SCIENCE MAGAZINE

Issue no. 4 | April 2021

SEAQIS Training

SEAMEO QITEP in Science Support Merdeka Belajar

Event

International Joint Conference on STEM Education

Movie Review

Dark Waters

Science Fact

Octopuses have blue blood

CHEMISTRY ROCKET ON STEM EDUCATION

ISSN 2776-8716

OUR FLAGSHIP PROGRAMMES

Get the latest info about our programmes on your mobile device, at **www.qitepinscience.org**

Dear readers,

The pandemic is still ongoing. The situation is still forcing us to conduct blended-mode activities, including in the education sector. However, we have to be able to adapt to this new situation and get used to the new normal protocols. During this time, SEAQIS keep its pace in conducting various programmes and activities to improve science teachers' competence in the region. All the activities performed, always paid attention to the health protocols; wearing a mask, keeping distance, and washing hands using soap or hand sanitiser.

This edition covers the Centre's activities in the last six months, including Training on Integrating Computational Thinking into Science Learning, International Joint Conference on STEM Education, SEAQIS Webinar Series, and also testimony from a teacher after participating in a SEAQIS' programme.

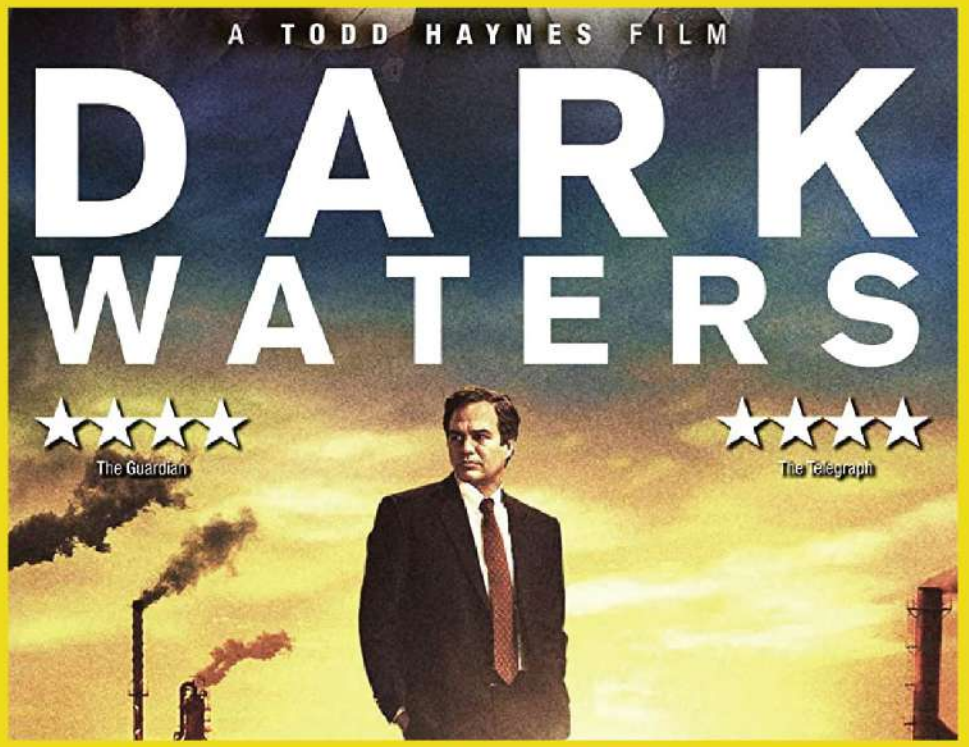
To conclude this foreword, I would like to wish that this pandemic situation will be over soon, and everything could be back to the normal condition as we had before the COVID. Thank you very much, and have a pleasant reading.

Thank you very much and have a pleasant read.

Dr Indrawati
Director

Table of Contents

April 2020, Issue 0 the official magazine of seameo qitep in sicence



Cover: Chemical rocket activity during the Training on STEM Learning

The Desk

Advisors

Board of Directors
Head of Divisions

Editor

Zuhe Safitra

Contributors

Zuhe Safitra
Amallia Yuliana
Nursidik
Marianne Soriano
Rika Siti Syaadah
Norhailmi bin Abdul Mutalib
Sisakhet Phewkhamphom
Siska Hidayanti
Sulastri

Layout & Design

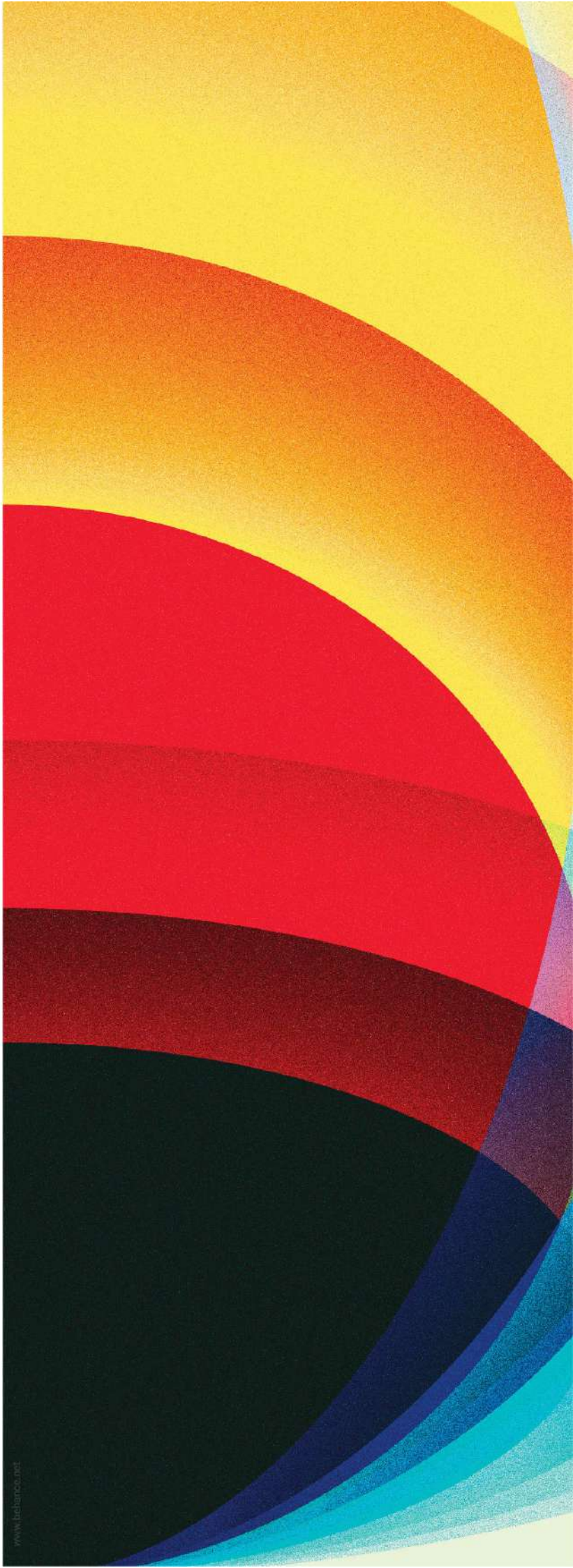
Octo Reinaldy

Publisher:
SEAMEO QITEP in Science
Jl. Diponegoro 12, Bandung 40115
West Java-Indonesia

+62 22 421 8739
+62 22 421 8749
secretariat@qitepinscience.org | partnership@qitepinscience.org
www.qitepinscience.org

find me at

+62 821 2345 0630 qitep_in_science @qitepinscience
QITEP in Science QITEP in Science



THE 3RD KI HAJAR DEWANTARA AWARD

17 AUG 2021

YOGYAKARTA, INDONESIA

Registration

http://s.id/KHD20

Hello
Q Science Magazine
readers!

Editor Message

Welcome to our fourth edition of Q Science Magazine. We would like to express our gratitude to God Almighty upon the publishing of this edition. We would also give our high appreciation to our editorial staff and contributors who had worked so hard to make this magazine publish.

Mistakes and errors in this publication might exist; therefore, critics, comments, and suggestions are very much welcome as they will help us improve the next edition. In this edition, we bring up our activities during the pandemic, including webinars, Training, and events that we conducted during this time. In this edition, we also introduce our new staff members and also sad news, where we lost one of our staff members.

We hope this magazine provides you with new information regarding the current issues in science.

Thank you very much, and have a good read.

SEAMEO QITEP in Science Support Merdeka Belajar (Freedom to Learn) and Guru Penggerak (Influencing Teacher) through the Implementation of Integrating Computational Thinking into Science Learning

In 2020, the Ministry of Education and Culture stated that Computational Thinking is a competence added to the Indonesian education system. This is a government solution to prepare the young generation to be digital literate. Moreover, the latest Indonesian students' Programme for International Student Assessment (PISA) score was less satisfying. Therefore, introducing CT to the teacher is one way to improve students' PISA score, especially in Mathematics' measurement.

As one of 26 SEAMEO Centres, SEAQIS conducted training on Integrating Computational Thinking into Science Learning for science teacher from 15 to 20 March 2021, in Yello Hotel, Bandung. The training was attended by 60 science teachers divided into three classes: physics, chemistry, and Biology. It aimed to provide a holistic concept of Computational Thinking, how to integrate it into science learning, and how to conduct the assessment in CT-integrated science learning to produce students possessing 21st-century skills.

The acting Head of Partnership and Public Relation Bureau of MOEC, Ir Hendarman, PhD, opened the training officially. In his welcome

remarks, he fully supported the programme since it is in line with the vision of national education to realize an advanced Indonesia that is sovereign, independent through the Pancasila spirit students. He also added that all the stakeholders in education are the agent of change. He emphasized that the training is one of SEAQIS services to support the Merdeka Belajar programme. At the end of his remarks, he left a message to the participants, "You are chosen to be here. You are all the inspiring teacher; therefore, you have to absorb all the knowledge given by the instructors." Dr Indrawati, the director of SEAQIS, also attended the opening ceremony.

Facilitators provided various materials during the training, including Computational Thinking, Critical Thinking Skills, Literacy and Numeracy in science learning, Integrating CT into science learning, Taxonomy of CT-STEM, Assessment in CT-integrated science learning. The training was a series of CT programme conducted in the In1-On1-In2-On2-In3 pattern.

The topic of Computational Thinking was delivered by Dr Inggriani Liem, the president of Bebras Indonesia. Bebras is an international initiative institution to promote Computational Thinking. In her session, she explained the key concept of CT consisting of Decomposition, Pattern Recognition, Abstraction, and Algorithms. The other important topic was the taxonomy of CT, delivered by Mr Reza Setiawan. He elaborated on four main aspects of CT, including Data Practices, Modelling and Simulation Practices, Computational Problem-Solving Practices, and Systems Thinking Practices.

The training received good responses from the participants. Ms Neti Kusmiati, a Biology teacher from SMAN 2 Sukabumi, stated that she is delighted to attend the training. "This training is amazing. It gives me new knowledge as well as motivating me to implement CT in my school," she said. She also hoped that students' achievement improves since they are familiar with the flow of Critical Thinking. In line with Ms Neti, Mr Imanuddin Hidayat, a physics teacher from SMA Plus PGRI Cibinong, responded that he gained new knowledge from the training. He also appreciated SEAQIS for conducting this event. "In my opinion, this training is beneficial. I got new knowledge. This is the first time I learn about CT, and I also appreciate SEAQIS for conducting this event. What SEAQIS have done regarding this training is accurate. We were trained not only the theory but also how to apply it in the learning process", he said. The training was officially closed by Mr Reza Setiawan, the deputy director for the Programme of SEAQIS.

Camel's Hump

actually store Fatty tissue and does not store water

Camels typically live in the desert, where food sources can be hard to come by. When a camel is unable to access food for a long time, its body can metabolize the fat in the humps for nutrition. The humps can deflate and droop if the camel has gone an exceptionally long time without food, but they will sit upright again once the camel can refuel. The camel's humps also help the animal regulate its body temperature, an essential feature in the desert, where temperatures can be extremely high during the day and drop drastically at night. Although the humps do not store water, camels are still incredibly efficient in the amount of water they use per day, which is why they can go nearly a week without drinking.

Octopuses
have blue blood

To survive in the deep ocean, octopuses evolved a copper rather than iron-based blood called hemocyanin, which turns its blood blue. This copper base is more efficient at transporting oxygen than haemoglobin when the water temperature is very low and not much oxygen is around. But this system also causes them to be extremely sensitive to changes in acidity. If the surrounding water's pH dips too low, octopuses can't circulate enough oxygen.

When one eye injured the fellow eye will be affected too

This condition is called Sympathetic Ophthalmia, a rare, bilateral, persistent eye inflammation. The injured eye is the exciting eye, and the fellow eye is known as the sympathizing eye. Also called spared eye injury is a diffuse granulomatous inflammation of both eyes' uveal layer following trauma to one eye. It can leave the affected person completely blind. Symptoms may develop from days to several years after a penetrating eye injury. It typically results from a delayed hypersensitivity reaction.

International Joint Conference on STEM Education

STEM has become increasingly important as it pervades every part of our lives. Science and mathematics are everywhere in the world around us. Technology can be found in every aspect of our lives and keep growing every day. It helps us to do everything more effective and efficient. Engineering provides the basic design to overcome many challenges. This situation makes STEM education is very crucial. By exposing students to STEM and giving them opportunities to explore STEM-related concept, it will develop them to be ready to succeed in this new information-based and highly technological society. However, the COVID-19 pandemic has caused more challenges for schools and policy makers in bringing STEM into students' learning activities. While many STEM education programs and schools already implemented with so many hands-on activities in face-to-face mode, distance learning is new to many of us.

Right now, organizing STEM activities in distance learning is like we are building the car while driving it. We have to design STEM activities for students while we have to implement them at the same time. This crisis period is our chance to think outside the box. It really is an opportunity to re-examine everything that we have been working on. To replace the hands-on activities that was usually conducted at school, we may design simple experiments using household items with virtual instruction from the teachers. However, we need also to open our minds to see that not everything about STEM is hands-on. For example, students may be able to learn more about the principles of engineering. They may practice programming language through online workshops.

SEAQIS, in collaboration with the Institute for the Promotion of Teaching Science and Technology (IPST), Thailand, and SEAMEO QITEP in Mathematics, provided a forum for Mathematics and Science educators from various countries to share their research results and best practices related to current issues regarding Science, Technology, Engineering, and Mathematics (STEM) Education. The forum was the International Joint Conference on STEM Education (IJCSE) 2020. The event was conducted from 18 to 19 November 2020 in Yogyakarta. This forum was aimed to provide an international platform for educators to share ideas and experiences, learn new knowledge and best practices, and disseminate recent research results in the field of STEM Education; strengthen STEM Education especially in Southeast Asia Region; establish and expand networks of academic cooperation at the international level; and promote the organization of online conference platform that corresponds with the time of crisis.

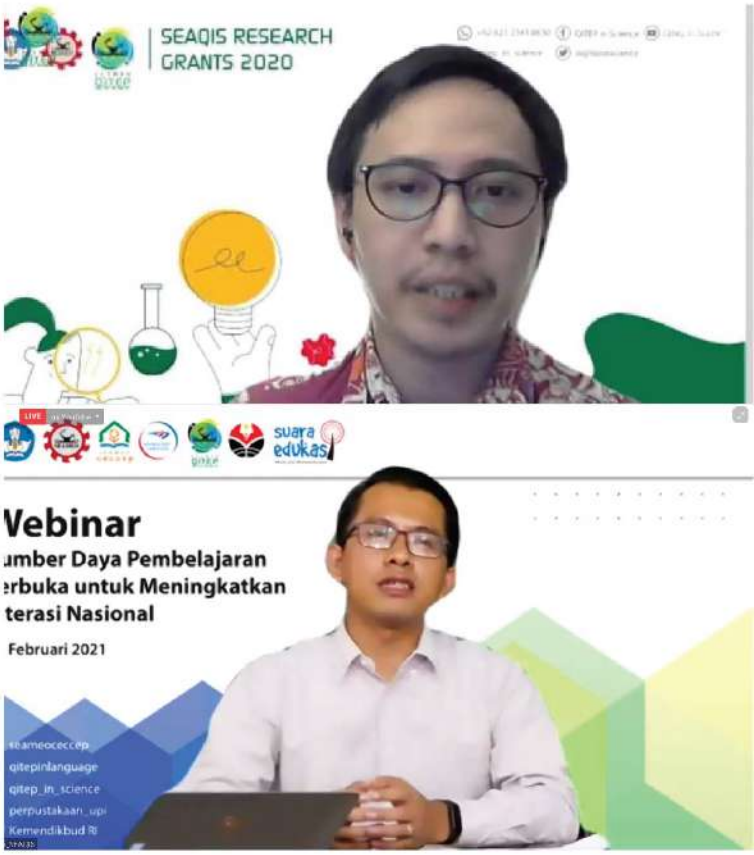
The Joint-Conference was opened by Dr Khunying Kalaya Sophonpanich, Deputy Minister of Education, Thailand, as well as providing his plenary talk entitled Coding Nation: A pathway of building human capacity in a post COVID-19 world. She said that coding has important role to uplift human capacity after COVID-19 pandemic end. During the opening, Dr Iwan Syahril, Ph.D, the Director-General of Teachers and Education Personnel, Ministry of Education and Culture, Indonesia, also delivered his remark. He stated that STEM philosophically gives students experience to collaborate in solving real-world problems. Dr. Rachmadi Widdiharto Director of Teacher and Education Personnel for Primary Education, Ministry of Education and Culture, Indonesia delivered his plenary talk entitled "STEM Local Context as a Learning Innovation to Create Productive Students". At the beginning, Dr Rachmadi explained Indonesia government policies to adapt with the new normal situation. He stated as well that STEM local context is one of the innovations that can be applied during COVID-19 Pandemic. Several experts also presented their research in the plenary session, including Mr. Rachmadi Widaddi, Director of Teachers and Education Personnel in Basic Education, Ministry of Education and Culture, Indonesia; Prof. Dr. Sukit Limpijumnong, President of The Institute for the Promotion of Teaching Science and Technology (IPST), Thailand; Assoc. Prof. Weng Kin Ho, National Institute of Education, Singapore; Prof. dato' Dr. Noraini Binti Idris, Malaysia; and Prof. Lew Hee-Chan, Korean National University of Education, South Korea.

Apart from the plenary session, there was also invited speakers, Dr Xingfeng Huang, Shanghai Normal University, China. He presented "Mathematics education in Shanghai". He explained about how the Mathematics education run in Shanghai. In this conference, there were five classes in parallel sessions; one Science class, two Math classes, and two IPST classes. The sessions conducted online and offline or blended. The event was attended by more than 300 participants from the Southeast Asia region.

SEAQIS Webinar Series

As the COVID-19 pandemic is still running, SEAQIS continues its Webinar series programme. From October 2020 up to March 2021, several series have been conducted. The first webinar during this period was Webinar on Getting Ready to the Minimum Competency Assessment. The main speaker of the webinar was Dr Rahmawati, M.Ed., from the Centre of Assessment and Learning, MOEC. The webinar was carried out on the Zoom platform and broadcasted live on the SEAQIS YouTube channel. The attendees of the webinar were 451 teachers and viewed by 2351 viewer on YouTube.

Dr Rahmawati opened her session by displaying a video of Minister Education and Culture, delivering his speech regarding the policy of Minimum Competency Assessment. She explained the difference between the Minimum Competency Assessment and the National Exam, followed by a description of the Minimum Competency Assessment implementation mechanism. The session then was concluded by Q & A from the participants.



The next webinar was entitled SEAQIS Supports Merdeka Belajar (Freedom to Learn) in Kampus Merdeka (Free Campus) Programme: A Collaboration with Kopertip Indonesia. This webinar collaborated with Kopertip Indonesia and showed SEAQIS programmes that support Merdeka Belajar and Kampus Merdeka.

The programmes developed by the Centre to support Merdeka Belajar covers the science innovation development and science teacher and education personnel training programmes. Besides, innovative research and development programmes could also help Merdeka Belajar. The programmes are STEM Learning, Computational Thinking, Climate Change Education Programme and SEAQIS Research Grant.

All programmes developed by the Centre correlate with the Merdeka Belajar programme. The outcomes of the programmes could be implemented in the classroom. Also, those programmes could be included in the research method subject.

The next webinar was also collaborative. SEAQIS, in collaboration with SEAQIL, SEAMEO CECCEP and the Library of Indonesia University of Education (UPI), conducted a webinar on Sumber Daya Terbuka untuk Meningkatkan Literasi Nasional (Open Education Resources as a Tool to Improve National Literacy) on 25 February 2021.

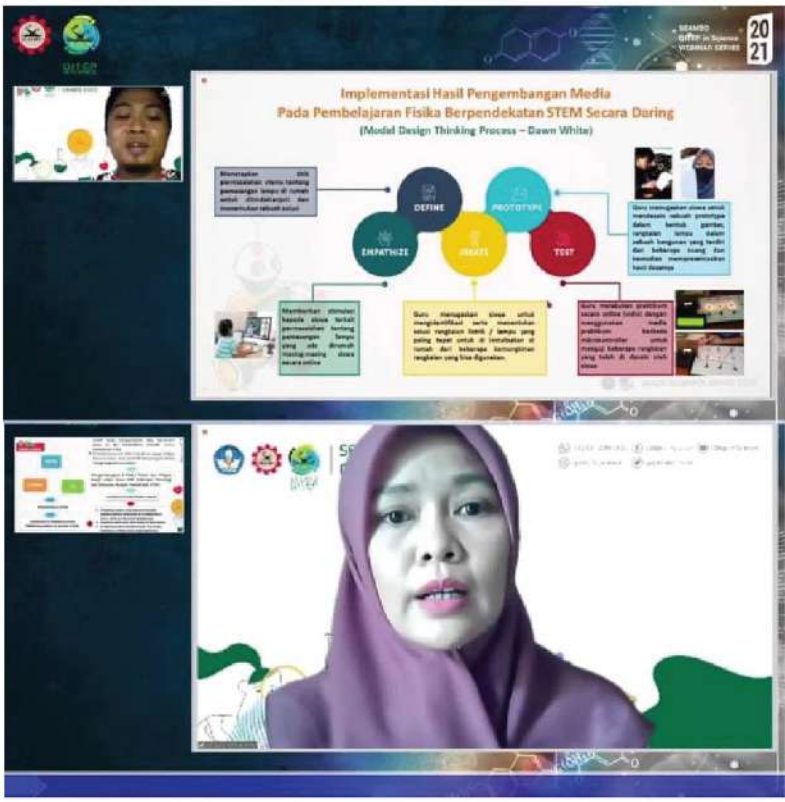
Prof Didi Sukyadi, the Vice-Rector for Student Affairs, delivered his remarks during the webinar's opening. He stated that this programme is beneficial since it provides information regarding the open resources. The webinar then officially opened by Ir Hendarman, PhD, the Partnership and Public Relation Bureau's acting head.

The first speaker was Dr Dwi Priyono, the Director of SEAMEO CECCEP. He presented SEAMEO CECCEP's spirit in sharing and collaborating. In his presentation, he presented various media developed by CECCEP that offer open education resources. The second speaker was Dr Luh Anik Mayani, the Director of SEAQIL. She discussed the advancement of literacy through the library as a learning resource, and she presented data showing the Indonesian's level of reading literacy. She also informed various SEAQIL's publications that can be accessed freely by the public.

The next presenter was Dr Indrawati, the Director of SEAQIS, who provided information regarding SEAQIS' publications. She also elaborated that SEAQIS have set a framework in developing science learning resources. Dr Riche Cynthia Johan, the head of UPI's Library, was the next presenter. She discussed the institutional repository towards openness of knowledge. She then elaborated on the definition of OER and repository. She also discussed its principles, concepts, and development. The last presenter was Mr Wahyu Setiko from Creative Commons Indonesia (CCI). He explained the difference between free and open resources. The webinar was then closed officially by the head of MOEC's library, Mr Chaidir Amir.

The last two webinars presented SEAQIS Research Grant grantees. Seven grantees presented their papers in two webinars. The first group consisted of Ms Lilik Muntamah, Ms Dewi Susanti, Ms Petri Priyatni, and Mr Reevi Haryanto. This group presented joyful virtual science learning. The second group consisted of Ms Kiki Lucky Naovalia, Ms Suriani, and Mr Bima Brilliando Agam. They presented Online Learning using the STEM Approach.

The Webinar series will continue until the end of this year. SEAQSI hope that this programme provides a forum for science teachers and education personnel in the region to share their best practice of science learning and gain accurate and relevant information regarding the current issues.



Chemistry Rocket

(Acid/Base Reaction)

Material Needed:
- An empty plastic bottle
- Wooden chopstick
- Cartoon board
- Scissors
- Duct tape
- Tissue
- Baking soda
- Vinegar

Steps:
1. Create a rocket using a plastic bottle.
2. Tape the wooden chopstick to the rocket. It will be used as legs for the rocket to stand on while launching.
3. Decorate your rocket in any way you can imagine
4. Fill the rocket halfway with vinegar
5. Scoop a spoonful of baking soda in the centre of a square of tissue and roll it up. Twist the ends to close the baking soda in.
6. Place the tissue into the bottle, but don't drop it in the vinegar yet. Let the neck of the bottle hold the tissue.
7. Turn the bottle upside down and let it stand on its legs.
8. Wait until the baking soda and tissue react!

The reaction that occurs in the Chemistry Rocket" launching activity is the reaction of baking soda ($NaHCO_3$) with vinegar (CH_3COOH). From this reaction, gas in the form of carbon dioxide (CO_2) is produced. This gas then propels the rocket to launch. This experiment aims to enable students to combine their chemistry and physics knowledge to design and construct a rocket and propellant system.

Source: https://www.learner.org/series/project-playbook-educator-edition/baking-soda-bottle-rocket/

Protection through Immunization

By Marianne Soriano
(Pangasinan National High School, the Philippines)

In today's world, where political disputes and national economic crises reign supreme in the media, the real struggle is mostly forgotten, the struggle of protecting the people from deadly viruses that wanders in the streets and even at home.

With wars raging and famines spreading, people, especially the young and the old, are becoming more vulnerable, prone to diseases and infections, and the dangers that come after a war has blazed. War distraught areas leave the environment in shambles, rubble, and debris. A healthy garden or a clean stream once resided, leaving the inhabitants with arid land and a higher possibility of acquiring more deadly countless infections.

Where do we turn our heads to look for help and a solution in a time like these? The answer lies in immunization. Immunization is not simply injecting a person with a fluid to suppress the virus; it shields the person from infection and from infecting others. To protect is to prevent, and to immunize is to cover.

Immunization targets are to prevent people from being infected and also from infecting others around them. Immunization is to be done immediately, without delay or distraction, to avoid unprecedented severe outbreaks or flashes of panic from arising in the general populace.

Immunization is serious in preventing deadly diseases like influenza, smallpox, polio, measles, and now COVID-19 virus must be done as soon as possible. The creation of vaccines nowadays is faster and readily available in almost all countries in the world compared to boosting our immune system against airborne and waterborne diseases.

Let's abolish the idea that immunization can harm us than cure us. Vaccines and medicines are products of duteous study in Science by experts. These days where we can't see what can kill us, immunization would be the best defence for us and our future.

With the help of these vaccines and medicines, people live with a lighter burden. They can worry less about the diseases brought about by the modern environment and can then put their attention to more pressing matters, like protecting their children from violence and resettling somewhere not affected by the war.

Mindfulness at Learning Science during the Pandemic

By Rika Siti Syaadah (SMK Piramida, Kab. Bandung)

The COVID-19 pandemic is now affecting all countries in the world. In Indonesia, this pandemic was started in early 2020 and is ongoing until now. The impact of this pandemic is enormous, especially on the education sector. Therefore, the Indonesian government set policies to conduct online learning instead of the traditional face-to-face to prevent the virus's spread.

Online learning has various obstacles and weaknesses for teachers and students, but the pandemic should not stop teaching. Distance learning with many obstacles and difficulties, of course, is not easy to perform. The anxiety haunting every individual about the existence of Covid-19 is also one of the triggers for stress, making some students and teachers often have their focus disturbed. Therefore, amid such a problematic situation, the learning strategy has to be slightly adjusted, and mindfulness might be one of the alternatives.

Mindfulness is defined as a person's complete awareness of his thoughts, feelings and his body's sensitivity to something (Maharani, 2015). By inserting mindfulness into the learning process, learners might seem to provide slow responses, but those responses come from their awareness of accountable knowledge (Burrows, 2015). Through mindfulness, students can think clearly, and it also trains students' critical thinking skills. Students will not only gain the score but rather the value regarding the lesson they learn.

In learning science during this pandemic, mindfulness can be applied to students' willingness to study the science around them. For example, students are doing practical activities with materials available at home, gardening, for instance.

Reference

Maharani, EA. (2015). Eksplorasi Mindful teaching sebaga strategi inovatif dalam pembelajaran bagi guru PAUD. Research Gate

Burrows, L. (2015). Inner Alchemy: Transforming Dilemmas in Education Through

Mindfulness. Journal of Transformation Education

ECO-LITERACY DURING COVID -19 PANDEMIC

By: Sulastri, S.T (Al Hikmah Elementary School, Surabaya)

The coronavirus disease (Covid-19) outbreak first in Wuhan, China, in December 2019. On 11 March 2020, World Health Organization (WHO) declared Covid-19 as a pandemic. It affects more than 188 countries all over the world, resulting in more than 631,000 deaths. It also impacts global politics, economy, society, culture, education and ecology. Most countries have tried to fight the spread of the virus, establishing public policies of social distancing and massive screening tests. Public places are closed, and people are quarantined in their houses. The poverty rate increases significantly.

Despite the negative effects of Covid-19, social distancing policies also generated positive results. Power plants and industrial facilities halted their production, and the use of vehicles decreased considerably. This caused air pollution has dramatically reduced. It also caused a noise reduction.

Ecological literacy, also referred to as eco-literacy, is the ability to understand the natural systems that make life possible. The term was coined by David W. Orr and Fritjof Capra in the 1990s. Ecoliteracy can be integrated into the curriculum. The eco-literacy movement through remote learning is more focused on how students get used to caring about the environment, especially during the pandemic season. According to Goleman, there are five points for developing eco-literacy:

1) Develop Empathy for All Forms of Life

The covid-19 pandemic caused many effects on the environment. The learning process should develop student's awareness and empathy for their surroundings. Students can observe the problems occur around them and have a suggestion to solve the problem.

2) Embrace Sustainability as A Community Practice

Students need to learn in groups and work together to develop their responsibility between group members. Students will understand how every individual response to environmental sustainability—for example, fundraising activity to help people get enough food during quarantine.

3) Make the invisible visible

Contextual learning can make the learning process being closer and meaningful to the students. They carefully follow the steps and procedures in activities and feel the goal of education. Some simple experiment procedure can be held in their houses. For example, to find out most appropriate materials to wrap food, which is safe, strong and biodegradable.

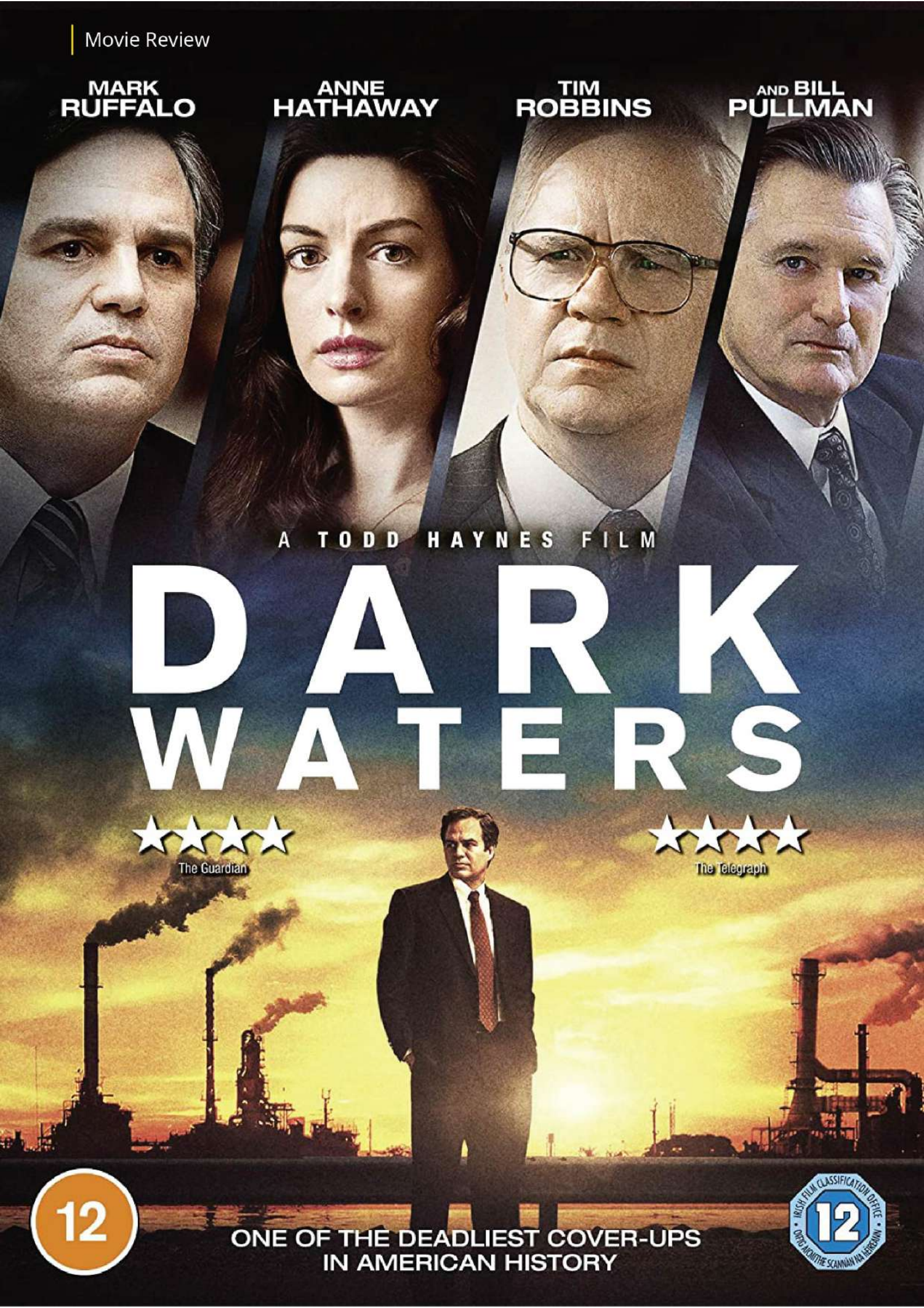
4) Anticipate Unintended Consequences

At this stage, students are required to take full responsibility for their treatment of the environment. The students develop their skills and attitude to take care of the environment, such as the campaign to stay healthy, wash hands, wear masker, etc.

5) Understand How Nature Sustains Life

This activity will bring students to evaluate the effects of the environment if the environment is not well maintained—understanding human responsibility to manage good life. Good management will have a good impact on the environment and vice versa. Teacher and students should work together to improve eco-literacy among their society. Through eco-literacy, people considerably have open mindsets and opportunity to acquire the knowledge, values, skills, attitudes, and commitments needed to protect and improve the environment.

Students' Presentation


MARK RUFFALO
ANNE HATHAWAY
TIM ROBBINS
AND BILL PULLMAN
A TODD HAYNES FILM
DARK WATERS
★★★★
The Guardian
★★★★
The Telegraph
12
ONE OF THE DEADLIEST COVER-UPS IN AMERICAN HISTORY
IRISH FILM CLASSIFICATION OFFICE
12

Directed by	: Todd Haynes
Produced by	: Mark Ruffalo, Christine Vachon, Pamela Koffler
Written by	: Mario Correa, Matthew Michael Carnahan
Starring	: Mark Ruffalo, Anne Hathaway, Tim Robbins, Bill Camp
Genre	: Mystery, thriller, drama
Running time	: 126 minutes
Distributed by	: Focus Features
Release date	: 22 November 2019

Movie Review:

Dark Waters

Rob Billot (Mark Ruffalo), a new attorney at Taft Law, received the unexpected visit from Wilbur Tennant (Bill Camp), a cow farmer from West Virginia. Tennant came to ask Rob for help to sue DuPont, which he suspects has polluted the environment of his farm, which resulted in a number of his cows died. Tennant also left behind a box of videotapes containing environmental conditions and the dead cows.

While visiting Tennant's farm, Rob learned that 190 cows had died with bloated organs, blackened teeth and tumours. Tennant also showed the river around his farm that he suspected had been contaminated with bleach waste.

Rob decides to sue DuPont to get the information through the legal discovery of waste. However, he did not find anything in the Environmental Protection Agency (EPA) report, apart from any compounds not regulated by the EPA.

DuPont sends hundreds of boxes of data. From these data, Rob found many references regarding PFOA (perfluorooctanoic acid), but no data regarding this compound in medical textbooks. PFOA is the material used to manufacture Teflon. From the data sent by DuPont, Rob found that DuPont had tested the effects of PFOA, and the results showed that PFOA caused cancer and birth defects. However, these results were never reported to the public. Rob collected all the evidence and people suspected of having contaminated this compound and finally brought the case to court with a total of 3535 cases.

DuPont's Worst Nightmare

The film is based on the true story of a corporate defence attorney, Robert Billot, whose story has been published in The New York Times Magazine in 2016, "The Lawyer Who Became DuPont's Worst Nightmare" by Nathaniel Rich. With more than 20 years of fighting, DuPont finally settled all 3535 cases for $670.7 million.

The films received 89% rating from 225 reviews and certified as "fresh" by Rotten Tomatoes and grossed more than $11.1 million in the US and Canada and over $23.1 million worldwide. It also received 73 out of 100 from Metacritic. This film also affects DuPont's stock price, which dropped from 72.18 to 65.03 after release.

Rob Billot also wrote a book called "Exposure" in 2019. Billot hoped his book would inspire activist and raise awareness of chemicals in drinking water.

Source:https://www.rottentomatoes.com/m/dark_waters_2019

https://www.nytimes.com/2016/01/10/magazine/the-lawyer-who-became-duponts-worst-nightmare.html

TEACHING AND LEARNING STEM BASED ON "TOUR de JANTUNG" ACTIVITY

Norhailmi bin Abdul Mutalib
Jerlun Secondary School
KM 16 Jalan Putera, 06150 Ayer Hitam
Kedah, Malaysia
Corresponding author: miecaprio@yahoo.com

ABSTRACT

Tour de Jantung is a student-centred STEM activity that can increase the students' skill in learning science through an inquiry approach. Student-centred learning aims to develop learner autonomy and independence by putting the responsibility for the learning path in the hands of students by imparting them with skills and basis on how to learn a specific subject required to measure up to the particular performance requirement (Hannafin, 2010). This study is to identify the achievement of learning outcomes of identifying human heart structure and its relationship with blood pathway in blood circulatory system. As a result, through the interview, students can identify the correct structure in the human heart and describe the pathway in the blood circulatory system. Students also show a tremendous increase in achievement, especially in term of their motivation, interest in learning and learning strategies after the activity. Indirectly, the activity is able to increase the students' achievement by using 21st-century learning and the STEM approach. The activity could be used in related science activities that have the same difficulty level of content to help students to understand the concept better.

Keywords: STEM, student-centred, inquiry, 5E Model of Learning, high order thinking skill

INTRODUCTION

Malaysia low performance in TIMSS and PISA is at an alarming level. Hence many authorities in this country need to take swift action to curb this issue. It also implicates the country in the future. The competitiveness of countries that priority focused on STEM development has given a good impact on their development as a modern country. The 4th Industrial Revolution notifies us to equip our students with 21st-century skills, such as critical thinking, collaboration, creativity, and communication.

This research aims to identify students' learning outcomes of identifying human heart structure and its relationship with blood pathway in the blood circulatory system. This is important for the students to relate the learning to the function of the heart and the roles of blood circulation in materials transportation.

Tour de Jantung activity can increase the students' motivation, interest in learning and their learning strategies towards STEM subject in an interesting way. Indirectly, the activity is able to increase the students' achievement towards 21st-century learning and STEM approach by imparting the students with future skills such as critical thinking, collaboration, creativity and communication. Tour de Jantung activity also recommended being used in related science activity with the same difficulty level of content to understand the concept better.

METHOD, ANALYSIS, DESIGN, AND IMPLEMENTATION

The framework of this action research is based on Kemmis and MacTaggart (1988). There are four steps,

Step 1: Reflection
Step 2: Planning
Step 3: Acting
Step 4: Observing

Based on this model, action research is a continuous cycle involving the steps above. It starts with the reflection process by the teacher. The teacher does an early review after a learning problem surfaced in the classroom. The researcher identifies a problem faced by the students. Planning is made, and action implemented to layout intervention to the problem.

Observation is made to monitor the progress based on the intervention. During observation, the researcher reflects whether the intervention is able to overcome the problem or otherwise.

Target Group

Twenty-five students from 2 Arif are involved in this action research to identify their achievement on learning outcomes of identifying human heart structure and its relationship with blood pathway in blood circulatory system. They are selected based on their average and low performance during Mid-Year Assessment. Research is done in a rural secondary school in Ayer Hitam, Kedah. A total of 25 Malay students from 2 Arif, which consists of 12 boys and 13 girls, are involved in this research.

The interview has been used to measure their achievement. Students are chosen based on their performance; high, average and low achiever. The interview transcript will be coded in the themes of achievement, interest, learning strategies and motivation.

In order to equip students with the appropriate skills, student-centred learning is a good approach to develop learner autonomy and independence in the hands of students to challenge their ability as a learner in this century.

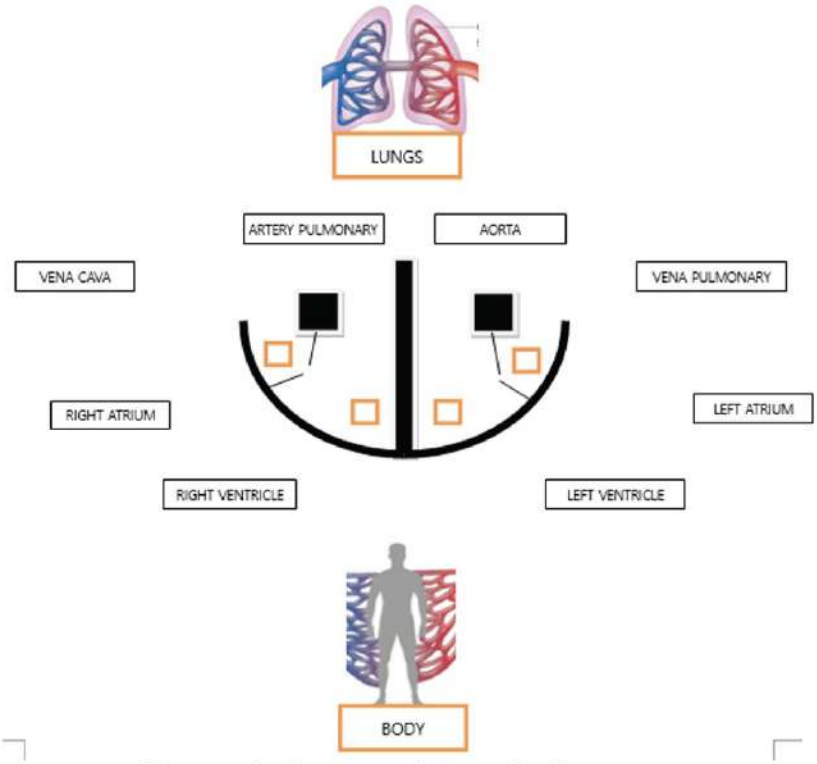
Student-centred learning

Student-centred learning aims to develop learner autonomy and independence by putting the responsibility for the learning path in the hands of students by imparting them with skills and a basis on how to learn a specific subject required to measure up to the specific performance requirement.

Students responsibility and independence help to develop characteristics of lifelong learners-motivation, self-evaluation, time management and the skills to access information. Research in student learning underscores the importance of concentrating on what learners do and why they think they are doing it rather than what the teacher does (Biggs, 1999).

Tour de Jantung

Tour de Jantung is a student-centred learning activity that gives autonomy and independence to students to explore their learning outcomes in a fun way. The learning outcome is to identify human heart structure and its relationship with the blood pathway in the blood circulatory system. To deliver the lesson to the students, the teacher used the 5E Model of Learning to instil the inquiry method among students.



Picture 1. Concept of Tour de Jantung

MATERIALS

For Tour de Jantung activity, these materials are prepared before the activity took place such as:

a. Labels for heart structure (Auricle and Ventricle)
b. Labels for the vein (Vena Cava and Pulmonary Vein)
c. Label for arteries (Aorta and Pulmonary Artery)
d. Model of Lungs
e. Model of human body
f. Red Cards to represent Oxygenated Blood
g. Blue Cards to represent Deoxygenated Blood
h. Map of Tour de Jantung.

Picture 2. The materials

Picture 3. The arrangement of Tour de Jantung

To make the activity meaningful, students are given activity sheet to help them do the activity. They need to fill up the worksheet while they are doing the task by exploring Tour de Jantung. They may work in a team, collaboratively.

Phase 3: Explain

After the exploration, students move to their group and discuss the best way to move in the simulation. Their movement represent blood circulation in the human system. Every group will present their pathway of blood flow in human based on their Tour de Jantung activity.

Picture 4. Presentation of blood flow in the human transportation system

Phase 1: Engage

The teacher asks students the differences between the human transportation system and the plant transportation system. The teacher guides students, who lead them to relate it with the heart's function in the human transportation system.

Phase 2: Explore

Students are divided into a group of 5 students. Students are given a map of Tour de Jantung to discuss the best way to move inside the simulation. In this activity, students will represent a red blood cell. Students can refer to their textbook as their reference as well.

Phase 4: Elaborate

Students' critical thinking is being tested by giving them the situation that might happen during a heart attack. They worked in a group collaboratively to discuss what happens during the attack and the best solution for them to overcome the situation. Each group will present their outcomes afterwards.

Phase 5: Evaluate

The teacher guides students to reflect on what they learn through the Tour de Jantung activity. Students relate it with the learning outcomes to identify human heart structure and its relationship with blood pathway in the blood circulatory system. Students also share their group outcomes when given situations to solve and relate it with their real-life situation.

RESULT AND DISCUSSION

As a result, 25 students are able to achieve learning outcomes that the researcher has set. The learning outcome is to identify human heart structure and its relationship with the blood pathway in the blood circulatory system. Students are able to describe the full process of blood circulation, including the structure and

process involved.

The student-centred learning approach was successful and effectual as a technique toward teaching pupils and provided the opportunity for social acceptance and self-confidence, and improved mental ability (Asoodeh, 2012). Therefore, this action research is parallel to past research.

From an interview with high achiever students, Student A stated that "I would love to learn science every day". This reflects that the activity had become the learning strategies for the student to learn more in science.

For average performance students, Student B said, "I am so happy learning science with my fellow friends today. Actually, I didn't feel like I'm learning science. Today's lesson is really cool". This is a proof that the activity had increased the students' interest in learning science.

Student C, low performance students said, "I was lazy to join in my class activities. However, seeing my friends were so eager and excited doing all the activities, I feel so motivated to do so". Therefore, this interview clearly portrays that the student becomes more motivated to learn science after experienced this learning activity.

CONCLUSION

In conclusion, Tour de Jantung activity can increase the students' motivation, interest in learning and their learning strategies towards STEM subject. Indirectly, the activity is able to increase the students' achievement towards 21st-century learning and STEM approach by giving the students future skills like critical thinking, collaboration, creativity and communication. Tour de Jantung activity is also recommended to be used in related science activities with the same difficulty level of content to help students understand the concept better.

REFERENCES

Brandes, D. & Ginnis, P. (1986). A Guide to Student-centred Learning. Oxford, UK:Blackwell.

Christine Ingleton, Margaret Kiley, Robert Cannon, Tim Rogers. (2000). Leap Into... Student-Centred Learning. The University of Adelaide.

Hannafin, M. J., Hannafin, K. M. (2010). Cognition and student-centred, web-based learning: Issues and Implications for research and theory. In learning and instruction in the digital age (pp. 11-23). Springer US.

Jones, Leo (2007) The Student-Centred Classroom. Cambridge University Press.

Mohammad H Assodeh, Maryam Zarepour. (2012). The Impact of Student-Centred Learning on Academi Achievement and Social Skills: Procedia – Social and Behavioral Science, Volume 46, 2012, 560-564.

TESTING THE EFFICIENCY OF HYDRAULIC RAM IN LUANG PRABANG TEACHER TRAINING COLLEGE

Sisakhet Phewkhamphom
Luang Prabang Teacher Training College
Naxangveuy village, Luang Prabang district, Luang Prabang Province
Lao PDR
sisakhetoh@gmail.com

ABSTRACT

Hydraulic Ram (HR) functions to take water from the lower area to the higher one without electricity. This study aims to 1) study how HR works and 2) test its efficiency. This test is a pilot study that can be adapted to use in local conditions with natural water sources effectively. The test results showed that the HR 1"/$%% could pump water up to as high as 4, 5, and 6 meters, respectively. Water at 3 meters height has efficiency at 42.69%, 4 meters has 38.40%, and 5 meters has 27.06%. The study also found that, averagely, in one minute, HR1/2" could pump water 8.11 litres up to 3 meters height, 5.47 litres up to 4 meters height and 3.06 litres up to 5 meters height, respectively.

Keywords: Hydraulic ram, efficiency, natural water sources.

INTRODUCTION

Nowadays, our society is transforming into a society of learning, and knowledge is a valuable factor that stimulates development. Each nation that has strength in intelligence would perform better than other nations. Our world is now becoming the world of information and becomes one borderless. Economics, social, politics, culture, environment, science, and technology affect all human beings, including daily life and social value throughout education. Social-economics development strategy 2030 stated that we should take social and culture as a top priority as a strategy for development that emphasizes improving our quality of life by reducing poverty, improving the education sector, culture, and quality of labour in a better way. The governmental vision and strategy of development up to 2030 mentioned that "Lao people will equally get qualitative education so that they can develop themselves and become good citizens, discipline, healthy, competence and professionals so that they will develop the country to be sustainable, civilized, and able to link and comparable in international society". National education strategy 2006-2015 recommended that we should gradually improve the quality of teaching-learning standard, modernization and move forwards closely to international standard. At the same time, it should be paralleled to human resource development that will serve national social-economic development in each zone, province, and the local area. Learning should be going alongside practice. Education cooperates with production physically; school education cooperates with education in family and society. They are taking account of education and moral as the main part, materials, experimental matters and planning to initiate ICT to operate education (Ministry of Education and Sports, 2008, p. 32).

In Luang Prabang province, the energy supply has increased in the last year. The electricity of Laos in Luang Prabang branch has supplied electricity to customers 182,211,561 Kwh in total or equivalent to 100.45%. Compared to the year 2016, it has increased 26,198,756 Kwh (in the year 2015 is 156,012,805 Kwh), equal to 16.79%, and the money increased 210,633,395 Kip (Lao currency) or 1.29%. In 2017, the price was 748 Kip/Kwh (the year 2016 was 739 Kip) (A report of Loss and Safety of Electricity service centre of Luang Prabang, 2018). In short, the usage of electricity in Luang Prabang is increasing. This may be because of the growth of houses, businesses, the business about entertainment, international organization, public, agriculture, industry, and education and sports that use electricity extravagantly. Comparatively, this usage rate is higher than that in developed countries. Therefore, the Electricity of

Laos issued ten years development plan to improve the system from 2015 – 2025. It aims to ensure that all Lao people have access to permanent electricity to improve their lives and develop social- economics by step. Hopefully, it will be achievable 90% of all households throughout the country in 2020. Although the electricity within the country has enough for the Lao people, we still need to find alternative energy as much as we can to save the energy and use it as suitable for the current status.

The principle of water pumping has been discovered more than 200 years ago since 1772 by a water supply technician in Bristol in England, and Frenchman Joseph Michel Montgolfier had developed it in 1796. Later in 1956, Dr Miyazawa utilized this principle and invented the water pump machine using hydropower. Though, it was not popularized because of some constraints: poor performance than other machines, more water wasted during the pumping process than gaining, some water leak out from the valve. However, if the price of petrol and electricity increases, this pumping machine will be alternatively useful in the future.

This HR is suitable for water source with strong current such as, waterfall or water that is flowing but low pressure or the level of inputs water (so-called "head") is not so high but able to lift water to a higher level by finding the level of inputs water 1 meter then it will be able to lift water up to 7

– 8 meters, or if carefully design, then it might be able to lift to 10 meters. Due to the fact that when this HR works, some part of the water will leak in the valve; therefore, this HR is appropriate with huge water source because the wasted water can be useful for other areas. However, this HR is not suitable for the water supply. As for Luang Prabang province, this principle has not yet been adopted. From the survey, Luang Prabang province has many water sources. Therefore, this HR is suitable to use as an alternative mechanism for those using electricity and petrol. If Luang Prabang province uses this HR without electricity, it will be very useful for society to minimize the cost.

This HR has a function to work on its own without using electricity, petrol or manpower. Its working starts from the sudden change of the flow in the inputs water. It creates and increases the pressure in the machine in a short time. Say, when the water current flows appropriately from a higher level against the waste valve, this valve will be opened (we will hear the sound of hit), increasing water pressure. This will force water flow into the pressure vessel through the delivery check valve, which can be opened only one way. When the water flows into the pressure vessel, the air inside will be pressed then the pressure will be increased. However, that air pressure has no other ways out, so it pushes the water out from the pressure vessel through the delivery pipe to the outlet through that double pressure. This HR work function can be explained in 3 steps as below:

1) The force of moving water: While the waste valve is opening because of the pressure, the water from outside will flow into HR in the inlet (drive pipe) and leak out at the waste valve, then the speed of the water will be gradually increased (A). When the speed reaches a certain point (Vm), water current will go through the waste valve then the kinetic energy will suddenly close the waste valve (B).

2) Water delivery: When the waste valve is closed, the pressure inside HR will be highly increased. This high pressure will be able to press the pressure inside the pressure vessel, then the delivery valve will be opened and forces some water to flow into the outlet (delivery pipe) (C). At the same time, the pressure inside HR will be decreasing until it could not press the water flow. At the same time, the pressure inside the pressure vessel will close the delivery valve (D).

3) Return flow: water will flow back to the inlet, and that will make the pressure inside HR lower. After that, the pressure of the air and atmosphere outside will come in via the waste valve and wait there to be pushed to the pressure vessel in another cycle (this is the process of adding air into the pressure vessel to replace the air that might be gone with water flow). The lower pressure makes the waste valve open again, and that is the complete cycle of HR's function.

When the HR starts working, it will work continuously under the system that is called "water hammer" that has the working cycle in every minute. Therefore, it is sometimes called a "self-acting ram hammer" if it has water source inputs to the system sufficiently. Water hammer is the phenomenon that the pressure inside the pipe freely changes but strong. The

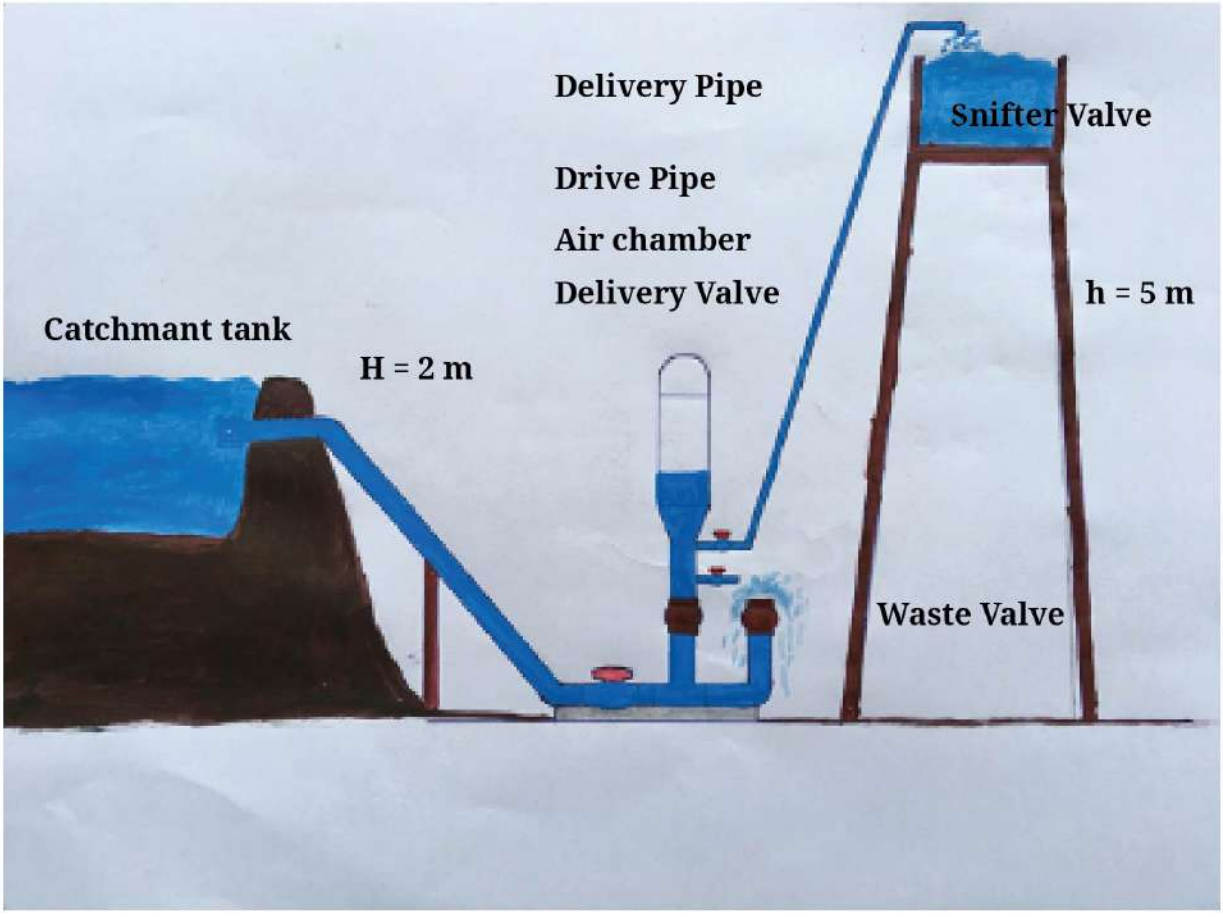
velocity of the water current affects the water hammer. For example, the immediate closing of the waste valve changes the speed of the water flow. This sudden change makes the momentum of the water flow transforms into force. If this force hits the pipe too strong, then it will be damaged. So, we use this principle and transform that point into an advantage by using material that can control that force of pressure so that we can bring those water to natural sources to use in our desired works.

The objective of this study was two folds:
1) To study the function of HR without electricity
2) To test HR's efficiency without electricity

METHOD, ANALYSIS, DESIGN, AND IMPLEMENTATION

Step 1: Firstly, connect a drive pipe into the inlet of the HR and connect a delivery pipe with the HR outlet. Then put the pipe connected to the outlet to the high position, 3 meters, in this case. After that, let the water in and activate the waste valve, after waiting 2 minutes, HR starts working. Three (3) minutes later, the water comes out from the outlet. This test lasts for 5 minutes. The test takes five times iteratively. After that, we increase the height to 4 and 5 meters, respectively.

Step 2: We measure the volume of the water from the inlet of the HR by measuring the volume of the water from the inlet and read the time it uses from the timekeeper in one second and read the water level from the beaker (liquid measuring cup). After that, take the volume of the water from the experiment both water from inlet and outlet to calculate the efficiency of the HR.



Picture 1: The design diagram and the working principle of the hydraulic ram

RESULTS

Tabel 1. Experiment result 1 (Measuring water from the outlet with 3, 4 and 5 meters in 5 minutes)

Time (min)	The volume of water of each level		
3 m		4 m	5 m
1	40.24	27.3	15.71
2	41.1	27.56	15.5
3	40.5	27.21	15.24
4	40.3	27.6	15.31
5	40.56	27.1	15.34
Average	40.54	27.35	
	15.42		

The result of the first experiment (see table 1) shows that the volume of the water from the outlet with the water level 3 meters height has an average value of 40.54 litres/ 5 minutes. In contrast, the volume of the water from the outlet with the water level 4 meters height has an average value of 27.35 litres / 5 minutes. Also, the volume of the water from the outlet with the water level 5 meters height has an average value of 15.42 litres/ 5 minutes.

Tabel 2. Experiment result 2 (Measuring water from the inlet in one second)

No	Time (second)	Volume (liter)
1	1.46	2.76
2	1.43	2.31
3	1.35	2.12
4	1.62	2.81
5	1.54	2.66
Average	1.48	2.53

Table 2 shows us that on average 1.48 second, we can measure the volume of the water from the inlet as 2.53 litres.

DISCUSSIONS AND CONCLUSION

Based on the data from Table 1 & 2, this study can be concluded as follow:

Tabel 3. Flow rate at 3, 4 and 5 meters in 1 minute

No	The volume of water of each level		
	3 m	4 m	5 m
1	8.05	5.46	3.14
2	8.22	5.51	3.1
3	8.1	5.44	3.05
4	8.06	5.52	3.06
5	8.11	5.42	3.07
Average	8.11	5.47	3.08

Tabel 4. Inlet flow rate (Measuring water from the outlet with 3, 4 and 5 meters in 5 minutes)

No	Flow rate (liter / minute)
1	115.07
2	117.48
3	124.44
4	103.7
5	109.09
Average	113.96

Based on the data from the experiment. This study can find the efficiency of the HR in each different level as below:

$$\eta = \frac{qh}{QH} \times 100\%$$

η is the efficiency of the HR

q The amount of water flow (liter/minute)

H- The height of the delivery pipe

Q The volume of water flow in inlet (liter/minute)

h: The level of inlet

the result of efficiency is as below:

1. The value of efficiency of HR of outlet in 3 meters height is:

$$\eta = \frac{8.11 \times 3}{2 \times 113.96} \times 100\% = 42.69$$

2. The value of efficiency of HR of outlet in 3 meters height is:

$$\eta = \frac{5.47 \times 4}{2 \times 113.96} \times 100\% = 38.40$$

3. The value of efficiency of HR of outlet in 3 meters height is:

$$\eta = \frac{3.08 \times 5}{2 \times 113.96} \times 100\% = 27.06$$

The results of the experiment show that HR 1"/$%% in 3, 4, 5 meters height has the efficiency in pumping water in 42.69 %, 38.40 % and 27.06 %, respectively. Considering when the HR works in one minute in the water level at 3 meters height, averagely, it has 8.11 L/min, 4 meters height has 5.47 L/min, and 5 meters height has 3.06 L/min averagely. The experiment results revealed that the more the level of outlet is higher the lower the efficiency of HR will be. This is because of the pressure in the pressure vessel. This pressure will be more or less is dependent on the height of the water flow from the inlet. Therefore, to pump water into the higher areas, we should use a dam or waterfall with strong water current flow. The higher level of water source is, the higher pressure of HR will be to pump water up to the higher areas.

REFERENCES

Document for training operation. (2555). Energy research, Maecho University, Chiang Mai, Thailand.

Luang Prabang electricity service center. (2018). A report of Loss and safety. Luang Prabang

Lao electricity. (n.d.). Lao development plan of electricity 2015-2025.

Luang Prabang electricity service center. (2017). A report of purchasing and supplying electricity current.

Ministry of Education and Sports. (2008). Educational development plan. Vientiane.

Ministry of Education and Sports. (n.d.). Educational development plan 2015-2020. Vientiane

Ministry of Education and Sports. (2015). Visions 2030, strategy 2025 and 5 years educational development plan 2016-2020. Vientiane

Phaitoun, I. (2557). Testing efficiency of hydraulic ram. Rasamongkhon University of Technology, Lampang.

The Application of Directed Activities Related to Texts (DARTs) Using Liveworksheets to Foster Students' Motivation in Distance Learning during the COVID-19 Pandemic

By SISKA HIDAYANTI,S.Pd (SD Negeri 2 Tambi, Kab. Wonosobo)

In regards to the COVID-19 pandemic, the government of Indonesia issued a policy about distance learning. Distance learning could be conducted both online and offline modes. In distance learning, problems and obstacles happen, such as insufficient time for home visit, difficulties in online communication with students and the parents. These obstacles and problems sometimes create boredom for students to follow the learning activities. Therefore, the teacher should be more creative to deliver materials to avoid boredom. With that in mind, I attended an online training on pedagogical content knowledge for primary school teacher conducted by SEAQIS in collaboration with IOA. During the training, I learned how to create a lesson plan for distance learning and a student's worksheet.

To foster students' motivation in distance learning, I was interested in using Darts' worksheet through the Liveworksheets. I implemented this strategy in grade 5 in SDN 2 Tambi, Kab. Wonosobo. The DARTs' worksheet aims to:

1.Improve students' understanding of text

2.Improve students' critical thinking skills towards text

3. Improve students' cognitive

4. Help students be more prepared to do the assignments in other subjects such as filling tables, labelling diagrams, completing Venn diagram, etc.

I used the DARTs' worksheet on the topic of temperature and heat. By using DARTs through Liveworksheets, 46% of students gained a perfect score, 29% earned 82.7, and 25% gained 80. It is shown that all students completed this topic.

From the data above, it can be concluded that DARTs can be an alternative strategy to improve student's achievements. In the process, this activity could grow student's enthusiasm because they found a new thing. It could foster their motivation to learn.

That was my experience in using DARTs to foster my students' motivation to learn science. I hope other teachers are inspired in conducting distance learning.

New Staffs

Dr Ida Kaniawati

Fathika Anjani Firman

At the beginning of this year, SEAQIS was happy to welcome two new staff members, an expert and a secretary. Dr Ida Kaniawati, a physics lecturer at Indonesia University of Education (UPI), joined SEAQIS as the Centre's expert. She is an expert in STEM Education. She holds a master's degree in Physics from Bandung Institute of Technology (ITB) and a doctor's degree in science education from Indonesia University of Education (UPI). She has been teaching for 27 years. Dr Ida Kaniawati also actively writes a scientific article published in several scientific journals and magazines. She also writes several textbooks used in upper and lower secondary education.

The other new staff member is Fathika Anjani Firman, as the secretary. She graduated from the International affairs department at Computer University of Indonesia (UNIKOM). Before joining SEAQIS, she worked for an IT start-up company for about two years. During her time in the company, she held several positions, such as business analyst, online reputation management and community manager.

Centre Visibility

To strengthen its visibility in the community, SEAQIS has signed Memorandum of Understanding (MOU) with several institutions from October 2020 to March 2021, such as Perkumpulan Guru Madrasah Indonesia Kabupaten Garut, Yayasan Pembinaan Sumber Daya Insani (YASRI), Konsorsium Perguruan Tinggi Provider Jardiknas (Kopertip-IB), Kantor Cabang Dinas Pendidikan Wilayah Wonosobo, Library Centre UPI, Dinas Pendidikan Kabupaten Purwakarta and Yayasan Taruna Bakti.

These MOUs are to develop programmes in education, research, community engagement, and capacity building and improve the competence of science teachers.

Abdurrahman Hasan

Not only two new staff members, but SEAQIS also welcome new members to the big family. Mr Widi Wisnu Gumilar has been blessed with a newborn baby boy named Abdurrahman Hasan. He was born on 19 April 2021. The Centre would like to congratulate upon his new baby born. May his baby brings joy to their family.

On 24 April 2021, we lost the precious soul of our colleague, Mr M. Haidar Helmi, a staff member of the Research and Development Division. He worked at SEAQIS for seven years since 2014. He also was part of SEAQIS' Academic team who conducted training, research and modules writing. Haidar, his nickname, was well-known for his passion and hard work. He also had a good personality. Haidar, you may be gone too soon but will never be forgotten. Rest in Peace.

Read on for SEAQIS information and the latest science topics only at

SCIENCE MAGAZINE

or download on your mobile device in www.qitepinscience.org

More Information

JL.Diponegoro 12 Bandung 40115,
West Java, Indonesia

+62 22 421 8739
+62 22 421 8749
secretariat@qitepinscience.org
www.qitepinscience.org

+62 821 2345 0630 @qitepinscience
qitep_in_science Qitep in Science
QITEP in Science

Coffee Time

https://theawkwardyeti.com/comic/coffee-time/

theAwkwardYeti.com

Most of us might love the smell of coffee, but have you ever wondered why sometimes it also helps us relieve constipation? According to healthline.com, the new report said coffee could cause muscle movement to help with this condition. Another study also stated some other benefits of coffee is to reduce the risk of gallstones. Although these benefits need further study, drinking coffee is still safe if consumed up to three cups a day.

source: source: https://www.healthline.com/health-news/does-coffee-help-your-digestive-system-experts-arent-convinced#How-much-coffee?