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## Preface

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## PREFACE

We are honored to introduce the Proceedings of the 4<sup>th</sup> International Conference on Informatics, Engineering, Science, and Technology (INCITEST 2021). With its main theme on "A Future Road Map, Encouraging Optimism and Technology to Face Post Covid-19 Era", this event is hoped to serve as a platform of gathering for anyone interested in exploring optimism, potential solutions, and answering issues and challenges in the era Covid-19 Pandemic". Unlike the 1<sup>st</sup> and 2<sup>nd</sup> INCITEST, the 3<sup>rd</sup> and 4<sup>th</sup> INCITEST was carried out in the virtual conference due to the impact of COVID-19. Universitas Komputer Indonesia (UNIKOM) held this online conference on 10 March 2021 to gather experts and scholars worldwide to continue disseminating the latest advanced research in the field of Informatics, Engineering, Science, and Technology and developing the academic exchange among researchers.

Following the success of INCITEST 2018, 2019, and 2020, the enthusiastic responses to the call-for-papers in the fourth INCITEST were increasing. More than 150 papers were submitted to the organizing committee from both local and foreign participants. A peer-review process has been conducted to check paper originality and quality, resulting in 120 accepted papers being presented. The papers have been presented via Zoom in 10 minutes for each paper.

It is an honor for us to have four renowned experts as our keynote speakers : Prof. Minoru Terano and Prof. Hiroyuki Iida from Japan Advanced Institute of Science and Technology (JAIST), Dr. Siva Kumar Sivaneshan from Taylor's University, and Dr. Salmon Priadji Martana from UNIKOM. The keynote speech is presented in the plenary session in online format (via Zoom) and lively broadcasted on UNIKOM Youtube official channel. Each keynote presented their address in 45 minutes duration, including the discussion session. After completing the plenary session, the schedule continued with a parallel session held in an online format. The participants were divided into several classes, which a moderator chaired. Each presenter should present their paper within 5 minutes via Zoom. Five minutes after the presentation will be given to each of them for the discussion session.



We believe that the outcome of the conference will be fruitful with the above arrangement. The conference's success is also due to the hard work of all involved parties. Therefore, we would like to express appreciation to all committee members, supporters, sponsors, and participants for an outstanding contribution to the conference's success. High appreciation goes to all of the reviewers who helped us maintain the quality of manuscripts included in the Proceedings published by IOP. We also express our sincere thanks to our Rector, Prof. Dr. Ir. Eddy Soeryanto Soegoto, MT, for his support at the conference. Special thanks are also conveyed to our prestigious publisher partner, IOP, and their publication team for their hard work on our publication.

Finally, this conference series's continuing success can be one indicator that we have through our right pathway to enforce optimism and bring a better roadmap after the pandemic. We hope that the 4<sup>th</sup> INCITEST will get fruitful outcomes and give the participants a great experience at the conference.

Thank you

Best Regards,

Dr. Lia Warlina

The Chief of the Conference

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## Virtual Reality Utilization as a Character– building of Children in Waste Problems

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## Virtual Reality Utilization as a Character– building of Children in Waste Problems

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**Abstract.** This paper aims to explain the benefits of Virtual Reality (VR) technology as an alternative solution to limited facilities in building children's awareness of waste problems. The method used is a descriptive method that explains how Indonesians treat waste and validates the effectiveness of using VR to develop an awareness of waste. The results showed that children are now more interested in using VR in education to care about the earth's environment. This can happen because it is interactive, but the immersive effect impacts the effectiveness of the learning experience felt by children. The use of Virtual Reality is the main solution with the latest technology in overcoming waste problems in Indonesia by building character since childhood.

### 1. Introduction

Virtual Reality (VR) is a special technology medium for displaying imaginary images to users by completely imagining virtual environments to experience visuals. Therefore, humans can expand the boundaries of their creation, experience, and learning into anything that can be represented in a virtual environment. In fact, this device has fewer limitations and is closer to the real experience than other devices that have been designed up to now [1]. Students' great interest in the use of this technology is clearly observed, presenting a great intrinsic motivation in its use. It has been verified that virtual reality not only offers great possibilities for teaching at many levels, but is also a relatively unexplored area in the beginning, which is indispensable for deepening its application in the classroom. A new generation of students and learners will naturally learn and interact in a digital environment. In addition, their communicative style requires tools and applications that are adapted to their learning styles [2]. Animation in VR has reasons that will make it more interesting, among others: the resulting story will be simpler and more enjoyable, interacting because it can affect the audience, can reduce costs in video production, can provide a different experience even though watching videos, marketing becomes more interesting [3]. 7 to 11 years old is a golden age where the full potential can be developed and maximally empowered to find something great, innovation, and concepts that can help human civilization between whether a child can do something without adult help and whether a child can do something in adult direction or in collaboration with peers [4]. One of the most important potential uses of VR is found in education. The potential of a learning device that is predicted by a student when he is faced with factual experiences of nearly real learning content can presuppose learning that is much more solid, fast and effective than other traditional learning situations [5].

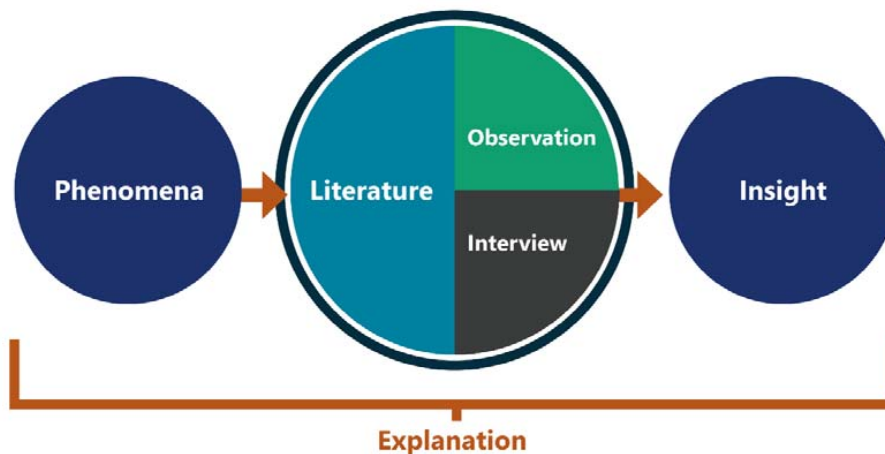
The purpose of making VR is to invite elementary school children to understand, select and separate inorganic, organic, and flammable waste in an effort to manage and recycle waste to preserve nature through VR technology as an alternative solution to these limitations. Through the Mozilla Hub, along with this activity children will feel motivated because they have friends in one lobby and parents or teachers that can help in character building in children. The method used descriptive method that explains Indonesian society's current behavior and awareness towards waste and validates whether the formation



of awareness of waste problems is effective by using VR for children.

## 2. Method

The methodology used in this research is descriptive method which explains the phenomenon of existing conditions and then explains the literature results. The literature explanation will be adjusted to the results of observations with qualitative interviews as final validation to gain insight (Figure 1).



**Figure 1.** Diagram of Research Methodology  
Source: Personal Document (2020)

Observations and research were carried out within 2 months, from June to July in Indonesia particularly West Java (Bandung and Subang). Qualitative data was collected by interviewing the number of six children respondents, who were the objects of research whom generally used to play video games. The method of collecting research objects carried out by direct interviews designed for approximately 10 minutes. Supporting tools for this research are smart phones, internet, and technology from Mozilla Hubs.

## 3. Results and Discussion

### 3.1. Indonesian Citizens' Habits towards Waste Management Phenomena

The habit of people throwing garbage everywhere seems to be commonplace in Indonesia. This is exacerbated by the absence of reprimanding each other to people who dump garbage carelessly. Since childhood, this happened to seeing parents who did not immediately teach their children to throw garbage littered. This is of course still very far from the way how the Indonesian people process waste.

Viewed from a survey conducted by the Katadata Insight Center (KIC) of 354 respondents in large cities, including Jakarta, Bandung, Semarang, Yogyakarta, and Surabaya, it revealed that 50.8% of households who do not sort waste have an opinion. That 79% of them argued that they did not want to bother choosing waste based on its type and thought that the waste would be disposed of in a landfill. This survey also illustrates the way households sort their waste from the remaining proportion before, namely 49.2% sorting their waste through waste sorting with 78% sorting into two categories, 18% sorting into three categories and 5% sorting into four categories. But ideally, there should be a separation between organic, inorganic, and hazardous waste. The remaining food, plastic and paper are dominated by household food. For plastic waste, respondents agreed to cover 78%, for leftover food or compost, including pieces of fruit and vegetable skin. Respondents agreed to reach 62%, households are one of the largest waste producers of the total waste in Indonesia [6,7].

In one hour, Indonesia produces 7,300 tons of waste or 175,000 tons per day. Every year plastic production generates about 8% of world oil production or about 12 million barrels of oil or the equivalent of 14 million trees, more than one million plastic bags are used every minute and 50% of plastic bags are only used once and then immediately discarded and from data only 5% is actually recycled according to the "Director General of Solid Waste Management, Garbage and B3 KLHK" (Figure 2).

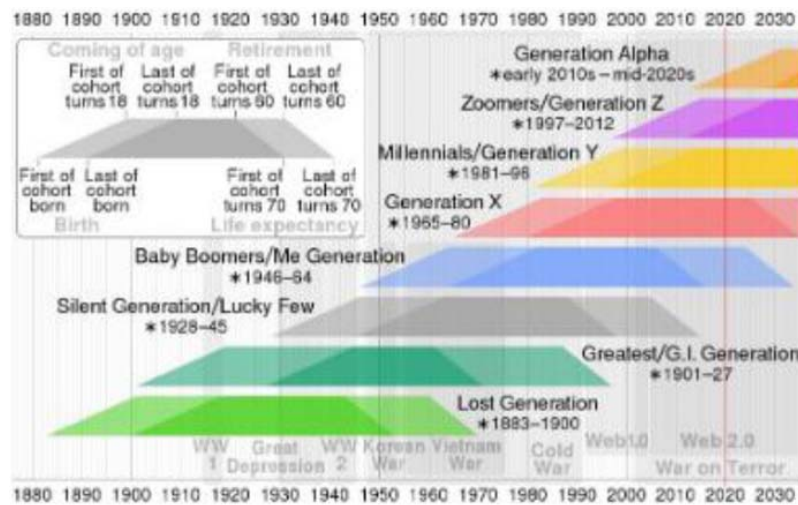


**Figure 2.** The Phenomenon of the Waste Problem in Indonesia  
Source : <https://theaseanpost.com/article/dying-rivers-asean> (2020)

The survey concluded that waste management should be done by sorting waste from the house to become a good habit to apply to children. The misunderstanding of *Tempat Pembuangan Sampah Akhir* (TPA stands for Final Processing Place) is also a problem for the environment. TPA is a place to process and return waste to the environment safely for humans and the environment. The community's perception that misinterpreting TPA as TPA makes the waste pile up even more [6]. This was exacerbated by the results of a study by Sustainable Waste Indonesia (SWI) which revealed that 24 percent of waste in Indonesia was still unmanaged. This means that around 15 million tons pollute the ecosystem and environment because they cannot support it per day. Without character awareness and order, this problem will get worse.

### 3.2. Alpha Generation Literature

The alpha generation is a generation that has known information technology since birth. This generation can take advantage of current technology to develop learning facilities easily. The alpha generation is characterized by being flexible, accustomed to change, capable of dealing with digital technology and a lot of information because this generation is easily immersed in a world connected with technology and information (See Figure 3). The generation is a critical reform of reflection and understanding to become highly progressive and transformative, more original, and develop unique skills [8-10].



**Figure 3.** Timeline of Generation Name

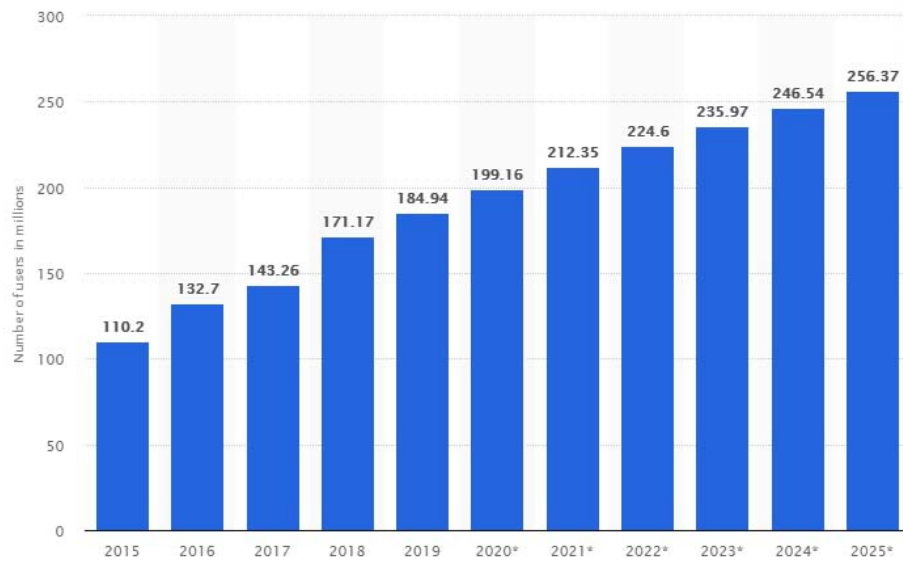
Source: [https://commons.wikimedia.org/wiki/File:Generation\\_timeline.svg](https://commons.wikimedia.org/wiki/File:Generation_timeline.svg) (2020)

Parents, educators, and other social media have profoundly influenced the concept of connection and have become a central element of this generation. The Alpha generation shows the need for a connection between the interface and technology that switches to the internet, the implementation of touch screen devices for dynamic interaction, therefore the Alpha generation is the controller of the digital world [10,11]. According to Bennet, digital natives are those who have high knowledge and skills in the field of Indonesian technology and this is different from the previous generation. This difference is very pronounced in education, experience and expectations. The Alpha generation prefers audio-visual and animation; the Alpha generation tends to be very addicting to gadgets and technology. The Alpha generation is more adaptable, because they will live in a variety of situations and environments.

### 3.3. Indonesian Internet Usage

According to Indonesian Internet Service Providers Association (APJII) internet users in Indonesia until year of 2018 have reached 171.17 million. This number increased rapidly by around 27 million users, resulting in 10.2 percent compared to 2017. Java Island became the region with the largest contribution of internet users with 55 percent. Internet usage in Indonesia continues to increase to 184.97 million in 2019. This is predicted to continue to increase if calculated based on statistics sourced from statista.com [4].

According to Newzoo data in 2019, smartphone users in Indonesia have reached more than 82 million and more than 52 million are mobile game players. This puts Indonesia ranked 17th in the world as the most mobile game user and contributed USD 624 million or equivalent to Rp 8.7 trillion for mobile gaming throughout 2019. This proves that children prefer things that have interactions such as games. This game will certainly be closely related to the use of VR (See Figure 4).



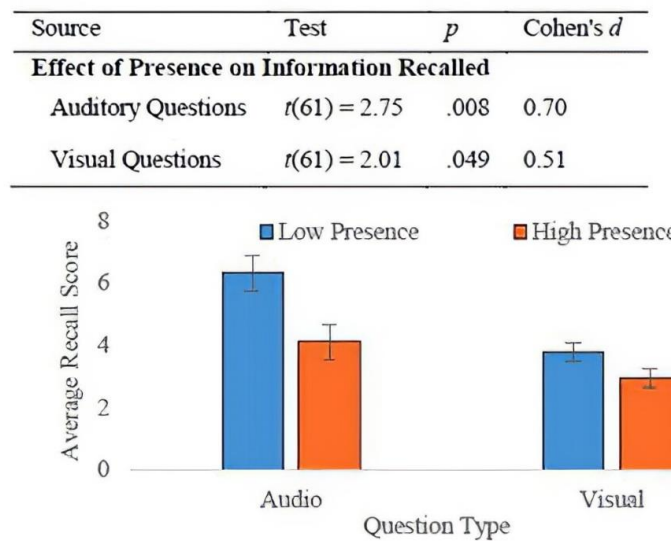
**Figure 4.** Number of internet users in Indonesia from 2015 to 2025

Source : <https://www.statista.com/statistics/254456/number-of-internet-users-in-indonesia> (2020)

#### 3.4. Immersive Effect of VR

The immersive effect is the impact of a situation where we feel truly in a virtual environment and wherever you see it is felt around you. VR is a technology that can provide exciting experiences and can lead to different and manifest (physiological) affective (emotional) [8,12]. VR dramatically expands the range of human experience beyond anything that might happen to be encountered in physical reality. VR updating computers is produced by what is seen from a first-person perspective from a third person which is under user control.

There are 2 main features in creating a VR environment: CAVE Automatic Virtual Environment and Head-mounted Display (HMD). A cave is an arrangement that uses a projector and indoor display or similar large-scale structure to create an immersive virtual environment. HMD is used on the eye. In HMD, the VR environment will be visible before the user's eyes anywhere when moving (Virtual Reality Society). Research shows that VR can provide added value to learning, especially in terms of motivating students, but the quality of learning is determined by pedagogical science theory and learning that informs virtual environments. His ability makes it possible to learn from experience in various ways, the ability to explore a world that is generally inaccessible, possible, or safe for students. Aligning with social construction approaches to student learning and pedagogy. Its ability makes it possible to learn from experience in a number of ways, the ability to explore a world that is generally inaccessible, possible, or safe for students. VR can present new opportunities for creativity in learning such as role playing and mentoring, opening up learning spaces for practice and exploration, and expanding the ability for inquiry learning. Research shows that the "memory effect" of audio is a contributing factor higher than visual (See Figure 5). Therefore, the application of VR must be accompanied by the delivery of audio for the maximum experience [5][6].



**Figure 5.** The effects of immersive and future VR expectations on subjective-experiences during an educational 360° video research

Source: [https://www.researchgate.net/profile/Daniel\\_Mcconnell10](https://www.researchgate.net/profile/Daniel_Mcconnell10)

### 3.5. VR validation for Alpha generation in Indonesia

Six Alpha generation children were interviewed in Subang and Bandung from June to July for approximately 10 minutes by trying out VR simulations directly. The result shows that more than 80% of them were interested in using VR especially for those already accustomed to playing online games. They feel VR is much more interactive because there is audiovisual to interact with friends through online connection. From different angles, the movement and position of the users of this technology create a feeling of presence or being in a virtual world or in a computer network environment, a shared presence, or a sense of being in a room with other people. To feel being together occurs, there are 2 important factors na: the This strong feeling occurs in a virtual place created. One factor that makes VR interesting since VR has a full immersive impact on users with an unusual experience.

## 4. Conclusion

Virtual Reality is a technology that can be used for simulations and at the same time can display audiovisuals that interact with everyone in the room or in a virtual world. Since the interest in VR will be something that is attractive so that without realizing it the use of content or learning media will be easily absorbed by users, especially alpha generation children. Using VR as character building can have an impact because of the immersive effect of VR. Suppose children are interested in learning and understanding waste problems through VR. In that case, this will impact character building so that they can solve the problem of waste and its processing in Indonesia. Hopefully it is a one of many solutions that solves the root causes of bad habits in Indonesia.

## 5. Acknowledgement

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