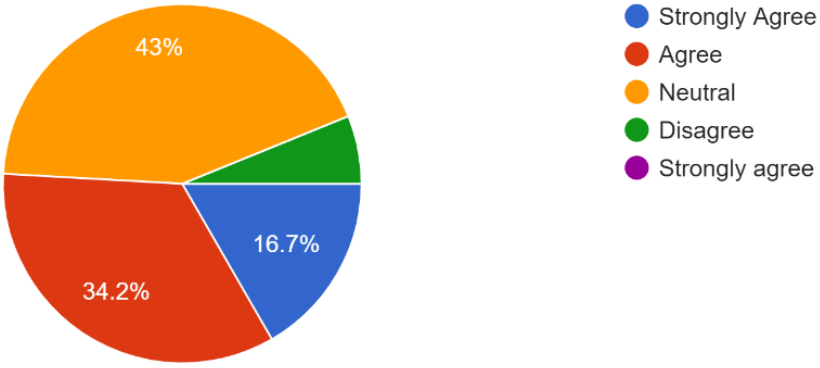

Figure 8: Preferences of students on video

COMMERCIAL POTENTIAL

The Interactive YouTube Channel.

The use of YouTube channels in teaching is knowingly beneficial in the education field. Inevitably, ASiD Biology YouTube Channel has benefited and positively impacted many students during the Open Distance Learning experience. The channel equips students with ubiquitous learning which can be accessed anywhere and can be watched repeatedly anytime throughout the day via various customized shortened URL links and QR codes. To date, the channel has attracted almost 3000 subscribers worldwide. The content does not just attract local students from diverse institutions in Malaysia with the same mode of the program, but it also provides useful teaching materials for international academicians and students worldwide.

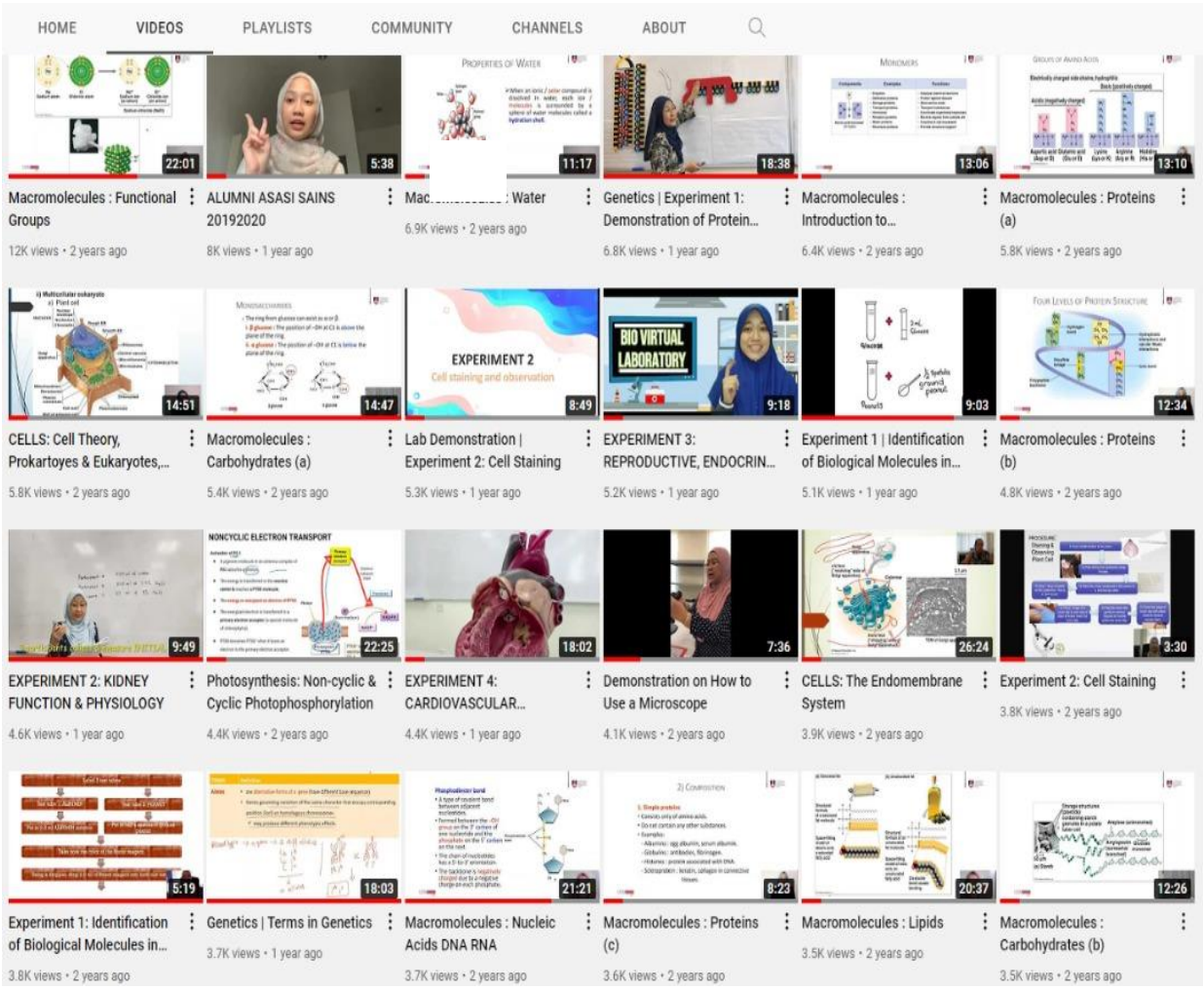

Figure 9: Interactive Video content on ASiD Biology YouTube Channel

Geography	Views ↓	
Total	**295,041**	
Malaysia	271,032	91.9%
India	1,248	0.4%
Philippines	184	0.1%
United States	91	0.0%
Zambia	69	0.0%
Pakistan	46	0.0%
United Arab Emirates	32	0.0%
Ukraine	28	0.0%
Ethiopia	25	0.0%
Bangladesh	21	0.0%
Indonesia	12	0.0%
Palestine	11	0.0%
Egypt	10	0.0%
Zimbabwe	10	0.0%

Figure 10: Worldwide ASiD Biology YouTube Channel viewers

Promote long-life learning of Biology in the Education Industry.

Biology is an interesting field of study that complies with both the theoretical and experimental of living things [5]. In many institutions, virtual learning looks impossible for laboratory and experimental-based fields. With the hybrid method, this perspective is invalid and virtual laboratory is complimentary to the common hands-on biology teaching and learning. It thus promotes that, biology experiments can be conducted by a touch of the fingertip, anywhere at any time.

CONCLUSION

The education field especially in the field of Biology, must move along with the ever surge of the latest development of technology especially in the use of digital and virtual approaches to teaching and learning. Academicians must be brave and explorative to deliver the most interesting and effective ways of learning biology incorporating both conventional teaching and

learning face-to-face in the classroom and merging with the latest technology to produce interactive and creative digital and virtual teaching and learning materials. This approach of combining both the 'old' and 'modern' ways of teaching and learning has lots of benefits and must be implemented in the education field to benefit all parties especially the students and the academicians.

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