Students' Perspective on Learning Basic Health in 4th Grade Science Subject: Experiences and Expectations Towards Interactive Digital Design Utilization

Cennywati[1,*,] Nina Hansopaheluwakan[2]

[1] *Universitas Multimedia Nusantara, Indonesia*
[2] *Universitas Multimedia Nusantara, Indonesia*
[*]*Corresponding author. Email:* *cennywati@umn.ac.id*

ABSTRACT

Today's technology advances rapidly while human critical illnesses such as cancer, coronary heart disease, kidney failure, and diabetes are affecting younger people. Based on that concern, our research team are compelled to look at the root of the problem, which is related to health awareness. It is crucial for society to be aware and has knowledge of basic human health since early ages, which can be started from primary school age. At the moment, most Indonesian schools are still using the conventional teaching media and methods in the primary education, where students depend on textbooks and teacher's input, while digital applications have been used globally in daily lives. With the current's technology advances, an interactive digital design-based learning medium can be developed to support health education. By applying this new method, it is hoped that students can have a better learning experience that satisfies their curiosity in science. Therefore, our research team aim to analyse how interactive digital design-based method can be applied to health education in primary school age from the students' point of view.

Keywords: digital design utilisation, science education, primary students, health awareness, effective learning method.

1. INTRODUCTION

People are accustomed to rapid technological advancement. Nevertheless, in most cases, it is not automatically aligned with a more positive impact brought in public health awareness. Healthy life habits are still hard to maintain for most people. Lack of sleep and exercise, junk food consumption, smoking, and other bad habits are prevalent in today's lifestyle. It leads to more and more younger people getting critical illnesses like coronary heart disease, kidney failure and other illnesses that affect much older people in the past. According to dr. Indra S. M Manullang, Sp. PD-KKV, a cardiovascular disease specialist at Siloam MRCCC Semanggi Hospital, in an interview on June 2019, he mentioned that coronary heart disease has affected many young people nowadays and are occurring to even younger age group than it was before [1]. The data from the Health Department confirms that coronary heart disease is affecting the younger age group, between 25-29 years old. Similarly, dr. Laurentius Aswon Pramono, Sp. PD, M. Epid from St. Carolus Hospital also stated that he has encountered many patients from productive age groups, even from those who are under 40 years old. This clinical epidemiologist said at the launching event "Peluncuran PRUTop *By* Prudential" at Sudirman, Jakarta, "Now, [in] every week of practice, there was always heart disease patients who were only 38 years old or younger. Patients of cancer, like cervical, breast and lung cancer, are also from the young age. The same

with diabetes mellitus, which can cause further complication into coronary heart disease, stroke or chronic kidney failure" [2].

All of the above data shows that there is a need for a boost in health education to bolster the public awareness of maintaining a healthy lifestyle and that can be achieved by strengthening the basic foundation of knowledge that should be built in primary school education.

Our research team aim to cultivate the early awareness in maintaining a healthy lifestyle that can be started from a young age, especially in primary school age. In order to create a good learning experience, the key is to pique children's curiosity by using interactive digital technology.

According to Professor Piliang [3] in his lecture, technology has made unbridled human curiosity of information to be even more accommodated. It suggests that there is a need for a research study to explore the possibility of using an application method based on digital design to support health subject in science education. But to get an effective result, our research team feels that students' point of view is needed as they are the targeted audience.

In a learning activity, children need the stimulation that is effective, fun and engaging. Born in a high-tech era, today's children are categorized as the generation Z (for people born between 1995 to 2015). They live in different natural and social conditions than the previous generations, which, in turn, form different perception patterns. Therefore, finding the best stimulation can effectively affect children's memorizing and understanding, which can be achieved by using an interactive digital design.

This research is primarily conducted online using data obtained from Google Form surveys and online interviews with 4th grade primary students due to avoiding face-to-face contacts during the current pandemic situation. Twenty two out of 33 students in this research were recruited from one private school in Jakarta, Indonesia. The aim of this research is to answer the following questions:

What are students' perspectives on learning basic health in the 4th grade Science subject?
What are their experiences and expectations towards digital design utilisation?

2. LITERATURE REVIEWS

2.1. Previous Research

Our team started with an idea to explore the challenges of science learning methods for primary school students with the purpose to gain insights to support the development of a more effective learning method based on the digital application design, particularly regarding the human body. This idea is derived from our previous researchs, "The Jamu Herb Illustration Card, Indonesian Health Culture Conservation Based on Augmented Reality Illustration Medium", where we explored the use of augmented reality based illustration flashcard design for boosting public awareness of the benefits of "jamu" herbal medicine for a healthier life [4], and our ongoing research "Exploration of Effective Learning Method Based on Digital Application Design for Science Subject in Primary Schools, where we explored the use of technology in learning science.

This journal is the basic research to collect necessary data about the needs of grade 4 students in learning science, and will be expanded to gather larger data pool of grade 4 students' respondents and also insights from their parents. Further study will be conducted to determine what media will be the ideal output for helping grade 4 students in learning science.

2.2. Definition and Method of Effective Learning

The benchmark of a successful learning process is that it results in the improvement of one's capability. According to Hakim (2000) in his book entitled "Belajar Secara Efektif":

"Learning is a process of change in human personality and that change shows in form of the improvements of behaviors, both in quality and quantity, such as the improvements of capability, knowledge, attitude, habit, understanding, skill, memory et cetera" [5].

Science subject in the Indonesian primary school's curriculum initially introduced in Grade 4 and the learning method is primarily based on textbooks, teacher's explanation and simple experiments, using the common tools such as spoons or cans. This simple method may not enough to be applied in this modern era, and we attempt to tackle the health education problem by improving the learning process through the interactive digital design utilisation, because without effective learning method, any improvement of behavior will not be last long. By arousing curiosity, we aim to imprint lasting improvements even to the adult stage.

2.3. Interactive Digital Design Technologies May Improve Experiential Learning in Science Learning

Skills in learning Science in primary school-age children need to be modified and simplified according to their cognitive development phase. Children's cognitive structure is different compare to a scientist. Samatowa, in his book entitled "Bagaimana

Membelajarkan IPA di Sekolah Dasar" defined that "children (primary school age)'s process skills are observing, experimenting, inferring, using the new knowledge to predict what will happen and testing the accuracy of that prediction" (p. 12) [6]. Primary school children's learning development tends to favour concrete objects and viewing things as a whole and interconnected.

Interactive digital design is a form of digital design that is able to interact virtually with its user. Interactive digital design can be used in many fields, such as game, education or simulation. Interactive digital design is one solution in improving the modern learning system so that it can be fun, interesting, and engaging for children in learning science.

Generally, in the process of learning, a human is better in retaining memory when the process includes action, rather than just memorizing from the textbooks. The sensation of touching and experiencing leaves a better impression on human memory, which is why people say experience is the best teacher. Figure 1 illustrates the experiential model that promotes the concept formation is obtained from testing the concept in concrete experience through observations and reflections.
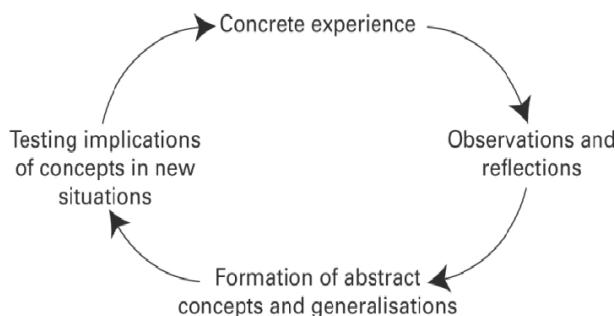

Figure 1. The Lewinian Experiential Learning Model

According to Zull, "The experiment I described [as a process of learning] suggests a direct engagement of a visual (sensory) area of the cortex in carrying out an action (motoric brain). This particular observation may not surprise you. Indeed, of the cognitive senses (touch, body perception, sound, and vision), vision seems to be the most fundamental. That is not to say that the other senses are not important, but there is increasing evidence that other senses either strengthen the visual or are subservient to it. We tend to check everything with our eyes" [7]. Therefore, visual is a crucial key in learning and interactive digital design can play important role in improving science learning.

2.4. Insight from Students for Effective Interactive Digital Design

We believe the insight from students is an important factor in gathering information for our research team in developing an effective, fun and engaging interactive digital design for primary students. Therefore, in this study, we conducted a survey in July 2020 to the primary students as our targeted participants. The data will then be used as a benchmark to develop our interactive digital design.

3. RESEARCH METHODOLOGY

According to Creswell et al., the definition of mixed-method is "a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies" [8]. In this research, the research methodology used is a mixed method approach which combines qualitative and quantitative data because we wanted to develop a result that emphasize efforts in obtaining data and then analyse the data that can describe and answer the problem studied by our research team.

This research can be categorized as using a mixed-method because the data gathering process is a combination of a qualitative method through interviews of primary school students and a quantitative method through surveys by using Google Forms. The analysis technique that we used is the componential analysis technique. The research team gathered the quantitative data through Google Form in July 2020, with primary school students as the target audience. The qualitative data was gathered through interviews to optimizing the data validation. The next data collection will be conducted with parents, teachers, headmasters and doctors as the other participants. Nevertheless, since the other data collection is still ongoing during the writing process of this article, the paper will only present the data we have collected from the students.

4. STUDENTS DATA ANALYSIS

Science curriculum in Indonesia starts to be introduced in grade 4 and the learning process is heavily based on the textbooks and verbal information delivered by the teachers. Teaching aids are limited to simple items, such as tin cans or spoons. But for learning human organs, the teaching tool used by the teachers are limited to pictures or anatomical models. Our research team believe that it is important to develop a new learning method which is fun, easy to remember and to

understand and one way to achieve it is by using technological advances.

In order to develop it, first, we need to gather inputs from students which are the targeted users. Then for the next articles from this study, inquiries will be conducted to other sources such as parents, teachers, headmasters and doctors. This approach is used as a combination to develop a valid result.

According to the data gathered from Google Form and interviews with grade 4 students, the need to improve the learning process by using the interactive digital design is as stated below:
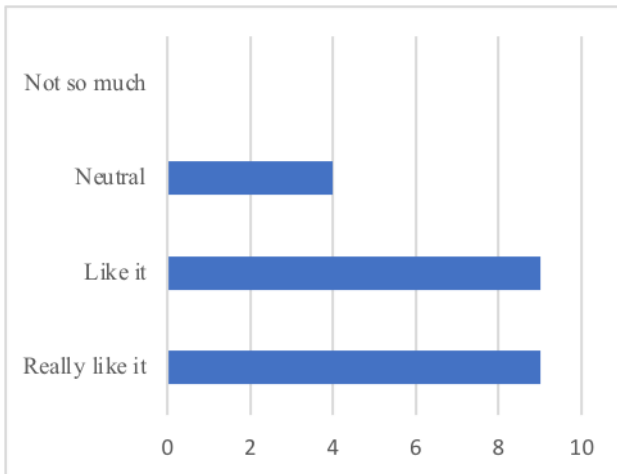
Figure 2 Question: "Do you like science subject?"

When asked "Do you like science subject?", 40.9% answered "really like it", while 40,9% answered "like it", and 18.2% answered "neutral", with no one chose "not so much". From the answers we can see that most of them like science subject and this is a good start to science learning in the future.
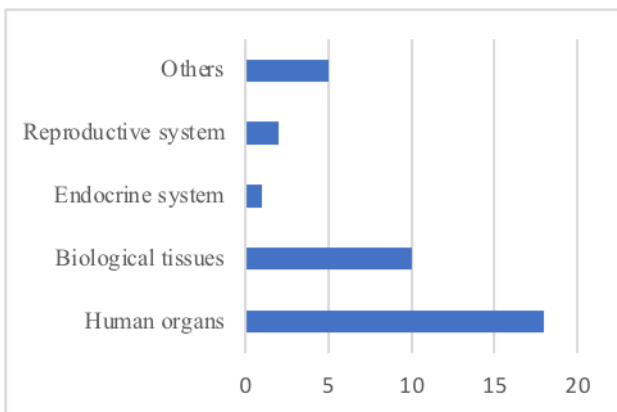
Figure 3 Question: "What topics have been taught in your class (more than one answer is valid)?"

The result of the question "What topics have been taught in your class?" found that 81.8% respondents answered, "human organs", the other 45.5% answered "biological tissue", 4,5% answered "endocrine system",

9.1% answered "reproductive system", while option E was filled with various answers about science subjects, such as "plants and animals", "natural resources", and "force". The fact that grade 4 students have learned about human organs is really advantageous for teaching health awareness.
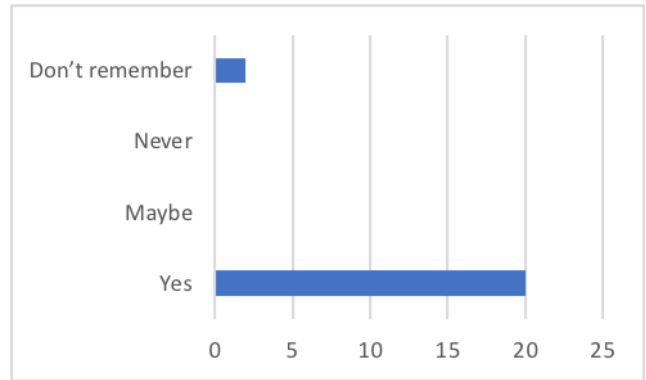
Figure 4 Question: "Have you been taught about human health in science subject?"

For the question "Have you been taught about human health in science subject?", 90.9% answered "Yes", with the rest answered "don't remember". It is really encouraging to see that the students have learned about human health so we can find ways to make the learning process effective.
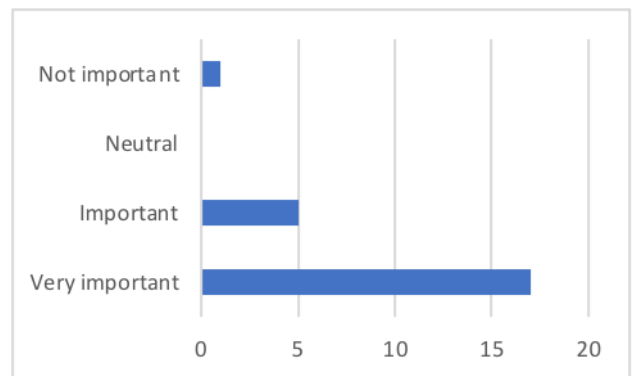
Figure 5 Question: "Do you think it is important to learn about human health?"

When asked about the importance of human health, 77.3% answered very important, 22.7% answered important, and 4.5% answered not important. Most respondents agreed that human health is important, but it is imperative to figure out why, in practice, this mindset does not reflect on everyday life and to the adult life.
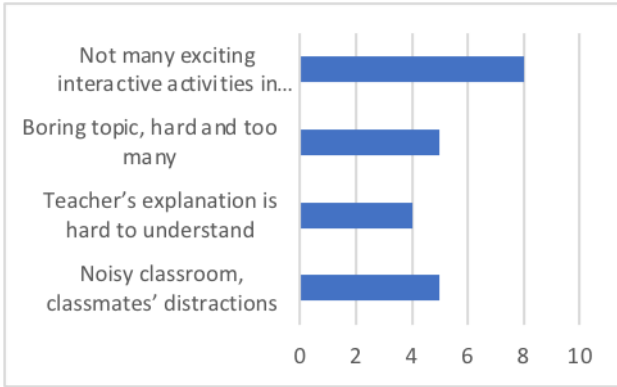
Figure 6 Question: "What bothers you the most in learning science?"

About hindrances in learning science, 36.4% of the respondents said that there was "not many exciting interactive activities in sessions", 22.7% said "boring topic, hard and too many" and 22.7% answered "noisy classroom, classmates' distractions" while the remaining 18.2% answered "teacher's explanation is hard to understand". From the result above, we can see that the respondents wanted more interactions, in which, a further study is warranted to find out which technology could be used as an efficient interactive learning tool.
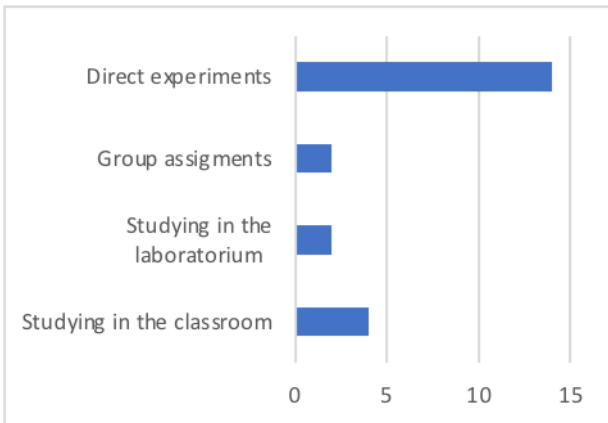

Figure 7 Question: "Which science learning method do you find interesting?"

The survey result from the question "Which science learning method do you find interesting?" was that 63.6% of the respondents answered, "direct experiments", 18.2% answered "studying in the classroom", and answers for both categories were 9.1 %. More than half of the respondents desired interactive activities in learning science, reinforcing the notion that we need to start evaluating the monotonic nature of current science learning method and move toward a more interactive method.

Figure 8 Question: "If your science teacher has used teaching tools / props in classroom, what do you think about them?"

86.4% of the respondents answered, "very good", and the rest 13.6% answered "good" when asked about what they thought about the use of teaching tools and props. Respondents also added some elaborations about why they had positive reactions, which were that they could see and experiment directly and made things interesting and not boring.
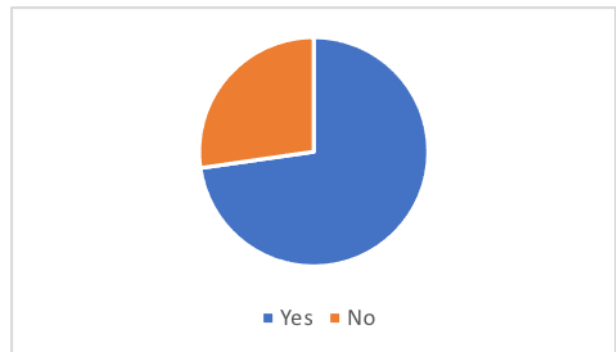

Figure 9 Question: "Do you think technology is important in learning science?"

The result from the question "Do you think technology is important in learning science?" was that 72.7% of the respondents answered "yes", the other 27.3% answered "not really". The students who agreed that technology is important in Science learning have filled their reasons with these answers: "for easier learning, to be more interesting and fun, needed sometimes, to understand the technology, makes it easier to understand, because it helps to learn". On the other hand, those who answered that the technology was not important in Science learning was only answered by one respondent as "sometimes we don't need it".
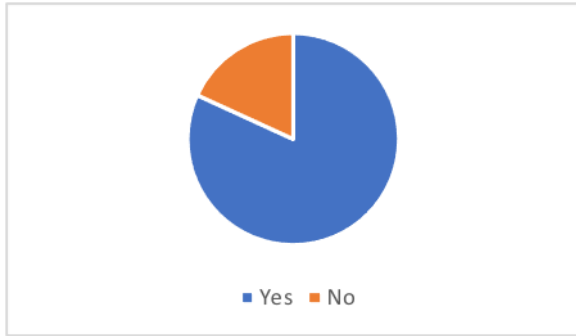
Figure 10 Question: "Have you heard about digital technologies such as Virtual Reality, Hologram, or Augmented Reality?"

When asked "Have you heard about digital technologies such as Virtual Reality, Hologram, or Augmented Reality?" is that 81.8% answered "Yes", and only 18.2% answered "No". This shows that young generation is already accustomed to technology. We need to find new and better method of learning to accommodate them.
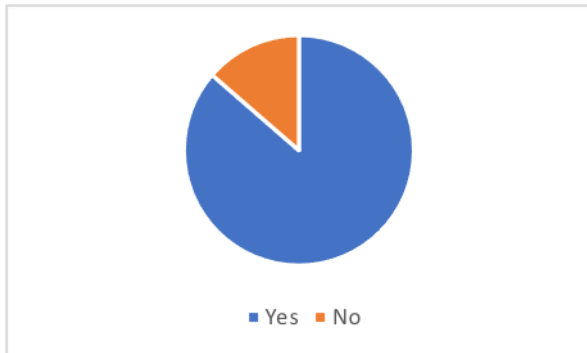

Figure 11 Question: "Do you agree if digital technologies are applied to science education?"

The survey result from the question "Do you agree for the interactive digital technologies to be applied in the Science education?" was that 86% of respondents answered "yes", 14% answered "no". Some of the students who answered agree adding their reasons like "I think it's more fun, it adds inspiration, getting more fun and interesting, okay, because it's fun". In contrary, those who answered that the interactive digital technologies were not necessarily applied to the Science learning added their reasons such as "because it's not fun, it's better not to rely on technology, and not fun".

Below is one interview transcript snippet with a grade 4 student from Penabur Kota Modern Elementary School:

Q: When your teacher using support tools for teaching Science subject in class, what do you think?

A: Very Good, because it's more interesting.

Q: Okay, in your opinion, what is the most interesting support tool used in learning Science? Props can be images or another thing that usually used by your teacher in class.

A: Hmm, depends on the learning topic.

Q: Okay next. Have you ever heard about digital technology like virtual reality, hologram or augmented reality?

A: Yes, I have heard about the hologram.

Q: Then it means that you haven't heard about the augmented reality? If so, let's continue to the next question, what do you think if interactive digital technology is applied in Science class? The hologram or augmented reality, do you agree or not? If you don't agree, why?

A: Not sure since I have no idea how it would apply to the topic, but I think it's more interesting doing a direct experiment.

Q: Okay, a direct experiment is more interesting because you can touch real things that have dimensions. Moving on to the next question, from your experience learning in the class what is your opinion to have a more interesting and easily understand when learning Science?

A: Maybe if we can do direct or hands-on experiments, that will be more interesting.

Q: Regarding the support tools as you said earlier, do you mean by using everyday objects that can be used, can be touched, smelled, the colour can be seen?

A: Yes, I would love to have those in learning. It sounds fun!

Q: Well, done, thank you for your help.

From the data above, it is shown that the students like Science subject, in which basic human anatomy study has been taught and they feel that health subject is important. There is an expectance of a more interesting way to learn Science. The students are already familiar with technology and the majority wants the implementation of interactive digital technologies in learning Science.

4. CONCLUSION

Based on data and analysis above, our research team concludes that children, particularly those who are in Grade 4 age group are enthusiastic in learning Science. This learning interest is very good since it can be a good foundation for their passion in learning Science. Primary school students love if their teacher integrates support tools while teaching, they also wish to have

direct experiments when learning Science. In their opinion, obstacles that get in the way for learning Science is having only boring textbook materials with too little direct experiments done during the learning activities. Children need another stimulation besides textbooks, that can be immediately observed, acted upon, and even better if it can be touched. Nowadays, primary school students are no stranger to the interactive digital design, and they think that effective learning method based on digital design for Science is an interesting thing for helping them learn Science easier. Thus, our researcher team asserts that interactive digital design application would help assist children learning process in this modern era.

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