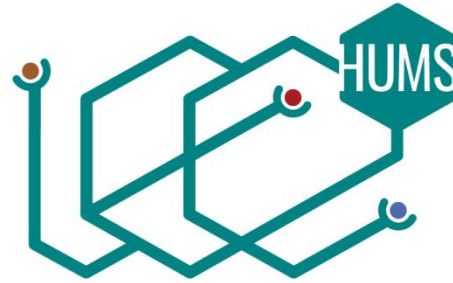
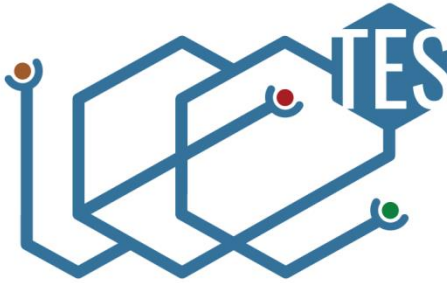




UNIVERSITAS  
KRISTEN  
MARANATHA



1<sup>ST</sup> INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN TECHNOLOGY, ENGINEERING AND SCIENCE  
&  
1<sup>ST</sup> INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN HUMANITY STUDIES AND SOCIAL SCIENCE

---

**1-2 JULY 2021**  
VIRTUAL CONFERENCE

Published by:



Evaluation for indexation:

**Scopus**<sup>®</sup>

## Table of Contents

Table of Contents	2
Message from the Rector	3
Message from General Chair	4
Committees	5
Virtual Conference Instructions	10
General Information	10
Virtual Conference using Konfrenzi Platform	12
Guidelines for Scientific Video presentation	13
Instruction for Session Chairs/Presenters/Attendees	15
Session Chairs	15
Presenters	16
Attendees	16
Conference Schedule	17
Keynote Speakers	26
Technical Parallel Session	39
Closing Remarks	168



## Message from the Rector



Honorable Keynote Speaker, Mr. Ignasius Jonan, former Minister of the Energy and Mineral Resources, and previously Minister of the Transportation Ministry of the Republic of Indonesia, we are greatly honored to have you with us this morning.

Distinguished keynote speakers, Prof. Ahmad M. Ramli (represented by Ikhsan Baidirus, S.H., LLM, Director of Post, General Directorate of Post and Information Technology, Ministry of Communication and Information Technology), Prof. John Silke, Dr. Ferry Sandra, Prof. Takayuki Arai, Prof. Young Ho Kim, Prof. Susy Tjahjani, Prof. Pim Martens, Dr. Dwinita Larasati, Prof. Chien-Hsu Chen, Prof. Wilson Bangun and Prof. Marcellia Susan, as well as all participants in the international conferences at Maranatha University.

A very good morning and best wishes to you all, and good evening to our colleagues in the US. Greetings and a warm welcome to Maranatha Christian University (MCU), Bandung, Indonesia.

I am delighted to be here with you today for the opening of the first MCU international conferences. These are: (i) The International Conference on Emerging Issues in Technology, Engineering, and Science, and (ii) The International Conference on Emerging Issues in Humanity Studies and Social Sciences, with the themes of: Digital Ecosystems for Sustainable Health and Community Development towards an Intelligent Society, and Innovations for Sustainable Community Development - Research and Practices, respectively.

We thank the many participants from countries across the different continents: the USA, the UK, the Netherlands, Norway, Taiwan, Japan, Korea, Thailand, Singapore, Malaysia, India, Australia, and New Zealand.

These first international conferences will serve as a platform to enable speakers and participants to share their research results, drawn from up-to-date research work, to initiate and strengthen further collaboration.

Without further ado, I would like to thank all the participants who have joined us for these international conferences. Again, my sincere hope is that what we accomplish today will be beneficial towards establishing collaboration among all the participants of these conferences.

I hereby declare the first international conferences at MCU in 2021 officially open.

May God bless you all. Thank you.

Prof. Ir. Sri Widiyantoro, MSc., PhD., IPU.

Rector of Maranatha Christian University



## Message from General Chair



On behalf of the committee members, it is a great pleasure to welcome you all to our first two international conferences: Emerging Issues in Technology, Engineering, and Science (ICE-TES) and, Emerging Issues in Humanity Studies and Social Sciences (ICE-HUMS).

ICE-TES and ICE-HUMS are twin events which serve our passion in balancing technology and humanity issues in the world of science and share the core values of our university: Integrity, Care & Excellence (ICE).

This year's theme for both conferences focus on the United Nations' Sustainable Development Goals (SGD), which emphasize the following aspects: ICE-TES (Digital Ecosystem for Sustainable Health & Community Development: Towards the Intelligent Society) and ICE-HUMS (Innovations for Sustainable Community Development: Research and Practices). We believe research and initiatives that has pragmatic and multidisciplinary/interdisciplinary approaches allows us to unravel fundamental problems and answer related questions regarding sustainable development.

The logistics of both of the First ICE-TES and ICE-HUMS 2021 conferences consist of two general and five-scientific keynote speakers. Special tracks are designed in each conference which cover recent developments in: ICE-TES (technologies, engineering, medical, and dentistry), ICE-HUMS (psychology, languages & cultures, economics, arts & design, and laws). The ICE-TES tracks received 82 submissions and 52 accepted full papers, involving authors from five countries, and corresponding to an acceptance rate of 63.4%. At the same time, the ICE-HUMS has received 130 submissions and accepted 76 full papers, involving authors from four countries, corresponding to an acceptance rate of 58.4%. All submitted papers were peer-reviewed on the basis of their significance, state-of-the-art contributions, and technical qualities.

Since we are still in the midst of COVID-19 pandemic, the conference has been organized virtually. The organizing committee has been working intensively to ensure that the scientific sessions will be valuable and engaging for all presenters and attendees. The parallel session format is a mix of pre-recorded and synchronous engagement through in-person live videos and question and answer sessions.

We would like to express our sincere appreciation to all the keynote speakers, committee members and reviewers for their dedication. Last, but certainly not least, we would like to offer many thanks to all authors who submitted their papers and all participants who registered to join this conference. We believe that ICE-TES and ICE-HUMS 2021 will be an inspiring academic occasion and will become a great platform for many ideas as well as research initiatives in the scientific community. Have an inspiring conference!

Dr. Hapnes Toba, M.Sc., General Chair of ICE-TES and ICE-HUMS 2021

Dr. Wahjoe Widowati, M.Si., General Co-chair of ICE-TES 2021

Joni, Ph.D., Ak., CA., CPSAK., General Co-chair of ICE-HUMS 2021



1st INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN TECHNOLOGY, ENGINEERING AND SCIENCE  
&  
1st INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN HUMANITY STUDIES AND SOCIAL SCIENCE  
1-2 JULY 2021 | VIRTUAL CONFERENCE



Published by:

Evaluation for indexation:

Scopus®

## Committees

### Steering Committee of ICETES and ICEHUMS

Prof. Gudivada Sudarsanam, Sri Venkateswara University, India

Prof. Hae Dong Jang, Hannam University, Korea

Prof. Lawrence Young, University of Warwick, United Kingdom

Prof. Young Ho Kim, Chungnam National University, Korea

Prof. Sri Widiyantoro, Maranatha Christian University, Bandung Institute of Technology, Indonesia

Prof. Budi Hartanto Susilo, Maranatha Christian University, Indonesia

Prof. Marcellia Susan, Maranatha Christian University, Indonesia

Prof. Susy Tjahjani, Maranatha Christian University, Indonesia

Prof. Wilson Bangun, Maranatha Christian University, Indonesia

### Organizing Committee of ICETES and ICEHUMS

#### General Chair

Dr. Hapnes Toba, M.Sc., Maranatha Christian University, Indonesia

#### General Co-Chair of ICETES

Dr. Wahjoe Widowati, M.Si., Maranatha Christian University, Indonesia

#### General Co-Chair of ICEHUMS

Joni, Ph.D., Ak., CA., CPSAK., Maranatha Christian University

#### Secretariat Chair of ICETES

Dr. dr. Hana Ratnawati, M.Kes., Maranatha Christian University, Indonesia

#### Secretariat Chair of ICEHUMS

Fenty Lidya Siregar, S.S., M.A., Ph.D., Maranatha Christian University, Indonesia

#### Finance Chair of ICETES

Dr. Teresa L. Wargasetia, S.Si, M.Kes., PA(K) Maranatha Christian University, Indonesia

#### Finance Chair of ICEHUMS

Susanti Ridawaty Saragih, S.E., M.Si., Maranatha Christian University

#### Scientific Program Chair of ICETES

Dr. Ratnadewi, S.T., M.T., Maranatha Christian University, Indonesia

#### Scientific Program Chair of ICEHUMS

Daniel Hendrawan, S.H., M.Hum., M.Kn, Maranatha Christian University, Indonesia



**Scientific Program Members of ICETES**

Dr. drg. Vinna Kurniawati Sugiaman, M.Kes. Maranatha Christian University, Indonesia

Andreas Widjaja, S.Si., M.Sc., Ph.D., Maranatha Christian University, Indonesia

Agustinus Oey, Ph.D. Maranatha Christian University, Indonesia

Alfredo Satyanaga Nio, Ph.D. Nanyang Technological University, Singapore

**Scientific Program Members of ICEHUMS**

Monica Hartanti, S.Sn., M.Ds., Maranatha Christian University, Indonesia

Dr. Missiliana Riasnugrahani, S.Psi., M.Si., Psikolog., Maranatha Christian University, Indonesia

Tita Alissa Bach, Ph.D., Det Norske Veritas Germanischer Lloyd (DNV-GL), Norway

Gregory Arief D. Liem, Ph.D., National Institute of Education (NIE), Singapore

**Publicity & Public Relation Chair of ICETES**

Iwan Santosa, S.T., Maranatha Christian University, Indonesia

**Publicity & Public Relation Chair of ICEHUMS**

Yenni M. Djajalaksana, S.E., M.B.A, Ph.D., Maranatha Christian University, Indonesia

**Reviewers of ICETES**

Agustinus Oey, Ph.D., Lucky Goldstar (LG) Electronics, Korea

Alfredo Satyanaga Nio, Ph.D., Nanyang Technological University, Singapore

Prof. Jong Seong Kang, Chungnam National University, Korea

Prof. Hae Dong Jang, Hannam University, Korea

Prof. Terutoshi Tada, Toyo University, Japan

Dr. Bambang Dwi Wijanarko, Binus University, Indonesia

drg. Ferry Sandra, Ph.D. Trisakti University, Trisakti University

Dr. Bernard Renaldy Suteja, S.Kom., M.Kom., Maranatha Christian University, Indonesia

Dr. Ir. Christina Wirawan, M.T., Maranatha Christian University, Indonesia

Cindrawaty Lesmana, S.T., M.Sc.(Eng). Ph.D., Maranatha Christian University, Indonesia

Dr. dr. Diana Krisanti Jasaputra, M.Kes., Maranatha Christian University, Indonesia

Dr. Erwani Merry Sartika, S.T., M.T., Maranatha Christian University, Indonesia

Dr. Teresa Liliana Wargasetia, S.Si., M.Kes., PA(K) , Maranatha Christian University, Indonesia



Dr. Hana Ratnawati, dr., M.Kes., Maranatha Christian University, Indonesia  
 Andreas Widjaja, S.Si., M.Sc., Ph.D., Maranatha Christian University, Indonesia  
 Dr.dr. Meilinah Hidayat, M.Kes., Maranatha Christian University, Indonesia  
 Dr. Yosafat Aji Pranata, S.T., M.T., Maranatha Christian University, Indonesia  
 Dr. Wahjoe Widowati, M.Si., Maranatha Christian University, Indonesia  
 drg. Dahlia, Sp.Pro., Maranatha Christian University, Indonesia  
 Dr.dr. Julia Windi Gunadi, M.Kes., Maranatha Christian University, Indonesia  
 Robby Yussac Tallar, S.T., M.T., Dipl.IWRM., Ph.D., Maranatha Christian University, Indonesia  
 Dr. Hapnes Toba, M.Sc., Maranatha Christian University, Indonesia  
 Dr.drg. Vinna Kurniawati Sugiaman, M.Kes., Maranatha Christian University, Indonesia  
 Dr. Ratnadewi, S.T., M.T., Maranatha Christian University, Indonesia  
 Marvin Chandra Wijaya, S.T., M.M., M.T., Maranatha Christian University, Indonesia  
 Semuil Tjiharjadi, S.T., M.M., M.T., Maranatha Christian University, Indonesia  
 drg. Angela Evelyn, M.Kes., Maranatha Christian University, Indonesia  
 Dr. Riko Arlando Saragih, S.T., M.T., Maranatha Christian University, Indonesia

### **Reviewers of ICEHUMS**

Dr. Amrinder Khosa, CA., Monash University, Australia  
 Dr. Ehtasham Ghauri, Otago Polytechnic, New Zealand  
 Dr. Emmanuel Jean-Francois, Ohio University, United States  
 Gregory Arief D Liem, Ph.D., National Institute of Education, Singapore  
 Tita Alissa Bach, Ph.D, Det Norske Veritas-Germanischer Lloyd (DNV-GL), Norway  
 Tessa Eka Darmayanti, PhD - School of Housing, Building & Planning, Universiti Sains Malaysia  
 Dr. Muhammad Abdan Shadiqi, S.Psi., M.Si, Universitas Lambung Mangkurat, Indonesia  
 Adiatma Y.M. Siregar, Ph.D., Padjadjaran University, Indonesia  
 Dr. Santy Pranawati, M.Psi, Psikolog, Associate reseacher of Family Studies, Universitas Indonesia, Indonesia  
 Dr. Henndy Ginting, M.Si, Psikolog, Institut Teknologi Bandung, Indonesia  
 Dr. Dra. Ariesa Pandanwangi, M.Sn., Maranatha Christian University, Indonesia



Dr. Benny Budiawan Tjandrasa, S.E., M.M., Maranatha Christian University, Indonesia

Dr. Bram Hadiano, S.E., M.Si., Maranatha Christian University, Indonesia

Dr. Elizabeth Susanti, B.A., M.Ds., Maranatha Christian University, Indonesia

Dr. Lina Anatan, S.E., M.Si., Maranatha Christian University, Indonesia

Dr. Pan Lindawaty Suherman Sewu, S.H., M.Hum., M.Kn., Maranatha Christian University, Indonesia

Dr. Rapina, S.E., M.Si., Ak., CA., Maranatha Christian University, Indonesia

Drs. Robert Oloan Rajagukguk, M.A., Ph.D., Psikolog., Maranatha Christian University, Indonesia

Dr. Tery Setiawan, B.A., S.Psi., M.Si., Maranatha Christian University, Indonesia

Dr. Yenni Carolina, S.E., M.Si., Maranatha Christian University, Indonesia

Dr. Yuspendi, M.Psi., M.Pd., Psikolog. Maranatha Christian University, Indonesia

Dr. Anton Sutandio., Maranatha Christian University, Indonesia

Dr. Christine Claudia Lukman, Dra., M.Ds, Maranatha Christian University, Indonesia

Dr. Dra. Ita Salsalina Lingga, M.Si. Ak., Maranatha Christian University, Indonesia

Dr. Dra. Jacinta Winarto, M.T., Maranatha Christian University, Indonesia

Dr. Fenty Siregar, Maranatha Christian University, Indonesia

Dr. Gianti Gunawan M.Psi Psikolog, Maranatha Christian University, Indonesia

Dr. Indah Soca Kuntari, M.Psi, Psikolog, Maranatha Christian University, Indonesia

Dr. Irene Prameswari E, M.Si, Psikolog, Maranatha Christian University, Indonesia

Dr. Jacqueline, M.Si Psikolog, Maranatha Christian University, Indonesia

Dr. Jane Savitri, M.Si, Psikolog , Maranatha Christian University, Indonesia

Dr. Krismanto Kusbiantoro, Maranatha Christian University, Indonesia

Dr. Maria Yuni Megarini, M.Psi, Psikolog, Maranatha Christian University, Indonesia

Dr. Meilani Rohinsa Sitompul, M.Psi, Maranatha Christian University, Indonesia

Dr. Missiliana Riasnugrahani, M.Si, Maranatha Christian University, Indonesia

Dr. Ria Wardani, M.Si,Psikolog, Maranatha Christian University, Indonesia

Dr. Se Tin, S.E., M.Si., Ak, Maranatha Christian University, Indonesia

Dr. Sri Iriantini M.Hum, Maranatha Christian University, Indonesia

Dr. Trisnowati Tanto, M.Hum., Maranatha Christian University, Indonesia





Joni, S.E., M.Si., Ak., Ph.D, Maranatha Christian University, Indonesia

Maya Malinda, S.E., M.T., Ph.D., Maranatha Christian University, Indonesia

Monica Hartanti, S.Sn., M.Ds., Maranatha Christian University, Indonesia

Prof.Dr.Dra. Marcellia Susan Karnadi, M., Maranatha Christian University, Indonesia

Prof.Dr.Drs. Wilson Bangun, M.Si., Maranatha Christian University, Indonesia

Tan Ming Kuang, Ph.D, Maranatha Christian University, Indonesia

Yohanes Hermanto Sirait, S.H., LL.M., Maranatha Christian University, Indonesia

### **Editors of ICETES**

Dr. Indah Victoria Sandroto, S.T., M.T., PgDipBusAdm., Maranatha Christian University, Indonesia

Dr. dr. Julia Windi Gunadi, M.Kes., Maranatha Christian University, Indonesia

Dr. dr. Meilinah Hidayat, M.Kes., Maranatha Christian University, Indonesia

Dr. Ir. Mewati Ayub, M.T., Maranatha Christian University, Indonesia

Dr. dr. Oeij Anindita Adhika, M.Kes., Maranatha Christian University, Indonesia

Dr. Riko Arlando Saragih, S.T., M.T., Maranatha Christian University, Indonesia

Dr. dr. Rita Tjokropranoto, M.Sc., Maranatha Christian University, Indonesia

Robby Yussac Tallar, S.T., M.T., Dipl.IWRM., Ph.D., Maranatha Christian University, Indonesia

Setia Budi, S.Kom., M.Com., Ph.D., Maranatha Christian University, Indonesia

Dr. dr. Theresia Monica Rahardjo, M.Si., Sp.An., Maranatha Christian University, Indonesia

Dr. Yosafat Aji Pranata, S.T., M.T., Maranatha Christian University, Indonesia

Dr. Ratnadewi, S.T., M.T., Maranatha Christian University, Indonesia

### **Editors of ICEHUMS**

Prof. Jong Seong Kang., Chungnam National University, Korea

Prof. Hae Dong Jang, Hannam University, Korea

Prof. Lawrence Young, University of Warwick, United Kingdom

Prof. Viroj Boon, Chulalongkorn University, Thailand

Dr. Emmanuel Jean-Francois, Ohio University, United States

Dr. Ratnadewi, S.T., M.T., Maranatha Christian University, Indonesia



## Virtual Conference Instructions

### General Information

ICETES-ICEHUM 2021 is a virtual conference which uses konfrenzi as its platform. There will be a co-host, a Session Chair, presenters, and guests for each session. The co-host and the Session Chair will be the persons in charge of facilitating the use of technology and coordinating the session and manage the Q&A respectively.

### Session instructions

#### 1. Beginning of the Session

- The Session Chair will introduce the presenter and then the technical assistant (or student) will play the video recording that the presenter has submitted. It will be followed by live Q&A.
- The duration of all presentation types is as follow:
  - Keynote speech: (20 minutes).
  - Recorded presentation (video) = max. 10 minutes per session.
  - Live Q&A = max. 5 minutes.
  - For opening and closing ceremonies, both ICE-TES and ICEHUMS participants can use the link below:

#### INTERNATIONAL CONFERENCE ON EMERGING ISSUES – ICE HUMS

Time: This is a recurring meeting Meet anytime

Join Zoom Meeting

<http://gg.gg/ICEHUMS>

Meeting ID: 858 132 1255

Passcode: ICE



## 2. Prior to the session

- The co-host will prepare the designated Go To Webinar session (10 minutes before the Session) and begin recording (2 minutes before the Session).
- The Session Chair introduces the session (1 minute before the Session).
- The participants of ICE-TES and ICE-HUMS can use the links below to access each event separately, except for the opening and closing ceremonies (we use ICE-HUMS link only).

### INTERNATIONAL CONFERENCE ON EMERGING ISSUES – ICE HUMS

Time: This is a recurring meeting  
Meet anytime  
Join Zoom Meeting  
<http://gg.gg/ICEHUMS>  
Meeting ID: 858 132 1255  
Passcode: ICE



### INTERNATIONAL CONFERENCE ON EMERGING ISSUES – ICE TES

Time: This is a recurring meeting  
Meet anytime  
Join Zoom Meeting  
<http://gg.gg/ICETES>  
Meeting ID: 869 481 9461  
Passcode: ICE



## 3. End of the Session

- Before ending the session, the Session Chair will fill out the evaluation form.



## Virtual Conference using Konfrenzi Platform

The global COVID-19 pandemic, which is still occurring to date, has resulted in impediments to the holding of scientific/academic conferences in Indonesia. One alternative solution to this problem is to hold virtual conferences by utilizing online information and communication technology. This onference can be accessed via the link: <https://konfrenzi.com/link/WM9CqjF>. In general, there are two types of virtual conferencing, which are briefly described below.

### 1. Synchronous Virtual Conference (SVC)

The implementation of the SVC is very similar to a traditional conference, except that the presentation sessions go completely online; thus, the physical meeting is eliminated. The presenter's talk time is still limited as usual (a session moderator is needed), and the interaction with the audience (questions and answers) must also be instantaneous. The point is, everything (presentations and questions and answers) is carried out in real time via the internet / online. Some of the popular applications that can be used for example are ZOOM, Google Meet, Skype, WebEx, and many other applications as well. Since it is implemented in real time with a very limited time, many technical problems might occur in VirtualConf SVC. The problems might be a slow or even intermittent presenter / audience internet connection, technical difficulties with laptop / smartphone cameras, problems with mic / speaker, background noise, laptop hangs suddenly, gadget runs out of battery, and so on. These problems might result in ineffective presentation sessions.

### 2. Asynchronous Virtual Conference (AVC)

The implementation of AVC is different from traditional conferences. The concept is quite simple, namely physical meetings are eliminated and all presenters make video recordings of their presentations instead. The video is then uploaded to the internet by each presenter, so that other conference participants can watch and listen to the presentation video. Then, the interaction with the audience is carried out online, through an online question and answer forum. The committee opens access to view video presentations and opens a question and answer forum for a rather long period of



time, for example for one week. Thus, even if the presenter / audience experiences technical problems at a certain point in time, this will not be too much of a problem, because the presentation video can be viewed again at any other time, and also the question-and-answer interaction can be held at any time within one week. Thus presentation sessions can be very effective. There are quite a number of conferences that have been held virtually / online, even a few years ago (especially in Europe and America) before the outbreak of the COVID-19 outbreak, both with the SVC and AVC methods. We can find many articles on the internet discussing the advantages and disadvantages of each method (SVC and AVC) and taking valuable lessons from their various experiences. Based on these articles, we recommend implementing VirtualConf with the AVC method rather than SVC. The Konfrenzi platform can be used for the implementation of VirtualConf both SVC and AVC. Konfrenzi can be directly used for SVC implementation, where the stages are exactly the same as traditional conferences. Especially for the implementation of AVC, we have recently complemented our system by adding new features in the form of a Presentation Video Embedding (YouTube-based) and also an Online Question & Answer Forum. AVC features are available in the Premium and Ultimate license packages, and not available in the Standard license package. We hope the brief information is useful to make you familiar with Konfrenzi.com.

## Guidelines for Scientific Video presentation

### A. Rules for Scientific Presentation

1. Every scientific presentation will be in a form of a recorded video (maximum duration 10 minutes) followed by a live Q&A (maximum duration 5 minutes).
2. Thus, every presenter should prepare his/her recorded presentation in a form of a video file (one file such as .mp4) of maximum 10 minutes. He and she also has to record the content of the presentation using Microsoft Power Point in English with maximum file size 100 MB and upload it to YouTube. Please submit the link YouTube file into the Konfrenzi system.
3. Audiences are not allowed to record, download, copy, or edit the presentations.

### B. Tips for preparing video file for scientific presentation

1. Before recording your presentation, please prepare the following items:
  - a. Microsoft PowerPoint Presentation slides.



- b. Laptop/computer.
  - c. Microphone.
2. To record your voice and make sure the video is audible. Please connect the microphone/headset to your laptop/computer.
  3. Since your voice will not be recorded while you switch the pages, you will have to finish your words before you go to the next page.
  4. Hyperlinks are not available for the recorded presentation; thus, if you would like to play videos, please embed them directly in the slides.



## Instruction for Session Chairs/Presenters/Attendees

### Session Chairs

A session chair will be responsible for:

- Introducing the session, and then each author/paper-title before playing the video.
- Observing and taking notes of questions from Q&A panel during the presentation playback.
- Reading the questions to the presenter during the Q&A period with absolutely no delay on the allocated Q&A slots.
- Concluding the session and filling out the evaluation form.
- Making sure the session starts and finishes on time.

Notes for the Session Chair:

- Please join the session at least 15 minute in advance by clicking a link that Organizer will provide via email.
- Please check and test your microphone once joined so that the session can start on time.
- Please turn on your video to engage the attendees during the sessional introduction and Q&A.
- Please turn off the video when the video is played so that the attendees can focus on the talk video.
- Please make sure to ask the questions verbally and according to the FIFO time they were first submitted.
- Please feel free to ask some of your question when there are not many questions from the audience.
- If the attendee needs to clarify their question, the Session Chair may unmute the attendee who placed the question to make clarifications.
- Please be mindful of the Q&A time limits! Any delays on the predetermined slots of each session will push other sessions behind.



## Presenters

- Please join at least 15 minutes before your designated time slot by clicking the link that the organizer will send you via email.
- Please be present during the video playback as well as the Q&A session.
- During the replay of the presentation video, your microphone will be muted during the video playback and you are encouraged to keep an eye on the attendees' questions.
- At the end of the pre-recorded presentation, your microphone will be unmuted and please open your webcam to engage well when answering questions.
- If the time does not permit you to answer some of the questions, you may want to discuss the answer off-line.
- You may stay in the session as an attendee when not presenting.

## Attendees

- Since webinars are intended to be "listen-only," the organizer will mute all webinar participants by default.
- To make sure the virtual conference runs smoothly and productively, following the introduction and the video presentation, the conference chair will moderate a brief Q&A session.
- All attendees are welcome to ask questions during the replay of the presentation video by typing your question in the given chat box.
- Since the time is limited, the Session Chair will select and ask the questions during the Q&A session.
- You will be unmuted if you would like to elaborate your questions by virtually raising hand; however, the limited Q&A duration, attendees may want to discuss with the author(s) off-line.
- You do not need to announce yourself when arriving or leaving a Session.





## Conference Schedule

The program schedule will be set in Western Indonesia Time (WIB or GMT+7).

Please adjust your time to be in line with WIB or GMT+7. Please visit <http://time.bmkg.go.id/> to get more information about WIB.

### ICE-TES Timetable

Day 1: Thursday, 1 July 2021

Day 1 (1 July 2021)		
	Activities	Description
08.50-09.00	Pre-event	Video
09.00-09.30	Opening ceremony	Prof. Ir. Sri Widiyantoro MSc. PhD. IPU Dr. Hapnes Toba, M. Sc., IPM
09.30-10.00	General Keynote Presentation	Prof. Ahmad M. Ramli
10.00-10.30		Drs. Ignasius Jonan, M.A.
10.30-11.00	Paper presentation 1	a maximum of 15minutes for each presenter
11.00-11.30		
11.30-12.00		
12.00-12.30		
12.30-13.00		Break Time
13.00-13.30	Keynote Presentation	Prof. John Silke
13.30-14.00		drg. Ferry Sandra, PhD.
14.00-14.30	Paper presentation 2	a maximum of 15minutes for each presenter
14.30-15.00		
15.00-15.30		

Day 2: Friday, 2 July 2021

Day 2 (2 July 2021)		
	Activities	Description
08.50-09.00	Pre-event	Video
09.00-09.30	Keynote Presentation	Prof. Takayuki Arai
09.30-10.00		Prof. Young Ho Kim
10.00-10.30		Prof. Dr. dr. Susy Tjahjani, M.Kes
10.30-11.00	Paper presentation 3	a maximum of 15 minutes for each presenter
11.00-11.30		
11.30-12.00		
12.00-12.30		
12.30-13.00		Break Time
13.00-13.30	Paper presentation 4	a maximum of 15minutes for each presenter
13.30-14.00		
14.00-14.30		
14.30-15.00	Closing Ceremony	Closing remark and best paper announcement
15.00-15.30		



## ICE-HUMS Timetable

Day 1: Thursday, 1 July 2021

Day 1 (1 July 2021)		
Activities	Description	
08.50-09.00	Pre-event	Video
09.00-09.30	opening ceremony	Prof. Ir. Sri Widiyantoro MSc. PhD. IPU Dr. Hapnes Toba, M. Sc., IPM
09.30-10.00	General Keynote Presentation	Prof. Ahmad M. Ramli
10.00-10.30		Drs. Ignasius Jonan, M.A.
10.30-11.00	Paper presentation 1	a maximum of 15minutes for each presenter
11.00-11.30		
11.30-12.00		
12.00-12.30		
12.30-13.00		Break Time
13.00-13.30	Keynote Presentation	Prof. Pim Martens
13.30-14.00		Dr. Dwinita Larasati, M.A.
14.00-14.30	Paper presentation 2	a maximum of 15minutes for each presenter
14.30-15.00		
15.00-15.30		

Day 2 : Friday, 2 July 2021

Day 2 (2 July 2021)		
Activities	Description	
08.50-09.00	Pre-event	Video
09.00-09.30	Keynote Presentation	Prof. Chien-Hsu Chen
09.30-10.00		Prof. Dr. Drs. Wilson Bangun, M.Si.
10.00-10.30		Prof. Dr. Dra. Marcellia Susan Karnadi, M.T.
10.30-11.00	Paper presentation 3	a maximum of 15 minutes for each presenter
11.00-11.30		
11.30-12.00		
12.00-12.30		
12.30-13.00		Break Time
13.00-13.30	Paper presentation 4	a maximum of 15 minutes for each presenter
13.30-14.00		
14.00-14.30		
14.30-15.00	Closing Ceremony	Closing remark and best paper announcement
15.00-15.30		



## ICE-TES Timetable

### Paper Presentation 1

Day 1: Thursday, 1 July 2021

ROOM A at 10:30-12:00

Artificial Intelligence, Big Data, IoT, Robotics, Multimedia and Game	Authors	Title
ABS-037	Ratnadewi Ratnadewi, Aan Darmawan Hangkawidjaja, Agus Prijono, Rudy Wawolumaja, Kartika Suhada, Maria Christine Sutandi, Andrew Sebastian Lehman, Ely Sarvia and Kervin Lusiano	Exploration of an Indonesian Currency Legality Detection System by Utilizing Image Intensity of RGB Mean Values
ABS-047	Joseph Sanjaya, Mewati Ayub, Hapnes Toba	Comparative Study of Convolutional Neural Networks-Based Algorithm for Fine-Grained Car Recognition
ABS-063	Muliady Muliady, Tien Sze Lim, Voon Chet Koo, and Nathaniel Pius Winata	Estimation of Paddy Leaf Nitrogen Status Using a Single Sensor Multispectral Camera
ABS-065	Novie Theresia Br. Pasaribu, Erwani Merry, Kalya Icasia, Jordan Eliezer, Che-Wei Lin, Febryan Setiawan	Taekwondo Poomsae-3 Movement Identification by using CNN
ABS-076	Semuil Tjiharjadi	Design and Implementation of A Path Finding Robot Using Modified Trémaux Algorithm
ABS-091	Marvin Chandra Wijaya	Priority Petri Net Multimedia Model For Non-Deterministic Events of Multimedia Presentations

Day 1: Thursday, 1 July 2021

ROOM B at 10:30-12:00

Bio informatics, Medical and Veterinary Science	Authors	Title
ABS-005	Hanna Sari Widya Kusuma, Hartini Tiono, Philip Onggowidjaja, Selonan Susang Obeng, Wahyu Widowati, Cintani Dewi Wahyuni, Cahyaning Riski Wijayanti, Muhammad Aldi Maulana, Aditya Rinaldy, Rizal Rizal	Anti-inflammatory Activity Screening of Pineapple (Ananas comosus) Core Extract in Lipopolysaccharide-induced RAW264.7 Cell Line
ABS-008	Wahyu Widowati, Rita Tjokropranoto, Cindy Damayanti, Hanna Sari Widya Kusuma, Aditya Rinaldy, Rizal Rizal	Potential of Black Tea (Camellia Sinensis (L.) O. Kuntze) Extract as Anti-oxidant, Skin Anti-aging
ABS-009	Ervi Afifah, Hartini Tiono, Philips Onggowidjaja, Selonan Susang Obeng, Wahyu Widowati, Cintani Dewi Wahyuni, Cahyaning Riski Wijayanti, Muhammad Aldi Maulana, Tri Handayani, Rizal Rizal	Luteolin Possess Anti-Inflammatory Effect on LPS induced RAW 264,7 Cell Lines
ABS-029	Julia Windi Gunadi, Diana Krisanti Jasaputra, Decky Gunawan, Ludovicus Edwinanto, Kwee Lindawati, Harijadi Pramono, Adrian Suhendra, Ghita Sarwidyantry, Hanna Goenawan, Ronny Lesmana	The Effect of Different Intensities of Treadmill Exercise on FGF23 Gene Expression in Gastrocnemius and Soleus Muscles of Wistar Rats
ABS-038	Ermi Girsang, Chrismis Novalinda Ginting, I Nyoman Ehrich Lister, Cahyaning Riski Wijayanti, Wahyu Widowati, Rizal Rizal	Antioxidant Properties of Salacca zalacca (Gaertn.) Voss Peel Ethanolic Extract Compared to Chlorogenic Acid
ABS-043	Tiur Gantini, Hans Christian	Analyse Protein Model of the SARS-CoV-2 Virus Using Data Mining Methods

Day 1: Thursday, 1 July 2021

ROOM C at 10:30-12:00

Bio informatics, Medical and Veterinary Science	Authors	Title
ABS-067	Didik Priyandoko, Wahyu Widowati, Cintani Dewi Wahyuni, Hanna Sari Widya Kusuma, Rizal Rizal	Antioxidant Properties of Soybean (Glycine max) Extract and Its Compounds
ABS-083	Dian Ratih Laksmiawati, Diah Ika Pratami, Wahyu Widowati, Hanna Sari Widya Kusuma, Cahyaning Riski Wijayanti, Cintani Dewi Wahyuni, Ervi Afifah, Rizal Rizal	Significance of Antioxidant Properties of Curcuma longa L. and Curcuma xanthorrhiza rhizomes
Dental Science and Advanced Dentistry	Authors	Title
ABS-034	Vinna Kurniawati Sugiaman, Henry Yonatan Mandalas, Ethan Yeshael Tanamal, Nathalia Cahya Calista, Natalia Pranata	The Effect of Agarwood Leaves Ethanol Extract on Porphyromonas Gingivalis Growth Inhibition and in Vitro Cytotoxicity Assay on Fibroblast
ABS-087	Aprianisa Obsidiany Daisy Tarigan, Hendra Polii and Rosalina Intan Saputri	Comparison of Two Dental Age Estimation Methods: the London Atlas and the Schour & Massler Atlas in 3-23 Years Old Indonesian
ABS-095	Rudy Djuanda, Eliza Madyanty, Almira Anggarini Witjaksono, Vinna Kurniawati Sugiaman, Natalia Pranata	The Effect of Apple Vinegar as an Irrigation Solution to Dental Root Canal Microstructure



## Paper Presentation 2

Day 1: Thursday, 1 July 2021

ROOM D at 14:00-15:30

Electrical, Electronics, Computer Engineering and Science	Authors	Title
ABS-049	I Gede Made Kama, I Ketut Gede Darna Putra, Made Sudama and Linawati	The Color Dissimilarity Based Method Among Other Segmentation Methods: a Comparison
ABS-054	Sodikin- Hendramawat Aski Safarizki	Safety Driving Behavior of Adolescents Pre-Owning Driving License (SIM)
ABS-064	Erwani Merry Sartika, Novie Theresia Br. Pasanbu, Richard Setiawan, Reynaldy Felicius Gunawan, Dion Melvern Siswanto, Che-Wei Lin, and Febrian Setiawan	Virtual Reality Stimulants of Motor Ability through the Virtual Reality-Based Game
ABS-094	Zainal Anifin- Linda Fitri	Implementation of Battery Energy Storage System at Cirata PV Solar Floating for Reducing the Electricity Cost Production on Jamali Grid
Process Automation, Scheduling and Adaptive Industrial Engineering	Authors	Title
ABS-068	Novie Theresia Br Pasanbu, Vivi Anisandhy, Christina, Elty Sarvia, Rainisa Maini Heryanto, Erwani Merry Sartika, Audyati Gany, Olga Catherina Pattipawaej, Richard Setiawan, Jessica	Design of Bilateral Hand Movement Device
ABS-081	Winda Halim, Rainisa Maini Heryanto, Santoso, Christina, Erwani Merry Sartika, Audyati Gany, Andrew Sebastian Lehman, Anggie Ervany Haryono, Vieni Candhya Wigayha	Experimental Design of Driving with Distractions at Urban Area using Simulator Driving

Day 1: Thursday, 1 July 2021

ROOM E at 14:00-15:30

Geo informatics, Building Structure, Landscape and Architecture	Authors	Title
ABS-021	Robby Yussac Tallar, and Teofilus Sawang	Experimental Study on Velocity Profiles due to Ecological Barriers
ABS-023	Efferiki, Robby Yussac Tallar, Alexander Yovan Suwono	Investigation on the Effectiveness of Riprap Layer Design for Circular Bridge Pier
ABS-025	Cut Talitha Salsabila Nuraprii, Robby Yussac Tallar, Alexander Yovan Suwono	Comparative Study of Riprap Model Design for Scour Protection of Bridge Pier
ABS-026	Dea Lidya, Robby Yussac Tallar, Alexander Yovan Suwono	The Experimental Study of Optimum Thickness on Riprap Layer Design
ABS-027	Daud Rahmat Wiyono, Roi Milyardi, YosafatAji Pranata, and Robby Y Tallar	The Effect of Seismic Masses in Calculation of a 17 Multi-story Concrete Structure
ABS-030	Deni Setiawan, and Stefanny Abigail	Identification of Risk Factors for Delayed Time Schedule in Summarecon Serpong Playfield Preschool Project

Day 1: Thursday, 1 July 2021

ROOM F at 14:00-15:30

Geo informatics, Building Structure, Landscape and Architecture	Authors	Title
ABS-033	Roi Milyardi <sup>1</sup> , Deni Setiawan <sup>2</sup> and Tri Octaviani Sihombing <sup>3</sup>	Flood Risk Assessment of Heritage Building in Semarang City
ABS-052	Jeffrey Limas Lim, Ayomi Dita Rarasati, and Mohammad Ichsan	Identification of Risks in Making Decision for Overseas Expansion by Indonesian State-Owned Construction Enterprise
ABS-053	Rumasoreng W.A.K., Karyadi, and Nindyawati	Pull-Out Resistance of Glued-In Rod Embedded Parallel to Grain in Laminated Bamboo with Two Edge Distance Variations
ABS-066	Marwahyudi, S Sangadji, Halwan Alfisa Saifullah, S.A. Kristiawan	Experimental Study of Shear Strength of <i>Purus Lobang Berkait</i> (PLB)-Masonry Wall
ABS-073	Noek Sulandari, Cindrawaty Lesmana, Cindy Maria Setyana	Engineering Education: Measuring the Relationship Between Knowledge and Confidence to the Student Performance
ABS-097	Ferlina Sugata, Nathalia Yunita Sugiharto, Nina Nurviana, Seriwati Ginting, Isabella Istipraya Andreas, Shirley Nathania Suhanjoyo, Andi A. Hamzah and Heddy Heryadi	Bio-Cord as an Ecotechnological Wastewater Treatment for Productive and Attractive Urban Open Spaces



### Paper Presentation 3

Day 2: Friday, 2 July 2021

ROOM G at 10:30-12:00

Health informatics, Public Health, and Clinical Research	Authors	Title
ABS-016	July Ivone, Stella T Hasianna and Victor Yohanes S, Vilia Ruthy W	Relationship between Low Birth Weight (LBW), Birth Length, Basic Immunization History and Stunting in Children Age 9 - 60 Months in Kabupaten Purwakarta
ABS-040	Nur Ika Haniastuti, Nike Susanti, Hana Apsari Pawestri and Kartika Dewi Puspa	Application of Freeze-thaw Harvest for SARS-CoV-2 PCR EQA Panel Material
ABS-046	Charissa Lazarus, Khamelia Malik	Suicide and Narcissistic Personality Traits: a Review of Emerging Studies
ABS-058	Elty Sarvia, Elizabeth Wianto, Erwin Ardianto Halim, Elvira Natalia	Expected Variables to Design Sleeping Facilities for the Elderly Based on the Potential Stakeholders Point of View
ABS-093	Wahyu Widowati, Teresa Liliana Wargasetia, Fanny Rahardja, Rimonta F Gunanegara, Hanna Sari Widya Kusuma, Seila Arunwardana, Cintani Dewi Wahyuni, Aditya Rinaldy, Cahyaning Riski Wijayanti, Tri Handayani, Rizal Rizal	Potential of Wharton's Jelly Mesenchymal Stem Cells as an Alternative Candidate for Covid-19 Therapy

Day 2: Friday, 2 July 2021

ROOM H at 10:30-12:00

Software Engineering, Information and Communication Technology	Authors	Title
ABS-011	Apliana Fajri Wibowo, Yova Ruldeviyani	Factors Affecting Success of Team Members in Indonesia Scrum Implementation
ABS-013	Erwin Ardianto Halim, Monica Hartanti, Maresha Caroline Wijanto, Yosepin Sri Ningsih, Hendra Setiawan, Yudita Royandi, Yunita Setyoningrum, Berti Alia Bahaduri, Aulia Wara Arimbi Putri	The Application of Digital Module Design of East Sumba Woven Fabric on Interior Accessories
ABS-057	Bayu Rima Aditya, Dina Fitria Murad, Oscar Kamalim, Aditya Permadi, Andrisyah, Fathul Jannah, and Irawan Nurhas	The Use of Technology in Indonesian K-6 Education during Covid-19 Pandemic: a Review
ABS-060	Febina Anastasha, Teddy Marcus Zakaria	Build Software of Information Management Community Service Events
ABS-096	Bernard Renaldy Suteja, Wilfridus Bambang Triadi Handaya	User Interactions Analysis on a Moodle-based online Learning Management System during Pandemic

### Paper Presentation 4

Day 2: Friday, 2 July 2021

ROOM I at 13:00-14:30

Nutrigenomics and Food Science	Authors	Title
ABS-019	TE Pramudito, EGA Putri, E Pahuphi, G Florencia, MR Gunawan, MP Pratiwi and Y Yogiara	Bioactivity of Soybean Tempeh Against Diarrhea Associated Pathogen is More Correlated with the Number of Total Bacteria than Specific Major Bacterial Phylum
ABS-031	Diana Krisanti Jasaputra, Julia Winda Gunadi, Penny Setyawati Martioso, Larissa, Yenny Noor, Ima Pezmanasari Gani, Erik Dwikumia Saimari, Desman Situmorang, Andi Haryanto	Effects of Herbal Ingredients (Allium Sativum, Punica granatum, Curcuma longa, Curcuma xanthorrhiza) on FATP3 Gene Expression in Aorta of High Fat Diet-fed Rats: a Preliminary Study
ABS-055	Sri Wulandari, Makhmudun Aimun and Anggoro Cahyo Sukartiko	Biochemical Characteristics of Ground Robusta Coffee under Various Postharvest Technologies and Processing Parameters
ABS-092	Deni Rahmat, Wahyu Widowati, Etik Mardiyati, Eny Kusnini, Abdi Wira Septama, Yati Sumiyati, Mita Restinia, Sjaikhurizal El Muttaqien, Cintani Dewi Wahyuni, Hanna Sari Widya Kusuma, Muhammad Aldi, Tri Handayani, Rizal Rizal	Substantially Improved Antioxidant Activity of Modified Polymeric Nanostructure Entrapping Curcumin

Day 2: Friday, 2 July 2021

ROOM J at 13:00-14:30



Machine Learning, Edge Computing, Deep and Federated Learning	Authors	Title
ABS-032	Hendra Bunyamin, Hapnes Toba, Meyliana, and Roro Wahyudiningsih	Breast Cancer Histopathological Image Classification Using Progressive Resizing Approach
ABS-082	Natalia Hartono	Multi-objective Bees Algorithm for Feature Selection
ABS-089	Audyati Gany, Meilan Jimmy Hasugian, Erwani Merry Sartika, Novie Theresia Br. Pasanbu, Hannah Georgina	Eye Abnormality Automatic Detection Using Deep Learning based Model

## ICE-HUMS Timetable

### Paper Presentation 1

Day 1: Thursday, 1 July 2021

ROOM K at 10:30-12:00

Family, Gender and Intergenerational Issues	Authors	Title
ABS-26	Jeanyfer, Eva Tuckyta Sari Sujatna, Susi Yuliawati, Trisnowati Tanto	Female Representation in <i>Legenda</i> : Tangkuban Perahu: a Transitivity Analysis
ABS-36	Affah Z. Sani, Destie N. Ramadhan, Minerva Patricia, Pingkan C. B. Rumondor, Farah M. Djalal	How do Indonesians perceive Marriage? Semantics Analysis of Marriage as a Concept and its Relation with the Well-Being
ABS-50	Abd Rahman, Sri Rum Giyarsih, Sigit Herumurti BS	Desire to Have Children Assessed from Socioeconomic Context Post Disaster in Palu
ABS-59	O.Irene Prameswari Edwina, Tessalonika Sembiring, Cindy Maria, Jean Esparanci	Family Resilience: Traits, Positivity, and Close Relationship in Adolescents
ABS-60	Ria Wardani, Ira Adelina, Heliany Kiswantomo	Predicting Retention: Sociodemographic, Motivational, and Perceived Social Support Factors
ABS-64	Fenty Lidya Siregar, Henni, Silvanni Comara	The Representation of Gender in Gamer's Politically Correct Bedtime Stories: a Critical Stylistic Analysis

Day 1: Thursday, 1 July 2021

ROOM L at 10:30-12:00

Financial Models, Accounting, Marketing and	Authors	Title
ABS-20	Tan Ming Kuang, Lidya Agustina, and Yani Monalisa	Using Educational Game for Improving Students' Knowledge and Interest in Investing in the Capital Market
ABS-24	Apriani D.R. Atahau, Imanuel Madea Sakti, Andrian D. Horuta, Min-Son Kim	Green Microfinance and Renewable Energy: Empowering the Role of Women in Rural Areas
ABS-34	Yenni Merlin Djajalaksana and Doro Edi	Utilization of Digital Marketing after Covid-19 Pandemic in Indonesia Businesses
ABS-41	Moh Farid Najib	Assessing Business Performance of the Traditional Market Trader: the Role of Buyer-Supplier Relationship and Dynamic Capabilities
ABS-51	Maya Malinda, Asni Harianti, Yolla Margaretha, Henky Lisan Suwarno, Kaleb Immanuel Yahya, Miki Tjandra	Comparison of Financial Literacy for Micro, Small and Medium Enterprises Entrepreneurs at Bojong Soang upon Using Financial Planning Application "SAKA (paSAK Abdi)"
ABS-57	Rhosalina Damayanti, Adrian Izaak Rompis and Aprina Nugrahesthy Sulistyia Hapsari	Testing the Internal Control of Simda Application in Effort to Improve Public Accountability

Day 1: Thursday, 1 July 2021

ROOM M at 10:30-12:00

Financial Models, Accounting, Marketing and Economic Growth	Authors	Title
ABS-62	Rima Kusuma Rini, Nanda Ayu Wijayanti	Does Socioeconomic Factors drive Peer to Peer Lending? Analysis in Indonesia
ABS-65	Christina Wirawan	Bibliometric Analysis of Product-Service System Related to Life Cycle
ABS-77	Elvira Luthan, Yulia H. Yeni, En Besra	Analysis of Factors Affecting the Sustainability of Village-Owned Enterprise in the Province of West Sumatera
ABS-80	Ita Salsalina Lingga	The Importance of Internal Control on Accounting Information System's Quality: Survey on Banking Sector
ABS-99	Ilham Pranata, SeTin SeTin	The Roles of Organizational Politics and Fairness in the Relationship between Relative Performance Evaluation and Managerial Performance
ABS-110	Marcellia Susan, Jacinta Winarto, Agus Anbowo, Yusuf Osman Raihin, Martalena, Herlina, Herman Kambono, Enny Prayogo	Sustaining Customer Loyalty in Higher Education

### Paper Presentation 2



1st INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN TECHNOLOGY, ENGINEERING AND SCIENCE  
&  
1st INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN HUMANITY STUDIES AND SOCIAL SCIENCE  
1-2 JULY 2021 | VIRTUAL CONFERENCE



Published by:

Evaluation for indexation:

Scopus®

Day 1: Thursday, 1 July 2021

ROOM N at 14:00-15:30

Financial Models, Accounting, Marketing and Economic Growth	Authors	Title
ABS-135	Rifal Hijira, SeTin SeTin	The Interactive Effects of Superior Trust and Subordinate Involvement in Decision Making on Budget Gaming and Budget Value
ABS-139	Michael Christian, Lasmary RM Girsang, Henilia Yulita	Measuring Ease of Use Aspects of Shopee Usage Behaviour During Pandemic Using the PLS-SEM Approach
Psychological, Education and Social Resources in the New Normal	Authors	Title
ABS-75	Yuspendi, Trisa Genia C. Zega, Indah Soca R. Kuntari, Lie Fun Fun, and Ida Ayu N. Kartikawa	The Role of Adult Attachment and Spiritual Well-Being Towards Wife's Marriage Satisfaction in the Muslim Community of Bandung
ABS-109	Imelda Junita, Fanny Kristine, Sherlywati, Rizki Muhamad Sidik	Potential Relationship between Students' Satisfaction on University Attributes and Positive or Negative Word-of-Mouth (WOM) and Its Correlation with their Recommendations
ABS-115	Pumama E.D. Tedjokoesoemo, Poppy Firtatwentyana Nilasari, and Sriti Mayang Sari	Addressing The Independent Learning Curriculum ( <i>Kurikulum Merdeka Belajar</i> ) as a Form of Positive Disruption to Empower the Community
ABS-134	Robert O. Rajagukguk, Candra Sinuraya, Jane Savitri, Kristin Rahmani, Stephanie Andamani	Model of Student Identity Development by Chickering Theory

Day 1: Thursday, 1 July 2021

ROOM O at 14:00-15:30

Hybrid Approaches to Create Sustainability in Arts and Design	Authors	Title
ABS-8	Elizabeth Wianto, Monica Hartanti	The Role of Sustainable Packaging Design for West Java Local Products
ABS-16	Ariesa Pandanwangi- Dewi Isma Aryani- Belinda Sukapura Dewi- Ismet Zaenal Effendi- Wawan Suryana- MikyEndro Santoso- Leonardo- Beni Sasmito	Spiritual Value: a Mythological Figure in Keraton Kanoman Cirebon
ABS-40	Christine Claudia Lukman, Krismanto Kusbiantoro, Irena Vanessa Gunawan, Lois Denissa, Eliati Djakaria, I Nyoman Natanael, Grace Caroline Sahertian, Wenny Anggraini Natalia	Multidiscipline Hybrid Approach in Art and Design Education to Support the Sustainability of Batik Cimahi
ABS-46	Greysia Susilo, S.E., S.Sn., M.Hum., Veila Venisia	Changes in Interior Design Programming at Residencials after Covid-19 Pandemic
ABS-82	Lois Denissa	JFC Timeless Uses Hybrid Codes in Costumes for Reaching Sustainable Identity
ABS-87	Isabella Istihpraya Andreas, Shiry Nathania Suhanjoyo, Andi Aulia Hamzah, Ferlina Sugata, Nathalia Yunita Sugiharto, Nina Nurviana, Heddy Heryadi, and Seriwati Ginting	The Improvement of <i>Jamu</i> Appeal Using Creative Sales Strategy and Contemporary Design

Day 1: Thursday, 1 July 2021

ROOM P at 14:00-15:30

Hybrid Approaches to Create Sustainability in Arts and Design	Authors	Title
ABS-105	Ratnadewi, Agus Prijono, Ariesa Pandanwangi, and Andrew Sebastian Lehman	Preservation of the Tasikmalaya <i>Batik</i> Motif with Turtle Graphics
ABS-121	Ariesa Pandanwangi, Ratnadewi, Agus Prijono	Local Potential as the Source of <i>Batik</i> Design Using Turtle Graphics
ABS-151	Hayu Puspasari Saputi	Arumawa II: New Normal and Sustainable Café Concept in Turirejo, Malang, East Java
ABS-152	Elizabeth Susanti Gunawan, Krismanto Kusbiantoro and Sugiri Kustedja	Transformation of a Chinese Cultural Heritage House in Bandung: Towards Sustainability
ABS-153	Kezia Clarissa Langi, Dian Widiawati, Setiawan Sabana, and Tusita Metadevi Jayamangalani Suprpto	Development of Weaving Craft Motif Designs as a Diversification Attempt for Nias Local Souvenir Products
ABS-154	Petrus Gogor Bangsa- Wening Udasmoro, and Christian Budiman	Self-taught Online Graphic Designer in Salaman, Magelang: Between Art Work, Decent Work and Vulnerable Work

## Paper Presentation 3

Day 2: Friday, 2 July 2021

ROOM Q at 10:30-12:00



Law and Legal Systems for Sustainable Development	Authors	Title
ABS-9	Johannes Ibrahim Kosasi- Yohanes Hermanto Sirait	Urgency in Using Indonesia Language on Business Contracts and Potency of Investment Dispute (the Study of Supreme Court Decision Number 601 K/Pdt/2015)
ABS-10	Tresnawati	Corporate Social and Environmental Responsibility Regulation and Implementation in Indonesia: Contribution for Sustainable Development or Legalized Robbery?
ABS-15	Rahel Octora , Fauzan Hanif M.	Financial Exploitation by Spouse, a Crime in Private Space (an Overview Based on Indonesian Legal System)
ABS-53	Ida Sumarsih	Study of Stock Ownership Nominee Agreement in Mining Business to People's Welfare that is Aligned for Sustainable Development Goals
ABS-70	Reggiannie Christy Natalia	Part Time Working Arrangement in Omnibus Law as Part of Sustainable Development and How it is Implemented in Developed Countries
ABS-108	Agus Setiawan, Harris Wiguna, Pan Lindawaty Suherman Sewu	Good Faith Principle and Legal Protection over Parties Related to Fiduciary Certificate in the Constitutional Court Decision in Indonesia after the Constitutional Court Decision Number 18/PUU-

Day 2: Friday, 2 July 2021

ROOM R at 10:30-12:00

Mental Health, Human Resources, Leadership and Well-being	Authors	Title
ABS-22	Misshiana Riasnugrahani, Meta Dwijayanthi, Cindy Maria	Calling and Work Engagement in Priest: the Moderating Role of Social Support
ABS-23	Susanti Saragih, Meily Margaretha, Sherlywati	The Role of Calling and Job Crafting on the Promotion of Employee Engagement for Organizational Sustainability
ABS-28	Hasna Fauziati Zakkiyah, Stella, Farah Mutiasari Djalal, & Yosef Dedy Pradipto	What does Sejahtera mean to you? The interpretation of Sejahtera based on money-saving habit, happiness, and life satisfaction
ABS-58	Ida Ayu Nyoman Kartikawati, Lie Fun Fun , Lisa Imelia, Stephanie Andamani	Teacher Self Efficacy and Work Engagement: the Mediating Role of Psychological Well Being
ABS-63	Heliany Kiswantomo & Theofanny	Neuroticism and Subjective Well-Being in Faculty of Psychology Student
ABS-66	Leonardus Dewa Hardana, Rayini Dahesihnsari	Internal Change Agents' Strategies to Deal with Boundary in Organizations in Indonesia

Day 2: Friday, 2 July 2021

ROOM S at 10:30-12:00

Mental Health, Human Resources, Leadership and Well-being	Authors	Title
ABS-091	Pingkan C. B. Rumondor , Elien Rosalie, Syifa Fauziah, Adriana Ginanjar, Claudia Chiarolanza, Ashley K. Randall	Perceived Individual, Partner, and Community Stressors Related to Covid-19 Quarantine in Indonesia: a Qualitative Study
ABS-094	Efnie, Indrianie	Brain Respiration to Overcome Stress People Who Live with HIV (ODHIV)
ABS-101	Rhea Griselda- Olivia Gunawan- Laksmi Kusuma Wardani	The Interior of Medium-Scale Business Tiara Handicraft in Surabaya with Accessible Design Principle for Mentally and Physically Disabled Employees
ABS-102	Mutiara Ramadhita Roesad, Pingkan Cynthia Belinda Rumondor	Happily Married in the Absence of a Child: Marital Satisfaction of Voluntary and Involuntary Childless Individuals
ABS-136	Ka Yan, Priska Analya	Gratitude Journal, Expressive Writing and Mindfulness
ABS-138	Henilia Yulita, Vincencius Farrel Jonathan, Yustinus Yuniarto, Michael Christian, Eko Retno Indriyarti, Suryo Wibowo	The Role of Affective Commitment in Mediating the Relationship between Authentic Leadership and Organizational Learning at Chicken-Based Food Processing Company in Indonesia

Day 2: Friday, 2 July 2021

ROOM T at 10:30-12:00





Mental Health, Human Resources, Leadership and	Authors	Title
ABS-155	Ni Luh Ayu Vivekananda, Evi Ema Victoria Polii	Perma - a Multidimensional Framework of Well-Being in Indonesian
ABS-159	Erwin Permana, Widarto Rachbini, Wasi Widayadi, Rukun Santoso	The Dimensions of Transformational Leadership and Their Impacts on the Performance of Construction Business during Covid-19 Pandemic
Psychological, Education and Social Resources in the New Normal	Authors	Title
ABS-39	Ira Adelina, Vida Handayani, Maria Yuni Megarini	Systematic Literature Review on Mindset and the Benefits in Living New Normal Life
ABS-52	Tery Setiawan, Indah S.R. Kuntari, and Indah Puspitasa	Human Development Index in Indonesia: Are We in Line with SDGs and How Much Have We Grown?
ABS-54	Ellen Theresia , Marissa Chitra Sulastra and Serena Wijaya	Role of Parental Stress in Parenting Practice in Parents of Middle Childhood Children
ABS-76	Kriswanda Krishnapatria	Game Engagement amid Covid-19 Pandemic: Research on Students' Perception

## Paper Presentation 4

Day 2: Friday, 2 July 2021

ROOM U at 13:00-14:30

Religion, Language and Humanity Issues in Sustainable Communities	Authors	Title
ABS-2	Anton Sutandio, Ph.D.	Indonesian Film Industry amidst the Covid-19 Pandemic: an Observation on Sustainability Efforts
ABS-27	Trisnowati Tanto, Sri Iriantini	Local Wisdom in Indomie and Demae Ichoou Video Advertisements: a Multimodal Analysis
ABS-38	Mohamad Makincoiri, Mulyana	The Influences of Song Lyrics "Jagad Anyar Kang Dumadi" on the Productivity of Traditional Artists in Yogyakarta: a Critical Discourse Analysis
ABS-43	Selvia, M.Hum., Yohan Yusuf Arifin, M.His., Septeanie Sutandi, M.TCSOL.	Representation of Political, Social, and Cultural Phenomena in Biopics of Chinese Indonesian Figures Using Historical Approach
ABS-67	Brian L. Djumaty: Nina Putri Hayam Dey	Food Sustainability in Local Wisdom Perspective of the Indigenous People Dayak Tomun Lamandau
ABS-73	Dexon Pasaribu, Bagus Takwin, Pim Marten	The Role of Religious Orientation and Ethical Ideologies in Environmental Concerns amongst Teachers and School Staff in East Java, Indonesia

Day 2: Friday, 2 July 2021

ROOM V at 13:00-14:30

Religion, Language and Humanity Issues in Sustainable Communities	Authors	Title
ABS-78	Vera Budi Lestari Sihotang	Tangos Therapy: Health Behavior as the Result of Normalizing Power in Medicating Symptoms of Malaria on the Community of Sebesi Island
ABS-84	Maryani	The Perceptions of Indonesian University Students on the Use of Extensive Reading in English Grammar Class
ABS-90	Xuc Lin, Mariana, Fu Ruomei	Raising Environmental Awareness Through Teaching Chinese as a Second Language at University
ABS-95	Hurriyah	Local Religions and Contested Civic Space in Indonesia: a Case Study of Sunda Writan community in Cigugur
ABS-103	Irsanti Widuri Asih, Heru Nugroho, Budiawan	New Constellations of Power and Resistance in the Platform Economy: Study of Gojek
ABS-104	Devi Riskianingrum- Henry Yogaswara	The Recalled of Disaster Memory on Sebesi Island: a Historical Perspective

Day 2: Friday, 2 July 2021

ROOM W at 13:00-14:30

Religion, Language and Humanity Issues in Sustainable Communities	Authors	Title
ABS-106	Olivia Gunawan- Rhea Griselda- Diana Thamrin	The Influences of Chinese Culture on Historical Buildings in Surabaya
ABS-113	Rizki Theodorus Johan, S.S, M.A, Sonny Angjaya, S.S, M.Hum.	Healing Through Acting: the Therapeutic Effect through Online Monologue Performance
ABS-132	Julianti Kasih1 , Yenni Merlin Djajalaksana2 and Doro Edi3	Digital Interactions in Church Communities Attributable to COVID-19 Pandemic
ABS-156	Ullyna Dewi	Phonics Instruction for Young Learners in EFL Context: a Comparative Review
ABS-158	Muhammad Syafar, Helmy Faizi Bahrul Ulumi	Social Entrepreneurship Pesantren-Based to Support Rural Development in the Era of Covid-19 Pandemic (Case Study in District of Lebak, Banten Province, Indonesia)



## Keynote Speakers



### Ignasius Jonan

Former Minister for Energy & Mineral Resources of Indonesia (2016-2019), former Minister of Transportation (2014-2016) and former CEO of the Indonesian government-owned railway company, PT Kereta Api Indonesia (PT. KAI) which he preside from 2009 to 2014. Born in Singapore, Jonan received his Bachelor's degree in Accounting from Airlangga University, Surabaya in 1986, and M.A. in International Relations and Affairs from the Fletcher School of Law and Diplomacy and Tufts University in 2005. He started his professional

career in the banking sector, holding a managing director role in the American banking and financial services corporation, Citigroup. Right now, he is Independent Commissioner at PT Unilever Indonesia and PT Industri Jamu dan Farmasi Sido Muncul, Tbk.

### Abstract

#### "World Order after Pandemic?"

The world must move on from neoliberalism after the pandemic. According to World Economic Forum Founder Klaus Schwab Free-market fundamentalism has eroded worker rights and economic security, triggered a deregulatory race to the bottom, and prompted the emergence of massive new global monopolies. So as COVID-19 shakes the globe, it's time to re-evaluate some sacred cows. In the decades after WWII, the world made huge strides towards eradicating poverty, reducing childhood mortality, increasing life expectancy and expanding literacy. Capitalism, trade and international cooperation drove these changes, and must be defended. We must also remain focused on the Fourth Industrial Revolution and digital technology. Recent advances have given us the tools to confront the crisis through vaccines, new treatments and personal protective equipment. But it's time to confront outdated aspects of the global economy. Chief among these is the neoliberal ideology which supports free markets, financial deregulation and fiscal austerity. We must rethink what we mean by 'capital', whether financial, environmental, social or human. Today's consumers do not just want cheaper, better goods and services. Instead, they expect companies to contribute to the common good. There is a demand for a new kind of approach: stakeholder capitalism. Where businesses work to improve the state of the world, and not just shareholder profits. How do you think we can make the world a fairer place?





**Prof. Dr. Ahmad M. Ramli, SH, MH,  
FCBArb**

Born in Bandung on July 4, 1961, Prof. Dr. Ahmad M. Ramli, SH, M.H., FCBArb is Professor of Legal Studies, University of Padjadjaran who has experiences more than 10 years as Echelon I on several government agencies. In October 2016, he was appointed as Director General of Post and Information Technology, Ministry of Communications and Information Technology. He pursued education by completing the Bachelore, Master and Doctoral Program of Law (cumlaude)

at Padjadjaran University and Visiting Scholar Program at the University of California Berkeley United States, as well as some International training of Intellectual Property Rights. When he was a grand-student, he has been named by the Ministry of Education and Cultural Affairs as Exemplary Student of University of Padjadjaran in 1985.





### **Ikhsan Baidirus, SH., LLM.**

Born in Lubuk Basung on 21th June 1962, Ikhsan Baidirus, SH., LLM. is Director of Post, General Directorate of Post and Information Technology, Ministry of Communication and Informatics.

He pursued his undergraduate education at Padjajaran University, International Law, Bandung (1988), Case Western Reserve University, Master Program (Llm), Usa(2000), Westminster University, Post Graduate Certificate, London Inggris (2000).

### **Abstract**

#### **Telecommunication for Sustainable Community Development**

Telecommunication is a rapidly growing industry, this sector also plays a pivotal role as an enabler to economy and society all other sectors. Some stakeholders get to benefit directly from telecommunications to improve the quality of their products and services which in turn will enhance the health of the industry. Information communication technology plays an important role as a catalyst to enable and facilitate the implementation of the development plan. Access to borderless telecommunication infrastructure means access to knowledge. Its triggers creativity and innovation. Innovation is important to maintain company competitiveness and also for long-term advantages in company development. Economists often cite innovation as a critical element for growth. Overall telecommunications improve lives. Basic telecommunication infrastructure is the key to make ICT works. developing telecommunication networks will enable all other services providers to reach their customers. Pandemic force people to stay at their residential, its makes the need for an internet connection in community residential areas increase unprecedentedly. This condition needs to be addressed by operators accordingly by maintaining the performance of their services as well as increase monitoring of all related supporting networks including providing redundancy. Indonesia has laid 458,807 km of fiber optic cables for telecommunications backbones both on land and submarine which is not enough for a country like Indonesia. Being the largest archipelagic state whose territory is 5,26 million km square, building telecommunication infrastructure is a challenging issue. Nevertheless, all kinds of technologies are deployed to provide people with better access to telecommunication including the internet. Realizing the telecommunications and all derivatives services are becoming the new oil, the Government maintains the function of the law and regulations is to facilitate the growing needs of telecommunication access for any kind of purposes especially during the hardship caused by the covid19 pandemic. However, when new technologies are introduced such as OTT Platforms and mega constellation LEO satellites, all legal aspects must be carefully studied to maintain the beneficiaries of new technologies are public and states.



## ICETES



### Prof. John Hendry Silke

Prof. John Hendry Silke was born on 6th March 1968. He pursued his undergraduate education at King's College, University of London and Churchill College, University of Cambridge. He then continued his education at the Institut für Molekularbiologie II, University of Zürich. Currently, he is a professor & theme leader in The Walter and Eliza Hall Institute. He is also adjunct associate professor at La Trobe University, Melbourne. Furthermore, he is an editorial board member in Cell Death & Differentiation Journals and reviewing editorial board in Science Signalling Journals. Lastly, he is also a consultant in Anaxis. He has 168 publications with H-Index 65.

### Abstract

#### TNF - "Quid Custos Ipsos Custodiet" Juvenal - Who Will Guard the Guards

Tumor necrosis factor (TNF) is an inflammatory cytokine that, upon binding to its receptor TNFR1, can drive cytokine production, cell survival, or cell death and is a major component of an organism's anti-pathogen repertoire. It is a major guardian against infection, but when its regulation goes awry it can result in chronic inflammatory diseases that are a huge health burden. My lab tries to understand, using a combination of genetics and molecular biology, how TNF signalling is regulated with the hope that this will lead to new therapeutic opportunities. In the first part of my talk I will discuss a recently published study<sup>1</sup> describing a new auto-inflammatory syndrome that results from loss of one level of regulation. And in the second I will discuss unpublished work that has led to the identification of a new type of post-translational modification that limits the ability of TNF to induce cell death and which may help it guard against viral infections, including coronavirus.

<sup>1</sup>Lalaoui et al, 10.1038/s41586-019-1828-5; Mutations that prevent caspase cleavage of RIPK1 cause autoinflammatory disease, Nature 2020.





## Prof. Takayuki Arai

Prof. Takayuki Arai was born on November 12, 1966. He pursued his undergraduate education at Faculty of Science and Technology, Sophia University. He then continued his education at Faculty of Science and Technology, Sophia University. Currently, he is a professor at the Department of Information and Communication Sciences, Sophia University, 7-1 Kioi-cho, Chiyoda-ku, Tokyo, Japan. He is also a member of academic societies such as International Speech Communication Association (ISCA), The Institute of Electrical and Electronics Engineering (IEEE), The Institute of Electronics, Information and Communication Engineers, Japan (IEICE), The Acoustical Society of America (ASA), The Acoustical Society of Japan (ASJ), etc.

### Abstract

#### What is a Speech Chain and How Can This Concept Be Applied to the Various Areas of Speech Communication in an Intelligent Society?

The concept of “Speech Chain” introduced by Denes and Pinson is widely used to interpret speech communication systems. The concept was originally aimed at human speech communication: a speaker first forms a message in his/her brain, the message is transformed into an acoustic signal that is sent to a listener, and the listener decodes the signal back into the original message. This simple situation can be extended to many scenarios. The acoustic signal can be fed into a telephone and transmitted over a telephone network. In human-computer communication, the speaker can be a speech synthesis system or the listener can be an automatic speech recognition system. For people who have lost the ability to talk, a speech synthesis system can improve their quality of life, and for people who have impaired hearing, an automatic speech recognition system can be a saviour. Communication with others is crucial as we live with other people in a society. As societies transform into intelligent societies, it is even more important to investigate speech communication systems from a scientific point of view and develop relevant applications in accordance with scientific findings. In this talk, the speech production mechanism will first be reviewed by using a set of vocal-tract models. Then, Speech Chain variations will be introduced for various areas in speech communication. Finally, application of the Speech Chain concept to an intelligent society through our “My Voice” project will be shared.

Keywords: Speech Chain, Speech Communication, Speech Production, Speech Perception, Vocal-tract Models, My Voice Project





## Prof. Young Ho Kim Ph.D.

Prof. Young Ho Kim Ph.D. is a Professor College of Pharmacy in Chungnam National University, Daejeon 305–764, Korea.. He completed all of his education in College of Pharmacy, Seoul National University, Korea. He received several awards, such as Gasan Kwangdong Haksooldaesang in 2019, Good Teacher's Award (Chungnam National University) in 2018, and Haksooldaesang (Korean Society of Pharmacognosy) in 2016. He has 675 papers published and HIndex Scopus 66

### Abstract

#### Bioactive Components from Ginseng-Like Medicinal Plants

Ginseng-like medicinal plants worldwide and plant-originated adaptogens have very similar phytochemical and pharmacological properties. Several members are belonging to the Araliaceae, the ginseng family of flowering plants, and economically very important in Asian country including Korea, Japan and China. In our ongoing research for Araliaceae family plants, we focused on the phytochemical constituents and their pharmacological activities from *Panax ginseng*, *Acanthopanax koreanum*, *Kalopanax pictus* and *Dendropanax morbiferus*.

*P. ginseng* is a perennial plant and popular traditional herbal medicine that has been used to increase vitality, prolong life, enhance the resistance of the human body and have various beneficial effects, such as anti-fatigue, anti-stress, anti-anxiety, anti-inflammatory, and anti-depression. From the several parts of ginseng roots, leaves and flower buds, many new dammarane-type saponins were isolated and evaluated on pharmacological activities including effects on the intracellular radical scavenging, the growth of HL-60 human leukemia cells, the lipopolisaccharide (LPS)-induced interleukin (IL)-12 production in bone marrow-derived dendritic cells, and the myocyte contraction, respectively.

*A. koreanum* is an indigenous plant in Korea and used for arthritis, rheumatism, lameness, high blood pressure and as a tonic. Several pimarane-type diterpenoids and lupane-type triterpenoids were isolated from roots, stems and leaves of *A. koreanum*. They were tested inhibitory effects on the LPS-stimulated production of pro-inflammatory cytokines in bone marrow-derived dendritic cells.

*K. pictus* is a deciduous tree growing in East Asian countries. The stem bark of *K. pictus* has been used in traditional medicine to treat rheumatic arthritis, neurotic pain, and diabetes mellitus. The anti-inflammatory activity of isolated compounds was evaluated through inhibition of a  $\text{TNF}\alpha$ -induced NF- $\kappa$ B luciferase reporter and by attenuation of  $\text{TNF}\alpha$ -induced pro-inflammatory gene (iNOS and COX-2) expression in HepG2 cells.

*D. morbiferus*, an endemic species in South Korea, has been used as an alternative traditional medicine for several diseases, such as headache, dysmenorrhea, infectious disorders, and skin disorders, for a long time. The extract of *D. morbiferus* leaves significantly inhibited tyrosinase activity and melanin formation in MSH-induced B16-F10 cells. It reduced melanogenesis-related protein levels, such as microphthalmia-associated transcription factor (MITF), TRP-1, and TRP-2, without any cytotoxicity

This report provides scientific support to the therapeutic use of ginseng-like medicinal plants and rationale for further studies on the application of these medicinal plants and their chemical components in medical use.





## Ferry Sandra

Ferry Sandra is a lecturer in Faculty of Dentistry, Trisakti University and an adjunct lecturer at the Faculty of Pharmacy, Padjadjaran University as well as the Faculty of Medicine, University North Sumatra. Apart from being a lecturer, he is also the editor in chief of the Indonesian Journal of Cancer Chemoprevention and a consultant at Prodia. He pursued his undergraduate education in Dentistry, University of Indonesia. Then, he continued his education at Oral and Maxillofacial Surgery, Kyushu University and Molecular and Cellular Biochemistry, Kyushu University. He has published 80 scientific papers over the last 10 years.

### Abstract

#### Development of Dental Pulp Stem Cell and Its Application

Role of dental stem cells continues throughout life. The stem cells do not play a role in tooth development merely, but in tooth homeostasis and repair as well. Several types of dental stem cells, including dental pulp stem cell (DPSC), stem cell from apical papilla (SCAP), stem cell from exfoliated deciduous teeth (SHED), periodontal ligament stem cell (PDLSC) and stem cell from dental follicle (DFSC) have been investigated. Among these stem cells, DPSC is of the most well investigated. DPSC has been suggested as valuable seed cells for various pulp tissues regeneration, including blood vessels, nerves and hard tissues. Isolated DPSC was reported to express cluster of differentiation (CD)117, and have a high growth rate. However in the dental pulp regeneration, besides the stem cell, the tissue regeneration would also require infection control and biomaterial/scaffold. Infection could induce inflammatory signalling which would down-regulate the differentiation capacity of DPSC. Therefore the inflammatory signalling should be inhibited, so that the capacity of DPSC could be restored. Biomaterial as an important aspect, have been developed so that high numbers of DPSC could be produced and delivered at the targeted area/tissue. Exploration of the natural and synthetic biomaterials have been reported so far. Besides the dental pulp regeneration, DPSC has been explored to form/regenerate other tissues, in the dental surrounding or even distance parts. In bone regeneration, DPSC could form bone nodule on the third week culture. This highly bone forming capacity should be useful for articular or even maxilla/mandible regeneration. Due to its high capacity in nerve regeneration, DPSC has been developed to produce nerve tissue, including facial nerve and inner-ear hair cell. In the clinical trial scheme, DPSC is being investigated for treatment of acute Ischemic stroke. And due to current pandemic situation, DPSC is also being investigated for its safety and efficacy on severe COVID-19 cases.







## Prof. Susy Tjahjani

Prof. Dr. Susy Tjahjani, dr., M.Kes was born on Bandung, 5 September. She pursued her undergraduate education in Medicine, Maranatha Christian University. Then, she continued her education at Padjadjaran University. Currently, she is a professor in Parasitology at Medical Faculty, Maranatha Christian University. Apart from professor, she also appointed as Chair of Maranatha Christian University Senate, assessment team for lecturer/assistant professor/associate professor/promotion, research reviewer of LLDikti IV and Maranatha Christian University, and assessment team of BKD. She has published 3 books. Her latest book was published in 2020 with the title: Penelitian Biomedik dan Ilmu Kedokteran (Book Chapter). She has also published 18 scientific articles in journal over the past 10 years.

### Abstract

#### Free Radicals and Antioxidants in Covid-19

Covid-19 is an acute infection via droplets into respiratory tract which causes pandemic condition and might go to severe disease attacking multiple organ. Its pathogenesis is closely related with hyperinflammatory, oxidative stress, and hemoglobinopathy condition and these ones are very closely correlated each other. This review might have a benefit in considering anti oxidant in the study of handling covid-19. Ineffectiveness of the respiratory system by invasion of the virus via ACE2 receptor which is rich in pneumocyte 2 is not only caused by the destroyed alveolar cell but also from the AT2 overproduction which causes hyperinflammatory condition as well as oxidative stress. Overproduction of AT2 is caused by ACE2 binding with viral spike protein which reduces ACE2 activation and inhibits conversion of AT2 to other type of angiotensin (angiotensin 1-7). AT2 binds to AT1R and stimulates NADPH oxidase to produce anion superoxide and it continues to produce mitochondrial ROS and damages mitochondria so that very little ATP to be produced. AT2 is also a potent proinflammatory mediator and might stimulate prostaglandin and VEGF to increase vascular permeability, and also might upregulate adhesion molecules (VCAM 1, P-selectin, and ICAM 1) on vascular endothelial cells and smooth muscle cells, activate monocytes to adhere, stimulate TNF alpha, IL6, IL8, ROS production. The ROS might activate also NF- $\kappa$ B with further detrimental impact i.e. endothelial as well as organ dysfunction.

On the other side Covid might cause hemoglobinopathy leading to inefficient hemoglobin in transporting oxygen and also might release toxic free iron and produce ROS. Several antioxidants including natural ones are very interesting and might work against this oxidative stress in various mechanism of action such as a direct scavenger, via Nrf2 etc. The role of pro-oxidant and antioxidant in Covid-19 would be present in this seminar.

Key words: Covid-19, oxidative stress, antioxidants



## ICEHUMS



### Prof. Dr. Pim Martens

Born in June 29, 1968 at Heerlen, The Netherlands, Prof. Dr. Pim Martens has a PhD in applied mathematics and anthrozoology and holds the chair 'Sustainable Development' at Maastricht University. He is the Founding Director of the Maastricht University Graduate School of Sustainability Science (MUST), and initiated the M.Sc. program Sustainability Science and Policy. Prof. Martens is project-leader and principal investigator of several projects related to sustainability science and education, in the context of human-animal relationships, and environmental (climate) change and health. Pim Martens is member of the Editorial Boards of the scientific journals BioScience,

Sustainability: The Journal of Record, and Current Opinion in Environmental Sustainability. Furthermore, he serves as a member of the Advisory Board of the Life Science Zurich Graduate School, the Advisory Board (StAB) of the Natural Resources Institute in Finland, and the Executive Board House of Animals. For 9 years, he has been the director of the International Centre for Integrated assessment and Sustainable development (ICIS), Maastricht University, and was member of the Dutch Health Council. Finally, Dr. Martens is a Fulbright New Century Scholar within the programme 'Health in a Borderless World' and winner of the Friedrich Wilhelm Bessel-Forschungspreis. Pim Martens has been a Leverhulme professor at Aberystwyth University, Wales, a research professor at ETH Zürich, Switzerland and Leuphana University Lüneburg (Germany), and visiting scholar at the London School of Hygiene and Tropical Medicine (UK), Harvard University (USA), Heidelberg University, (Germany), ETH Zürich (Switzerland), Aberystwyth University (Wales), Leuphana University Lüneburg (Germany), and Shandong University (China).

### Abstract

#### Our Sustainability Challenges: Climate Change, Biodiversity and Health for All

Our dominant current socio-economic and political systems have become decoupled from the larger ecology of life, and our relationship with our natural environment and the animals within has changed dramatically. This has led to various outbreaks of vector-borne and zoonotic diseases – with COVID-19 as the hard lesson learned (or not?). In this lecture, Pim Martens, Professor of Sustainable Development at Maastricht University, will discuss the complexities and connections between our own well-being and that of the animals with whom we live, and global environmental changes like climate change and biodiversity loss.



1st INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN TECHNOLOGY, ENGINEERING AND SCIENCE  
&  
1st INTERNATIONAL CONFERENCE ON EMERGING ISSUES  
IN HUMANITY STUDIES AND SOCIAL SCIENCE  
1-2 JULY 2021 | VIRTUAL CONFERENCE



Published by:

Evaluation for indexation:

Scopus®



### **Dr. Dwinita Larasati, S.Sn., M.A**

Born in Jakarta, 28 December 1972, Dr. Dwinita Larasati, S.Sn., M.A is a industrial designer, lecturer, researcher at Man & Industrial Product Design Research Group, Industrial Design Program, Faculty of Art and Design, Institut Teknologi Bandung (ITB), Indonesia. She pursued her undergraduate education at Design, Industrial Design Department, Institute of Technology Bandung (ITB), Indonesia in 1991-1997. She continued her master's education in Design Research / Industrial Design, Postgraduate Program, The Design Academy, Eindhoven, The Netherlands in 1998-1999. She pursued her doctoral education at Delft University of Technology, The Netherlands and graduated in 2007. She has published 12 journals and is now an Advisory Council Member in West Java Creative Economy & Innovation Committee (KREASI Jabar).

### **Abstract**

#### **Co-Designing Our Common Future: from Sporadic Activism to Strategic Actions**

In growing dense urban areas, community development mainly attempts to cope with issues around population growth and its impacts, such as disparity, poverty, access to basic services and infrastructure, mobility, solid waste management, and matters related to environmental qualities. In the case of Bandung City, whose dynamics are determined by its youth that dominates the demography, community development has taken various shapes; among which are initiatives that created numerous prototypes of urban solutions, which eventually managed to influence regulations and government policy at the city level. These practice-based improvements have led to the formulation of methods and concepts that keep being adjusted for acuity and relevance. This discussion covers the process of how a cross-community forum in Bandung utilises design thinking method and urban acupuncture concept in intervening public spaces and in conducting participatory development; how it maps crucial stakeholders to achieve common goals; and how its actions have elevated to another level, when the forum grew into a national-level hub that also contributes to the creative economy sector at the global level.





## **Prof. Chien-Hsu Chen Ph.D**

Prof. Chien-Hsu Chen Ph.D is a professor at Industrial Design Department College of Planning and Design National Cheng Kung University, Taiwan. He completed his undergraduate education at Industrial Design National Cheng Kung University Taiwan. He continued his education at Computer and Information Syracuse University, NY, U.S.A and Industrial Engineering The University of Texas at Arlington, TS, U.S.A. He was once a Director General of Technology Transfer and Business Incubation Center (2017-2020). His areas of research is Interaction Design, Ergonomics and Design, and Augmented

Reality Application.

### **Abstract**

#### **Creative a Conceptual Design Thinking with Three Design Disciplines**

Designers create product or service to satisfy customer needs and improve daily living conditions through a creation process. Conceptual design is essentially a creation process on early-stage design. This talk is going to explore the three design disciplines from product design, interaction design and service design perspective into the conceptual design process to promote creativity. We would like to create a processing of thinking to extend designers' creativity as an extension of their design. for better understanding of the creativity and creative process, the internet of things (IOT) design issue will be used to demonstrate how this thought can work on design concept.





### **Prof. Dr. Wilson Bangun, S.E., M.Si.**

Prof. Dr. Wilson Bangun, S.E., M.Si was born in Batukarang (Karo-North Sumatra), January 31, 1964. He is a professor at Faculty of Economics, Maranatha Christian University. He also a President of the Senate in Faculty of Economics, Maranatha Christian University and Professor Forum Leader in Maranatha Christian University. He pursued his undergraduate education at the HKBP Nommensen University, Medan (1989) and continued his master education at the University of North Sumatra, Medan (1999). He then continued his doctoral education at Padjadjaran University, Bandung and graduated in 2005. He has published five books, and his most recent book is *Pembangunan Sumber Daya Manusia: Teori dan Kasus di Indonesia dan Negara-Negara Asean Lainnya*, which published in 2021.

### **Abstract**

#### **Human Resource Development: a Study in Indonesia on ASEAN**

Human Resource Development is a process to improve the ability (knowledge and skills) to increase individual productivity in contributing to the prosperity of a countries society. Indonesia is currently focusing on Human Resource Development to solve development problems in realizing Indonesian 2045 vision, namely to become a developed country, prosperous people, sovereign, just and prosperous. One of the government's programs is to improve the quality of human life. President Joko Widodo was speech at the MPR-RI Annual Session, August 16, 2018 emphasized that Human Resource Development is an investment to the nation's future towards advanced Indonesia. Human Resource Development is a performance measure for a country through a three-dimensional approach: a long life, healthy, knowledge, and a decent life and each dimension is represented in each indicator. Various indicators in Human Resource Development in Indonesia show progress but are still below some countries in Southeast Asia. To meet human needs through the development process from various aspects, such as the construction of relevant facilities and infrastructure. The purpose of development is to create and adapt it to the environment to achieve well-being. Human Resource Development is expected to improve the quality of work to improve the welfare of the people of a country.

Keyword: Human Resource Development, long life, healthy, knowledge, decent life





### **Prof. Marcellia Susan**

Prof. Marcellia Susan studied undergraduate education at the Faculty of Economics, Department of Management, Parahyangan Catholic University, Bandung. She continued her education at the Faculty of Engineering and Industrial Management, Department of Industrial Management, Bandung Institute of Technology and Doctoral Program in Business Management, Padjadjaran University, Bandung. Currently, she is a professor in Management Science at the Faculty of Economics, Maranatha Christian University, Bandung.




### **Abstract**

#### **Sustaining MSMEs: the Role of Financial Literacy**

The economic growth of a country is supported by Micro, Small, and Medium Enterprises (MSMEs), especially for developing countries. In running their businesses, MSMEs need to make various business decisions. Some business decisions may affect the potential growth and the success of a business. The lack of MSMEs' financial knowledge often results in challenges in their operating, financing, and investing decisions. Proper financial decision-making requires an understanding of finances and the ability of money management. Ultimately, MSME owners/managers with substantial financial literacy would be able to sustain their business by managing financial resources through utilizing financial knowledge and skills



# Using Educational Game for Improving Students' Knowledge and Interest in Investing in the Capital Market

Tan Ming Kuang<sup>1</sup>, Lidya Agustina<sup>1</sup> and Yani Monalisa<sup>2</sup>

<sup>1</sup>Department of Accounting, Universitas Kristen Maranatha, Prof. Drg. Surya Sumantri no. 65, Bandung, Indonesia

<sup>2</sup>Department of Management, Universitas Kristen Maranatha, Bandung, Indonesia

**Keywords:** Simulation Games, Educational Games, Card Games, Capital Market.


**Abstract:** This study examines the impact of using a card simulation game named STOCKLAB to improve students' knowledge and interest in investing in the capital market. Additionally, this study examines the effects of adding explanation—where an instructor explains the educational contents of the game to the players—during the game. A total of 172 undergraduate students from three private universities in Indonesia participated in this study and a randomized control trial with a three-group pretest/posttest research design was used. The results showed that STOCKLAB with explanation is more effective than STOCKLAB without explanation in assisting students in acquiring knowledge about capital market, but it is as effective as traditional approach. The three approaches are equally effective for improving students' interest in investing in the capital market. However, both STOCKLAB with and without explanation group reported a significantly higher level of agreement that the game is an interesting way to study capital market compared to the traditional group. This study implies that STOCKLAB can be used as an alternative approach to introduce capital market to the students if it is coupled with explanation.


## 1 INTRODUCTION


Knowledge of financial literacy has an important role in improving an individual's well-being. However, the latest national survey shows that the Indonesian people's financial literacy index is relatively low at 38.03% (Otoritas Jasa Keuangan, 2020). From various financial sectors, public understanding of the capital market is one of the lowest, i.e. at an index of 4.9% in 2019. This index means that only 4-5 out of 100 Indonesians have knowledge, skills, and confidence about the capital market in 2019. To educate the capital market to the public, the government through the Financial Services Authority (OJK) has introduced a card simulation game called STOCKLAB since 2017. OJK in collaboration with the Indonesia Stock Exchange has even held various national student-level STOCKLAB competitions in many major cities in Indonesia. Although STOCKLAB has been widely recognized nationally, studies examining the effectiveness of this card

simulation game in educating the capital market to college students are still very rare. This study aims to test the effectiveness of the STOCKLAB game to increase students' knowledge and interest in investing in stocks in the capital market.

Studies that test the effectiveness of simulation games in improving cognitive (Chen et al., 2014; Chuang & Chen, 2009; Keys et al., 2020; Morin et al., 2020; Soflano et al., 2015), psychomotor (Gopher et al., 1994; Whitehill & McDonald, 1993), and affective (Bai et al., 2012; Hwang et al., 2015; Knechel & Rand, 1994; Manero et al., 2015; Ruggiero, 2015; Tompson & Dass, 2000; Y.-T. C. Yang, 2012) abilities have been done extensively. In terms of affective learning, researchers have even tested how games can change attitudes (Ruggiero, 2015), increase self-efficacy (Tompson & Dass, 2000), motivation and interest of students (Bai et al., 2012; Hwang et al., 2015; Knechel & Rand, 1994; Manero et al., 2015; Y.-T. C. Yang, 2012). Studies that focus on increasing interest generally tests the

<sup>a</sup> <https://orcid.org/0000-0003-2996-4009>

<sup>b</sup> <https://orcid.org/0000-0003-2888-5034>

<sup>c</sup> <https://orcid.org/0000-0002-2454-6257>

effectiveness of simulation games in increasing learner interest in certain subjects. As an example, Knechel & Rand, (1994) compare basic accounting learning methods using traditional accounting exercises with the business simulation game Monopoly® in five Accounting Principles classes at a university in the United States. They found that students who studied accounting using Monopoly® showed a higher interest in completing accounting exercises compared to students who studied using traditional accounting exercises. Similar research results were obtained by Manero et al. (2015) who test the effectiveness of a simulation game in the field of theater arts. They found that students who studied using the simulation game method showed a higher interest in the world of theater than students who studied using traditional lecture methods (i.e., teacher-centered learning). They also found that the simulation game method was slightly less effective than the lecture method delivered by professional actors. These studies, however, do not focus on learning about the world of stock investing.

Very little studies have linked simulation games to stock investing learning. Albrecht (1995) used Monopoly® to teach students to make financial reports and company stock purchase decisions based on their financial performance. The survey conducted at the end of the lesson revealed that most students were satisfied in learning accounting and investment using Monopoly®. However, the survey conducted did not ask whether the students would be interested in getting to know the real world of stock investing or not. This study fills the literature gap by examining the effectiveness of a simulation game called STOCKLAB in increasing students' knowledge and interest in getting to know the world of stock investing.

This study also contributes to the simulation game-based learning literature by examining the effect of adding game explanations—the game instructor explains the educational content of the game—as long as the game progresses to players on the knowledge and interest of students investing in stocks in the capital market. The addition of explanations can help students understand the knowledge conveyed so as to increase the effectiveness of learning using simulation games (Garris et al., 2002). Although several studies have tested the effectiveness of simulation games with self-explanation (Adams & Clark, 2014; Hsu & Tsai, 2012; O'Neil et al., 2014), adaptive advice (Leutner, 1993), scaffolding (Barzilai & Blau, 2014), and supplemental materials (Miller & Hegelheimer, 2006) in increasing the student's understanding of the

material, the effect of adding explanations by the instructor is still very rarely studied. Bagley & Shaffer (2015) in their study have used the assistance of an instructor to explain urban science material in a simulation game both virtual and face-to-face. Although the researchers found both approaches to be equally effective, this study has not proven that the use of instructors increases the effectiveness of learning because the control group (the group that does not use an instructor) is not used. Therefore, studies that specifically examine the impact of using instructors in game-based learning are still needed. Understanding the impact of adding explanations by the instructor is not only useful for STOCKLAB users to socialize the capital market, but also for users of simulation game-based learning to deliver learning materials effectively.

## 2 THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

### 2.1 Definition of Simulation Games

Simulation games have been interpreted in various ways, such as a combination of play and simulation with competition (Heyman, 1982). One definition of a fairly complete simulation game in an educational context is given by (Szcurek, 1982), who defines educational simulation games as: “an instructional method based on a simplified model or representation of a physical or social reality in which students compete for certain outcomes according to an established set of rules or constraints. The competition can be (1) among themselves as individuals or groups, or (2) against some specified standard, working as individuals or cooperating as a group” (p.27).

An educational simulation game is an interactive learning experience developed based on a model of the real world or imagination, which operates by a coherent set of rules. In games, participants or students compete with others to achieve certain goals, and experience joy when those goals are achieved (Van Eck & Dempsey, 2002). This definition of educational games is used in the context of this study.

### 2.2 Theoretical Framework for Simulation Games

Simulation games have several elements that make them capable of being a cognitive, psychomotor, and



affective learning tools. Malone's (Malone, 1981) Theory mentioned that challenge, fantasy, and curiosity are factors that make an educational game intrinsically motivating. Malone & Lepper (1987) develop this theory by adding elements of control, cooperation, competition, and recognition. Control and the three elements in the original model (challenge, fantasy, and curiosity) relate to individual motivation, while the other elements (cooperation, competition, and recognition) relate to interpersonal motivation. A systematic review conducted by Jabbar & Felicia (2015) regarding the impact of game features on learning performance concluded that there is not one element that specifically causes students to be motivated and interested in learning material in educational games. Thus, all elements in the game work together to influence the cognitive and motivation of students in order to acquire new knowledge, skills, and attitudes.

The STOCKLAB game used in this study has intrinsic motivating characteristics that are relevant to the individual and interpersonal motivators as stated by Malone. In terms of individual motivators, STOCKLAB gives players the control to determine the amount of money to be invested, the types of shares/mutual funds to buy or sell, and to decide when the shares/mutual funds they own will be sold. Players are challenged to get the largest net asset at the end of the game by means of decisions made. Players imagine themselves as stock investors who have to make investment decisions based on micro and macroeconomic conditions that occur during the game. These economic conditions, however, are highly dependent on the information provided by game cards or the actions taken by other investors (i.e., opposing players). Since economic conditions will affect the net worth of the players, any information from the cards and actions taken by other players will generally generate high curiosity. In terms of interpersonal motivators, STOCKLAB requires players to compete with other players to increase their net asset value, and at the end of the game, the owner with the largest net assets will be recognized as a winner or a reliable investor. The two intrinsic motivating elements of STOCKLAB—personal and interpersonal—are predicted to increase the effectiveness of conveying knowledge about stock investing to potential investors, which in turn increases their desire to know and even invest in real stocks.

## 2.3 Research Hypothesis

This study aims to determine whether the STOCKLAB card game can increase the knowledge and interest of the players towards the capital market in Indonesia. This study focuses on cognitive and affective learning (interest in stock investing), because there are two following main reasons: (1) Some of the share trading mechanism that occurs in games is the same as the share trading mechanism that occurs in practice. For example, in practice there are four sectors of shares traded on the Stock Exchange, i.e., consumer, agriculture, finance, and mining sectors. These four sectors can be found in the STOCKLAB game. Therefore, it is relevant to test the cognitive aspects (i.e., knowledge) of players, and (2) the main objective of the STOCKLAB game is to introduce the world of investment to potential investors. Through STOCKLAB, investors can familiarize themselves to the terms stocks, risks, and benefits of investing in stocks so that it is hoped that through this experience their interest in investing will increase. Thus, this game is said to be effective if it succeeds in increasing players' interest in getting to know the world of investment, especially the capital market.

Learning using simulation games is more effective than traditional learning because it can increase learner motivation. Malone's theory states that the individual and interpersonal intrinsic motivating features found in games make students more willing to invest their time, thoughts, and emotions in learning the knowledge being taught (Malone, 1981; Malone & Lepper, 1987). In addition, the pleasant learning climate created by simulation games helps students to more easily process the information provided. The theory of abstract-interactive cognitive complexity states that simulation games are more effective than traditional learning because they involve aspects of thought and emotion simultaneously (Tennyson & Jorczak, 2008). These advantages are predicted to be able to make STOCKLAB an effective method to open up students' insights about the world of stock investing, which in turn can increase their interest in getting to know the real stock investing. Studies show simulation games are effective in increasing knowledge (Cheng et al., 2014; Chuang & Chen, 2009; Soflano et al., 2015) and participants' interest in the material that has been studied (Knechel & Rand, 1994; Manero et al., 2015).

The literature, however, indicates that simulation games are not necessarily more effective at improving learning outcomes than traditional learning methods (Boyle et al., 2016; Perrotta et al., 2013). The

explanation of why simulation-based learning is not always effective in improving learning outcomes can be due to an intrinsic problem, i.e., that students generally have difficulty learning various complex relationships in simulations only from experience (De Jong & Van Joolingen, 1998). Studies show that game-based learning increases its effectiveness when there is instructional support (Wouters & Van Oostendorp, 2017). This study uses additional explanations by the instructor throughout the game as instructional support to increase the effectiveness of STOCKLAB learning. Adding explanations improves learning outcomes because it helps students connect experiences with the material STOCKLAB is trying to convey. For example, the instructor explains the benefits of a stock split when a player experiences a certain skyrocketing stock price increase. Bagley & Shaffer (2015) found that instructor explanations in a simulation game both virtual and face-to-face helped students learn urban science. However, their study has not compared simulation games with explanations to simulation games without explanations, so their effectiveness still needs to be tested. Therefore, this study uses three learning methods: STOCKLAB with explanations, STOCKLAB without explanation, and traditional presentations using power points to test the effectiveness of STOCKLAB with explanations in increasing students' knowledge and interest in investing in the capital market. Based on the theory and results of previous studies, the proposed hypotheses are as follows:

**H1** *Students will have better knowledge of stock investing after playing STOCKLAB with Explanation compared to students who use the STOCKLAB without Explanation and Traditional approaches.*

**H2** *Students will have a higher interest in stock investing after playing STOCKLAB with Explanation compared to students who use the STOCKLAB without Explanation and Traditional approaches.*

### 3 METHODS

#### 3.1 STOCKLAB Educational Game

STOCKLAB is a commercially available card game created by Ryan Filbert and supported by the Financial Services Authority (OJK) made to support the capital market education program. The number of players are between three to six people including the banker who is in charge of managing the game and managing the bank's assets. The duration of the game lasts for  $\pm$  45 minutes for six rounds. In the game,

players compete to develop assets through investing in stocks and mutual funds, and use various strategies optimally to become the most successful investors. The winner is the player with the most total assets (i.e., money coins) at the end of the game.

Game materials consist of 1 mutual fund card, 4 stock sector cards, 4 price tokens, 5 street order cards, 5 cue cards, 5 debt cards, 10 split tokens, 36 economy cards, 58 cash coins, and 60 action cards. Each type of card has its own function. Mutual fund cards serve as an alternative investment for players other than stocks. The stock sector card aims to show four traded stock sectors, i.e., mining, agriculture, finance, and consumer. The road sequence card aims to determine which player will start first. The economic card functions to inform economic conditions (such as inflation and recession), which also determine stock price movements. Six economy cards are placed on each stock card. After all economy cards are opened, the game will end. Action cards are used by players to perform various actions such as buying shares, quick buys, acquisitions, trading fees, rumors, and stock exchange info. Quickbuy means each player can take 2 cards at once. Acquisition means that each player can acquire shares owned by other players on the condition that the share card ownership they own must be the same or more than the player whose shares will be acquired. Trading fee means that each player can immediately sell the card they have without having to wait for the sell phase. If it is saved, the player who takes this card must pay tax according to the number of card colors they have. Rumor means that each player can increase or decrease the value of the shares listed on the stock price board that contain the price token. Exchange info means that only players using this action can open 3 economy cards first before the action card is opened by the banker and may not be disclosed to other players.

Apart from cards, STOCKLAB also uses three types of coins, i.e., pricing coins, split coins, and cash coins. Pricing coins are used to show the price of a share. The initial share price will all be uniform, at the price of 5. The split coins will be used when the share price is too high so that it exceeds the value stated on the card. Stock split causes the number of shares owned to increase, but the value remains. Lastly, money coins serve as a measure of success in the game. The winner is the player with the highest number of coins at the end of the game.

STOCKLAB games are usually done in 6 rounds of  $\pm$  45 minutes. Each round consists of 4 stages. First is the Bidding Phase. At this stage, the player bids with closed hands, the banker will give an order to open the fist simultaneously to find out how many

Table 1: Participants' demographics.

Treatment	University			N	Gender		Median	Mean	SD
	S	M	W		M	F			
STOCKLAB with Explanation	20	18	20	58	23	35	20.00	20.00	1.24
STOCKLAB without Explanation	20	18	20	58	21	37	20.00	20.03	1.30
Traditional	22	17	17	56	20	36	20.00	20.09	1.56
Total	62	53	57	172	64	108			

coins each player is offering. The player with the highest coin bid will get a turn to take the first card followed by the second highest bidder, and so on. All coins used for bidding are submitted to the Bank. Second is the action phase. Each player takes a stock card according to the sequence number that has been determined during the bidding phase. The cards will be distributed with 2x players or each player has the opportunity to get a maximum of 2 stock cards. The action phase is carried out until the cards that have been dealt run out. Third is the selling phase. At this stage, all players have the opportunity to sell one sector of their shares without a maximum or minimum number of shares. Lastly, the economic phase. At this stage, the banker opens the economy card and executes card instructions which affect the stock price. Economy cards that have been used cannot be used again until the game ends. A description of how to play SOCKLAB can be found at <https://www.youtube.com/watch?v=6-bpc6MCGJ8>.

### 3.2 Research Design

This study hypothesizes that students' knowledge and interest in the world of stock investing will increase after playing STOCKLAB with explanations. To test this hypothesis, the study used a randomized control trial with a three-group pretest/posttest research design. The three groups were 1) STOCKLAB with explanation, 2) STOCKLAB without explanation, and 3) Traditional (presentation using a power point) approach. Instructors and students who participated in this study were assigned to each group randomly.

### 3.3 Participants

One hundred and seventy-two students from three private universities that have the most active Indonesia Stock Exchange Investment Gallery (GIBEI) in West Java, Indonesia, participated in this research. Researchers contacted GIBEI managers at the three universities and asked for their help in recruiting students as research participants. Although students come from three different universities, all instructors are from M university. Table 1 provide

information about the participants' university origins, gender, and age.

### 3.4 Instruments Assessment

This study used two instruments that were given before and after the treatment was given. The first instrument consists of 12 multiple choice question items which were developed by the research team to measure students' knowledge about stock investment in the Indonesian capital market. In order to increase the validity of the instrument, the question items were made in line with the objectives of the STOCKLAB game. Each correct response is assigned a point of 1, so the total points for all correct answers is 12. The Kuder-Richardson 20, person and item-reliability statistics for the knowledge test showed -.36 and .97 before and -.55 and .96 respectively after the intervention. The low person reliability value in the pre-test may be due to the low ability of the participants at the beginning of the experiment.

The second instrument consists of 10 survey items adapted from Nussbaum et al. (2015) to measure the student's interest in stock investing. The survey items used a 5-point Likert scale ranging from 1 (very uninterested) to 5 (very interested). Adaptation is needed because the original instrument asked students' interest in the context of climate change education, while this research is in the context of stock investment education. Nussbaum et al. (2015) found that the instrument had an internal consistency of .81 before and .86 after the intervention. This study found similar results, i.e., an internal consistency of .85 before and .86 after the intervention. In addition, a feedback survey consisting of 7 items with a 5-point Likert Scale that ranges from 1 (Strongly disagree) to 5 (Strongly Agree) was given after the intervention. This survey was also adapted from Nussbaum et al. (2015) who found the internal consistency value of .89, while the internal consistency value in this study was .82.

### 3.5 Procedure

Prior to the study, 11 instructors were trained to administer tests and treatments. Each instructor was

in charge of handling 5-6 students during the study. The researchers explained to the instructors that the research objective was to test the effectiveness of the three learning methods to educate the capital market. Instructors only described the methods assigned to them without explaining the other two methods. In order to familiarize the instructor with the method to be carried out, the instructors were asked to practice and were informed about the important features of the method. The test protocol was also described. In particular, they were informed that the type of test was closed books, that the study participants had to take the test individually, and that the instructor was not allowed to assist the participants during the test.

The study was conducted outside regular class hours and consisted of three main stages: pre-test, treatment, and post-test. In the first stage, students were asked to complete a pre-test questionnaire containing demographic questions and two instruments, each of which was used to measure students' knowledge and interest about stock investing in the capital market. Students were asked to work individually and were informed that the scores obtained during the study do not affect their course scores. This pre-test lasts twenty minutes.

The treatment stage lasts for one hour and forty minutes. Each researcher who was present acted as an observer and kept the interaction to a minimum with the instructors and the students in the three groups: STOCKLAB with explanation, STOCKLAB without explanation, and Traditional approach. STOCKLAB Group with explanation to learn to invest in the capital market using STOCKLAB accompanied by an explanation of the capital market material being experienced by the instructor. For example, the Instructor while distributing stock cards explains the sectors traded in the capital market. Likewise, when a player experiences a Stock Split, the instructor explains how this event causes the number of player shares to increase, but the overall share value does not change. In contrast, the STOCKLAB Group without explanation learns to invest in the capital market using STOCKLAB without obtaining an explanation regarding the capital market educational content contained in the game. Instructors in the STOCKLAB group with and without explanation act as bankers in charge of explaining the rules of the game and managing bank assets. In the Traditional approach group, students learn the capital market by listening to the instructor's presentation using power points. Students can also ask questions and discuss with the instructor if there is material that they did not understand.

The final stage of the research procedure was to conduct a post-test after the treatment stage had been completed. This test used the same instrument and duration as the pre-test. In addition, a survey aimed at obtaining information about their perceptions of the learning experience was conducted after the post-test ended.

## 4 RESULTS AND DISCUSSION

### 4.1 Learning Outcomes

Table 2 shows the mean, standard deviation, minimum, maximum, and results of the paired t-test for each experimental group. One-way ANOVA results showed that there was no significant difference at  $p < .05$  level in knowledge:  $F(2, 169) = 2.04, p = .13$  and interest pre-test scores:  $F(2, 169) = .07, p = .94$  for all three groups. The ANOVA was performed after verifying that the assumptions of homogeneity of variance was satisfied (Pallant, 2016). Based on the results of the Levene's test of variance for knowledge  $(2, 169) = 1.86, p = .16$  and interest pre-test scores  $(2, 169) = 1.32, p = .27$ , using ANOVA is appropriate. Furthermore, the paired t-test results showed a significant increase in knowledge and interest after treatment at STOCKLAB with Explanation (knowledge:  $t = 4.30, p < 0.01$ ; interest:  $t = 4.82, p < 0.01$ ), STOCKLAB without Explanation (knowledge:  $t = 2.54, p < 0.05$ ; interest:  $t = 6.30, p < 0.01$ ), and Traditional approach (knowledge:  $t = 7.37, p < 0.01$ ; interest:  $t = 4.54, p < 0.01$ ). This illustrates that these three methods can be effective. To test the research hypothesis that the STOCKLAB with Explanation learning method outperformed two other methods, One-way between-groups analysis of variance (One-way ANOVA) with Planned Contrast tests were performed. One-way ANOVA was performed after verifying that the assumptions of homogeneity of variance was satisfied (Pallant, 2016). Based on the results of the Levene's test of variance for knowledge  $(2, 169) = .32, p = .73$  and interest post-test scores  $(2, 169) = 2.71, p = .07$ , using ANOVA is appropriate.

Table 2: Pre-test and post-test knowledge and interest scores for the STOCKLAB with Explanation group versus two comparison groups.

Group		Interest		Knowledge	
		Pre-test	Post-test	Pre-test	Post-test
STOCKLAB with Explanation (n = 58)	Mean	4.02	4.27	6.84	7.86
	SD	0.53	0.48	2.10	2.20
	Min.	2.10	3.10	3.00	2.00
	Max.	5.00	5.00	11.00	12.00
	<i>t value*</i>	4.82***		4.30***	
STOCKLAB without Explanation (n = 58)	Mean	4.06	4.33	6.33	6.86
	SD	0.43	0.41	2.08	2.36
	Min.	2.40	3.40	2.00	2.00
	Max.	5.00	5.00	11.00	12.00
	<i>t value*</i>	6.30***		2.54**	
Traditional Approach (n = 56)	Mean	4.04	4.30	6.11	8.09
	SD	0.40	0.36	1.83	2.25
	Min.	3.30	3.50	2.00	2.00
	Max.	5.00	5.00	10.00	12.00
	<i>t value*</i>	4.54***		7.37***	

Note: \**post – pre*; \*\**p* < 0.05; \*\*\**p* < 0.01

### 4.2 The Impact of the STOCKLAB Game on Students’ Knowledge

H1 predicts that students will have better knowledge of the world of stock investing after playing STOCKLAB with Explanation compared to students who use the STOCKLAB without Explanation and Traditional approach. H1 was partially supported. Panel A of Table 3 shows a significant main effect in the knowledge post-test scores among the three groups,  $F(2, 169) = 4.74, p = .01$ . As shown in Table 4, planned contrasts revealed that the students’ knowledge post-test scores of the STOCKLAB with Explanation were significantly different from the STOCKLAB without Explanation,  $t(169) = 2.37, p = .02$ . Meanwhile, no significant difference was found between STOCKLAB with Explanation and Traditional groups,  $t(169) = -.53, p = .59$ . These statistical results are supported by the effect size analysis comparing the knowledge post-test scores of the STOCKLAB with Explanation and controls groups. The effect size analysis shows a medium to large effect for the STOCKLAB with Explanation compared with STOCKLAB without Explanation, while it shows a negligible effect for the STOCKLAB with Explanation compared with Traditional. These results suggest that students in the STOCKLAB with Explanation group exhibited a greater level of improvement in knowledge about stock investment than those in the STOCKLAB without Explanation group, but the STOCKLAB with Explanation group’s improvement is as high as the Traditional group.

Table 3: Effects of treatment groups on students’ knowledge and interest post-test scores (Analysis of variance summary table).

Panel A: ANOVA-The effects of treatment groups on students’ knowledge scores					
Knowledge post-test scores		df	Mean Square	F-statistic	p-value
	Between groups	2	24.49	4.74	.010
	Within groups	169	5.16		
	Total	171			
Panel B: ANOVA-The effects of treatments groups on students’ interest scores					
Interest post-test scores		df	Mean Square	F-statistic	p-value
	Between groups	2	.10	.57	.57
	Within groups	169	.18		
	Total	171			

### 4.3 The Impact of the STOCKLAB Game on Students’ Interest

H2 predicts that students will have a higher interest in stock investment after playing STOCKLAB with Explanation compared to students who use the STOCKLAB without Explanation and Traditional approach. H2 was not supported. Panel B of Table 3 shows insignificant main effect in the interest post-test scores among the three groups,  $F(2, 169) = .57, p = .57$ . Planned contrasts (see table 4) shows the interest post-test scores of the STOCKLAB with Explanation group do not differ significantly from the STOCKLAB without Explanation,  $t(169) = -.82, p = .42$  and Traditional groups,  $t(169) = .20, p = .85$ . These statistical results are supported by the effect size analysis comparing the knowledge post-test scores of the STOCKLAB with Explanation and controls groups.

The effect size analysis shows a negligible effect for the STOCKLAB with Explanation compared with STOCKLAB without Explanation and Traditional. These findings suggest that the three approaches are equally effective for improving students’ interest in stock investment in the capital market.

Table 4: Planned contrasts by dependent variable.

Dependent Variable	Experimental group (a)	Comparison group (b)	Mean difference (a-b)	Std. Error	<i>p</i> value	Cohen's <i>d</i>
Knowledge	STOCKLAB with Explanation ( $\mu = 7.86$ )	STOCKLAB without Explanation ( $\mu = 6.86$ )	1.00	.42	.02 <sup>a</sup>	.44
	STOCKLAB with Explanation ( $\mu = 7.86$ )	Traditional ( $\mu = 8.09$ )	-.23	.43	.59	.10
Interest	STOCKLAB with Explanation ( $\mu = 4.27$ )	STOCKLAB without Explanation ( $\mu = 4.33$ )	-.06	.08	.42	.13
	STOCKLAB with Explanation ( $\mu = 4.27$ )	Traditional ( $\mu = 4.26$ )	.01	.08	.85	.07

Note: Significant at the 0.05 level.

#### 4.4 Student Feedback Survey

In addition to knowledge and interest assessments, the present study surveys students' perceptions of the assigned approach. The means and standard deviations of the STOCKLAB with Explanation, STOCKLAB without Explanation, and Traditional groups on the five Likert-scale items (with some items reversed scored) are 4.26 ( $SD = .52$ ,  $n = 58$ ), 4.27 ( $SD = .43$ ,  $n = 58$ ), and 4.01 ( $SD = .52$ ,  $n = 56$ ), respectively. These indicate that students' perceptions of the assigned approach were generally positive. However, the results of ANOVA revealed a statistically significant difference at the  $p < .05$  level in survey item scores for the three groups:  $F(2, 169) = 3.08$ ,  $p = .049$ . Planned contrast indicates no statistical difference in the item scores between the STOCKLAB with Explanation and STOCKLAB without Explanation,  $t(169) = -.19$ ,  $p = .85$ . Meanwhile, a significant difference is observed between the STOCKLAB with Explanation and Traditional,  $t(169) = 2.06$ ,  $p = .04$ . These findings suggest that students learning through game approach (i.e., the STOCKLAB with and without Explanation) demonstrate a higher level of level of agreement that the game is an interesting way to study capital market compared to the Traditional approach.

#### 4.5 Discussion

The main purpose of this study is to examine the effectiveness of STOCKLAB for improving students' knowledge (H1) and interest (H2) in investing in the capital market. To improve the internal validity of this study and determine which approach work best, the STOCKLAB with Explanation is compared with STOCKLAB without Explanation and Traditional approach with each having similar learning objectives.

This study finds the three methods can be effective in improving students' knowledge and

interest in investing in the capital market. However, the results of this study exhibit partial support for H1. The students in the STOCKLAB with Explanation group scored higher on knowledge post-test than those in STOCKLAB without Explanation group. These findings are consistent with the review studies that show the effectiveness of the game approach can be enhanced when it includes instructional supports (Hays, 2005; O'Neil et al., 2005; Wouters & Van Oostendorp, 2017). The knowledge about capital market (e.g., capital gain, capital loss, stock split) explained by the instructor during the game might have prompted the students to form connections between the knowledge and game actions. In contrast, this study did not find the game approach with explanation is more effective than Traditional in enhancing students' knowledge. This result is contrary to the theory of abstract-interactive cognitive complexity (Tennyson & Jorczak, 2008). The inconsistent result is perhaps due to two factors. First, the nature of the experimental design requires students in the game groups to study more information in the same amount time (i.e., both the rules of STOCKLAB and the knowledge of the capital market). Second, the problems appearing on the test may focus on the lower-order thinking (i.e., memorization, understanding, and application. For instance, Mr. X invested in stock for Rp100 million in the beginning of year. If the stock has a fair value Rp90 million in the end of year, calculate the realized or unrealized profit/loss of Mr. X's stock investment.) rather than higher-order thinking (analyzing, evaluating, and creating). The education literature argue that educational simulation games are more effective than traditional teaching methods for fostering complex thinking skills (Bonner, 1999; Fowler, 2006) such as complex decision making (Pasin & Giroux, 2011), problem solving and critical thinking (Lovelace et al., 2016; Yang, 2015), and the higher-order thinking skills associated with Bloom's

taxonomy (Anderson & Lawton, 2009; Kuang et al., 2021; Zigmont et al., 2011).

The finding that students in the STOCKLAB with Explanation group scored equally on the interest post-test with students in the STOCKLAB without Explanation and Traditional groups, does not lend support to H2. The result is inconsistent with the previous studies showing game is more effective at increasing students' interest in materials learned than traditional approach (Knechel & Rand, 1994; Manero et al., 2015). Upon reflection, it is possible that the topic itself (i.e., stock investment in capital market) is interesting for the students. A national survey shows the young Indonesian (aged 17-29) considers a financial self-sufficiency is one of the most important factors for happiness (CSIS, 2017). A substantial financial return potential from stock investment may arouse students' enthusiast to learn more about capital market. A survey performed by Fintechnews Singapore, (2020) found that the young Singaporean (aged 18-23) ranked the bonds/stock (59%) as the most preferred investment followed by real estate (41%), and mutual funds (35%).

A feedback survey at the end of experiment shows that students in the STOCKLAB with and without Explanation group demonstrate a significantly higher level of enjoyment with and enthusiasm to continue to use the game than those in the Traditional group. Special features of game-such as challenge, competition, curiosity, and recognition- effectively produce the affective effects for the STOCKLAB. These effects, however, are insufficient to improve students' knowledge and interest higher than Traditional approach. The emotion may affect the long-term memory rather than the short one (Thomas & Hasher, 2006). Studies find simulation games are more effective than alternative learning methods in promoting knowledge retention (e.g., Brom et al., 2011; Curry & Brooks, 1971; Lucas et al., 1975). As this study only performed an immediate knowledge post-test, the long-term effect of the game was not known.

## 5 CONCLUSIONS

This study investigates the effectiveness an educational game called STOCKLAB for improving students' knowledge and interest in investing in the capital market. This study argues that the game is more effective than traditional approach (presentation using power point) if it is used with combination of explanation, —where an instructor explains the educational contents of the game to the players—

during the game. The results show that STOCKLAB with Explanation is more effective than STOCKLAB without Explanation in assisting students in acquiring knowledge about capital market, but it is as effective as Traditional method. The three approaches are equally effective in improving students' interest in investing in the capital market. However, students learning through STOCKLAB with and without Explanation reported a significantly higher level of enjoyment with and enthusiasm to continue to use the game than those in the Traditional group.

Taken together, the findings of this study imply that STOCKLAB can be used as an alternative approach to introduce capital market to the students if it is coupled with explanation. The next steps include assessing students' higher-order thinking skills and knowledge retention, and replicating the findings with another simulation game, subjects, and topics. These are crucial to enhance our understanding about the efficacy of game-based learning and generalization of this study.

## ACKNOWLEDGEMENTS

This study has been fully funded by Universitas Kristen Maranatha. We also thank to all the instructors and universities involved in this experiment, particularly to Siti Komariah and Ramlah Puji Astuti.

## REFERENCES

- Adams, D. M., & Clark, D. B. (2014). Integrating self-explanation functionality into a complex game environment: Keeping gaming in motion. *Computers and Education*, 73, 149–159. <https://doi.org/10.1016/j.compedu.2014.01.002>
- Albrecht, W. D. (1995). A financial accounting and investment simulation game. *Issues in Accounting Education*, 10(1), 127–141.
- Anderson, P. H., & Lawton, L. (2009). Business simulations and cognitive Learning: Developments, desires, and future directions. *Simulation & Gaming*, 40(2), 193–216. <https://doi.org/10.1177/1046878108321624>
- Bagley, E. A., & Shaffer, D. W. (2015). Stop talking and type: Comparing virtual and face-to-face mentoring in an epistemic game. *Journal of Computer Assisted Learning*, 31(6), 606–622. <https://doi.org/10.1111/jcal.12092>
- Bai, H., Pan, W., Hirumi, A., & Kebritchi, M. (2012). Assessing the effectiveness of a 3-D instructional game on improving mathematics achievement and motivation of middle school students. *British Journal of*

- Educational Technology*, 43(6), 993–1003. <https://doi.org/10.1111/j.1467-8535.2011.01269.x>
- Barzilai, S., & Blau, I. (2014). Scaffolding game-based learning: Impact on learning achievements, perceived learning, and game experiences. *Computers and Education*, 70(January), 65–79. <https://doi.org/10.1016/j.compedu.2013.08.003>
- Bonner, S. E. (1999). Choosing teaching methods based on learning objectives: An integrative framework. *Issues in Accounting Education*, 14(1), 11–39.
- Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., Lim, T., Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers and Education*, 94, 178–192. <https://doi.org/10.1016/j.compedu.2015.11.003>
- Brom, C., Preuss, M., & Klement, D. (2011). Are educational computer micro-games engaging and effective for knowledge acquisition at high-schools? A quasi-experimental study. *Computers and Education*, 57(3), 1971–1988. <https://doi.org/10.1016/j.compedu.2011.04.007>
- Chen, S., Chang, W. H., Lai, C. H., & Tsai, C. Y. (2014). A Comparison of Students' Approaches to Inquiry, Conceptual Learning, and Attitudes in Simulation-Based and Microcomputer-Based Laboratories. *Science Education*, 98, 905–935. <https://doi.org/10.1002/sce.21126>
- Cheng, M. T., Su, T., Huang, W. Y., & Chen, J. H. (2014). An educational game for learning human immunology: What do students learn and how do they perceive? *British Journal of Educational Technology*, 45(5), 820–833. <https://doi.org/10.1111/bjet.12098>
- Chuang, T. Y., & Chen, W. F. (2009). Effect of computer based video games on children: An experimental study. *Educational Technology and Society*, 12(2), 1–10. <https://doi.org/10.1109/DIGITEL.2007.24>
- CSIS. (2017). Ada Apa dengan Milenial? Orientasi Sosial, Ekonomi dan Politik. *Survei Nasional CSIS 2017, November*, 1–45. [https://www.csis.or.id/uploaded\\_file/event/ada\\_apa\\_dengan\\_milenial\\_paparan\\_survei\\_nasional\\_csis\\_mengenai\\_orientasi\\_ekonomi\\_sosial\\_dan\\_politik\\_generasi\\_milenial\\_indonesia\\_notulen.pdf](https://www.csis.or.id/uploaded_file/event/ada_apa_dengan_milenial_paparan_survei_nasional_csis_mengenai_orientasi_ekonomi_sosial_dan_politik_generasi_milenial_indonesia_notulen.pdf)
- Curry, J. F., & Brooks, R. L. (1971). *A comparison of two methods of teaching life career planning to junior high school students*. <http://files.eric.ed.gov/fulltext/ED059401.pdf>
- De Jong, T., & Van Joolingen, W. R. (1998). Scientific Discovery Learning with Computer Simulations of Conceptual Domains. *Review of Educational Research*, 68(2), 179–201. <https://doi.org/10.3102/00346543068002179>
- Fowler, L. (2006). Active learning: An empirical study of the use of simulation games in the introductory financial accounting class. *Academy of Educational Leadership Journal*, 10(3), 93–103.
- Garris, R., Ahlers, R., & Driskell, J. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming*, 33(4), 441–467. <https://doi.org/10.1177/1046878102238607>
- Gopher, D., Weil, M., & Bareket, T. (1994). Transfer of skill from a computer game trainer to actual flight. *Human Factors*, 36(3), 387–405. <https://doi.org/10.1518/107118192786749243>
- Hays, R. T. (2005). *The effectiveness of instructional games: A literature review and discussion. Technical report 2005-004*. Naval Air Warfare Center Training Systems Division.
- Heyman, M. (1982). What are simulation games? *Environmental Education Report*, 10(5), 2–5.
- Hsu, C.-Y., & Tsai, C.-C. (2012). Examining the effects of combining self-explanation principles with an educational game on learning science concepts. *Interactive Learning Environments*, 4820(February 2015), 1–12. <https://doi.org/10.1080/10494820.2012.705850>
- Hwang, G.-J., Chiu, L.-Y., & Chen, C.-H. (2015). A contextual game-based learning approach to improving students' inquiry-based learning performance in social studies courses. *Computers & Education*, 81, 13–25. <https://doi.org/10.1016/j.compedu.2014.09.006>
- Jabbar, A. I. A., & Felicia, P. (2015). Gameplay engagement and learning in game-based learning: A systematic review. *Review of Educational Research*, 85(4), 740–779. <https://doi.org/10.3102/0034654315577210>
- Keys, E., Luctkar-Flude, M., Tyerman, J., Sears, K., & Woo, K. (2020). Developing a Virtual Simulation Game for Nursing Resuscitation Education. *Clinical Simulation in Nursing*, 39, 51–54. <https://doi.org/10.1016/j.ecns.2019.10.009>
- Knechel, W. R., & Rand, R. S. (1994). Will the AECC's course delivery recommendations work in the introductory accounting course? Some preliminary evidence. *Journal of Accounting Education*, 12(3), 175–191. [https://doi.org/10.1016/0748-5751\(94\)90030-2](https://doi.org/10.1016/0748-5751(94)90030-2)
- Kuang, T. M., Adler, R. W., & Pandey, R. (2021). Creating a Modified Monopoly Game for Promoting Students' Higher-Order Thinking Skills and Knowledge Retention A Modified Monopoly for Promoting Students' Higher-Order Thinking Skills. *Issues in Accounting Education*, 36(3). <https://doi.org/10.2308/ISSUES-2020-097>
- Leutner, D. (1993). Guided discovery learning with computer-based simulation games: Effects of adaptive and non-adaptive instructional support. *Learning and Instruction*, 3(2), 113–132. [https://doi.org/10.1016/0959-4752\(93\)90011-N](https://doi.org/10.1016/0959-4752(93)90011-N)
- Lovelace, K. J., Eggers, F., & Dyck, L. R. (2016). I do and i understand: Assessing the utility of web-based management simulations to develop critical thinking skills. *Academy of Management Learning and Education*, 15(1), 100–121. <https://doi.org/10.5465/amle.2013.0203>
- Lucas, L. A., Postma, C. H., & Thompson, J. C. (1975). A comparative study of cognitive retention using simulation-gaming as opposed to lecture-discussion techniques. *Peabody Journal of Education*, 52(4), 261–266. <https://doi.org/10.1080/01619567509538029>
- Malone, T. W. (1981). Toward a theory of intrinsically motivating instruction. *Cognitive Science: A*



- Multidisciplinary Journal*, 5(4), 333–369. <https://doi.org/10.1207/s15516709cog0504>
- Malone, T. W., & Lepper, M. R. (1987). Making learning fun: A taxonomy of intrinsic motivations for learning. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, Learning, and Instruction* (3rd ed., pp. 223–253). Lawrence Erlbaum Associates.
- Manero, B., Torrente, J., Serrano, Á., Martínez-Ortiz, I., & Fernández-Manjón, B. (2015). Can educational video games increase high school students' interest in theatre? *Computers & Education*, 87, 182–191. <https://doi.org/10.1016/j.compedu.2015.06.006>
- Miller, M., & Hegelheimer, V. (2006). The SIMs meet ESL Incorporating authentic computer simulation games into the language classroom. *Interactive Technology and Smart Education*, 3(4), 311–328. <https://doi.org/10.1108/17415650680000070>
- Morin, J., Tamberelli, F., & Buhagiar, T. (2020). Educating business integrators with a computer-based simulation game in the flipped classroom. *Journal of Education for Business*, 95(2), 121–128. <https://doi.org/10.1080/08832323.2019.1613951>
- Nussbaum, E. M., Owens, M. C., Sinatra, G. M., Rehmat, A. P., Cordova, J. R., Ahmad, S., Harris, F. C., & Dascalu, S. M. (2015). Losing the lake: Simulations to promote gains in student knowledge and interest about climate change. *International Journal of Environmental and Science Education*, 10(6), 789–811. <https://doi.org/10.12973/ijese.2015.277a>
- O'Neil, H. F., Chung, G. K. W. K., Kerr, D., Vendlinski, T. P., Buschang, R. E., & Mayer, R. E. (2014). Adding self-explanation prompts to an educational computer game. *Computers in Human Behavior*, 30, 23–28. <https://doi.org/10.1016/j.chb.2013.07.025>
- O'Neil, H. F., Wainess, R., & Baker, E. L. (2005). Classification of learning outcomes: evidence from the computer games literature. *Curriculum Journal*, 16(4), 455–474. <https://doi.org/10.1080/09585170500384529>
- Otoritas Jasa Keuangan. (2020). *Survei Nasional Literasi dan Inklusi Keuangan 2019*. <https://www.ojk.go.id/id/berita-dan-kegiatan/publikasi/Pages/Survei-Nasional-Literasi-dan-Inklusi-Keuangan-2019.aspx>
- Pallant, J. F. (2016). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (6th ed.). McGraw-Hill Education.
- Pasin, F., & Giroux, H. (2011). The impact of a simulation game on operations management education. *Computers & Education*, 57(1), 1240–1254. <https://doi.org/10.1016/j.compedu.2010.12.006>
- Perrotta, C., Featherstone, G., Aston, H., & Houghton, E. (2013). Game-based learning: Latest evidence and future directions. In *NFER Research Programme: Innovation in Education*. NFER. [www.nfer.ac.uk](http://www.nfer.ac.uk)
- Ruggiero, D. (2015). The effect of a persuasive social impact game on affective learning and attitude. *Computers in Human Behavior*, 45, 213–221. <https://doi.org/10.1016/j.chb.2014.11.062>
- Singapore, F. (2020). *Gen Z Versus Millennials – Who Fared Better at Saving Money and Budgeting?* <https://fintechnews.sg/43844/personalfinance/gen-z-versus-millennials-who-fared-better-at-saving-money-and-budgeting/>
- Soflano, M., Connolly, T. M., & Hainey, T. (2015). An application of adaptive games-based learning based on learning style to teach SQL. *Computers and Education*, 86, 192–211. <https://doi.org/10.1016/j.compedu.2015.03.015>
- Szczurek, M. (1982). Meta-analysis of simulation games effectiveness for cognitive learning (Doctoral dissertation, Indiana University). *Dissertation Abstract International*, 43, 1031A.
- Tennyson, R. D., & Jorczak, R. L. (2008). A conceptual framework for the empirical study of instructional games. In H. F. O'Neil & R. S. Perez (Eds.), *Computer games and team and individual learning* (pp. 39–54). Elsevier Inc.
- Thomas, R. C., & Hasher, L. (2006). The influence of emotional valence on age differences in early processing and memory. *Psychology and Aging*, 21(4), 821–825. <https://doi.org/10.1037/0882-7974.21.4.821>
- Tompson, G. H., & Dass, P. (2000). Improving students' self-efficacy in strategic management: The relative impact of cases and simulations. *Simulation & Gaming*, 31(1), 22–41. <https://doi.org/10.1177/104687810003100102>
- Van Eck, R., & Dempsey, J. (2002). The effect of competition and contextualized advisement on the transfer of mathematics skills in a computer-based instructional simulation game. *Educational Technology Research & Development*, 50(3), 23–41.
- Whitehill, B. V., & McDonald, B. A. (1993). Improving learning persistence of military personnel by enhancing motivation in a technical training program. *Simulation & Gaming*, 24(3), 294–313. <https://doi.org/10.1177/104687810003100102>
- Wouters, P., & Van Oostendorp, H. (2017). Overview of instructional techniques to facilitate learning and motivation of serious games." In *Instructional techniques to facilitate learning and motivation of serious games* (pp. 1–16). Springer, Cham.
- Yang, Y.-T. C. (2012). Building virtual cities, inspiring intelligent citizens: Digital games for developing students' problem solving and learning motivation. *Computers and Education*, 59(2), 365–377. <https://doi.org/10.1016/j.compedu.2012.01.012>
- Yang, Y. T. C. (2015). Virtual CEOs: A blended approach to digital gaming for enhancing higher order thinking and academic achievement among vocational high school students. *Computers and Education*, 81, 281–295. <https://doi.org/10.1016/j.compedu.2014.10.004>
- Zigmont, J. J., Kappus, L. J., & Sudikoff, S. N. (2011). Theoretical foundations of learning through simulation. *Seminars in Perinatology*, 35(2), 47–51. <https://doi.org/10.1053/j.semperi.2011.01.002>