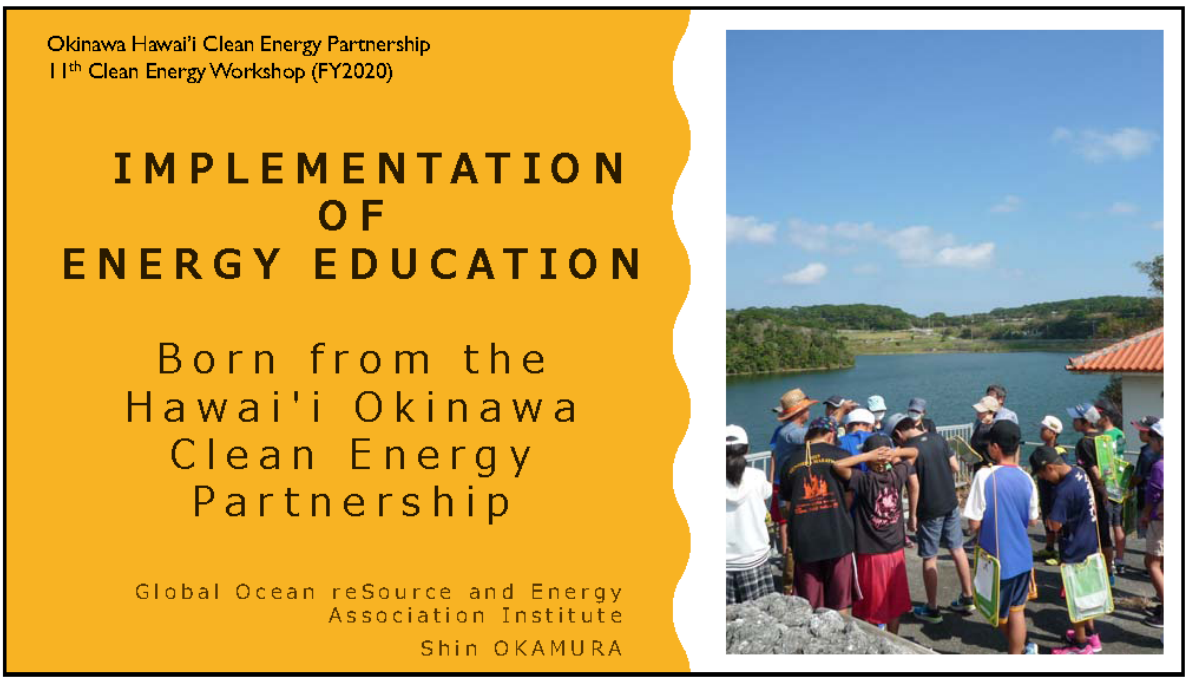
Okinawa Hawai'i Clean Energy Partnership
11th Clean Energy Workshop
6-1) "IMPLEMENTATION OF ENERGY EDUCATION Born from the Hawai'i Okinawa Clean Energy Partnership" Transcript



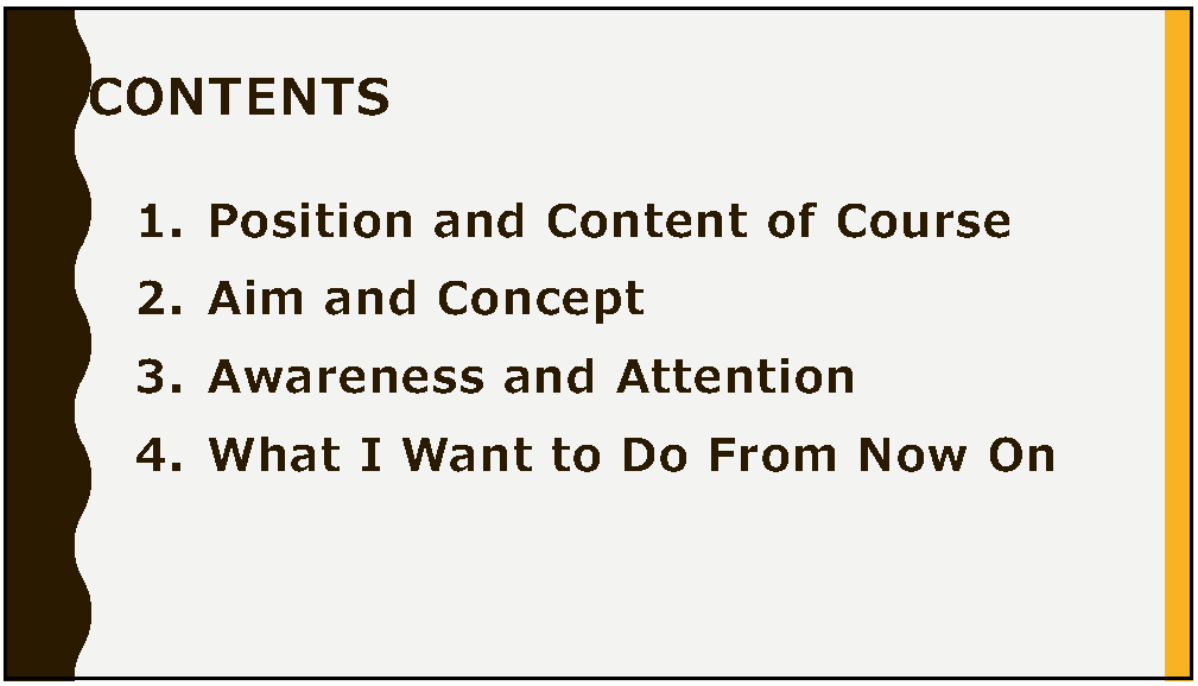

Alo-Haisai

This year is the third year of Kumejima's energy classes for elementary schools that the Okinawa-Hawai'i Clean Energy Partnership provided a chance to start. Thank you for the opportunity to talk about the energy classes today.

I'm Shin Okamura of GOSEA. I specialize in thermal engineering, and each year at this workshop I have talked about demonstration tests of OTEC on Kume Island and the combined use of deep ocean water.

As for the energy classes in elementary schools, I myself was originally very interested in educating children, and as my daughters were just elementary school students, I often thought about STEAM education in elementary school, so I volunteered myself and have been acting as a teacher for the past two years.

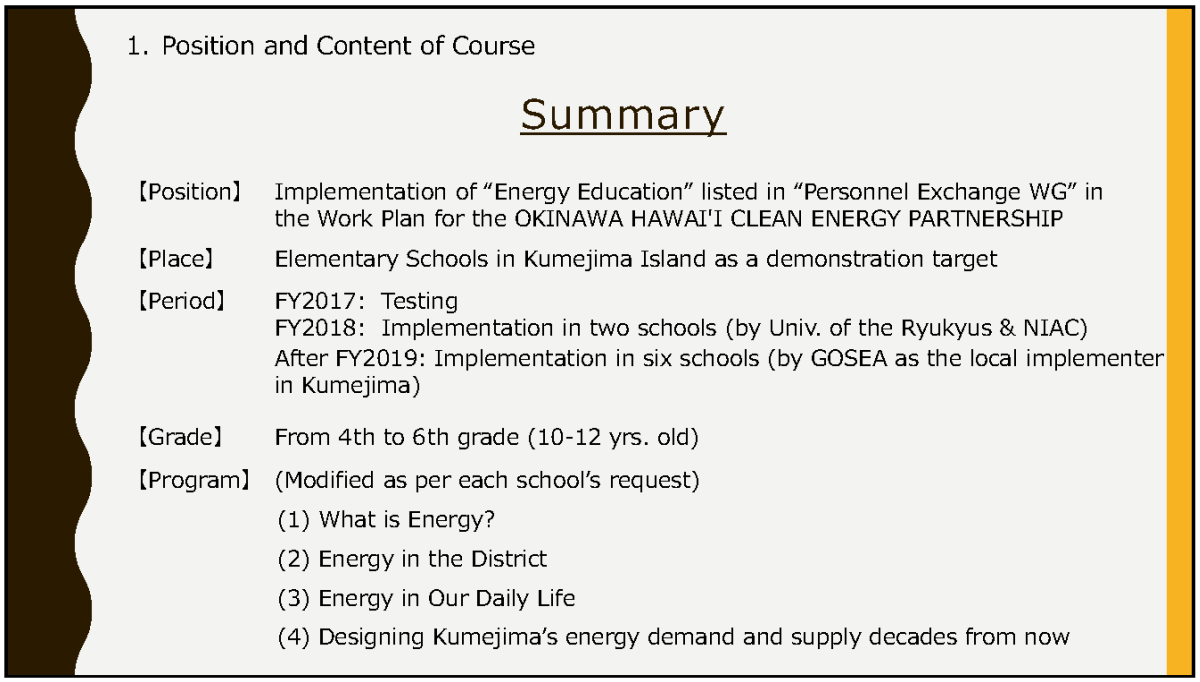
So today, I would like to talk about the energy classes, which is a different topic from usual.



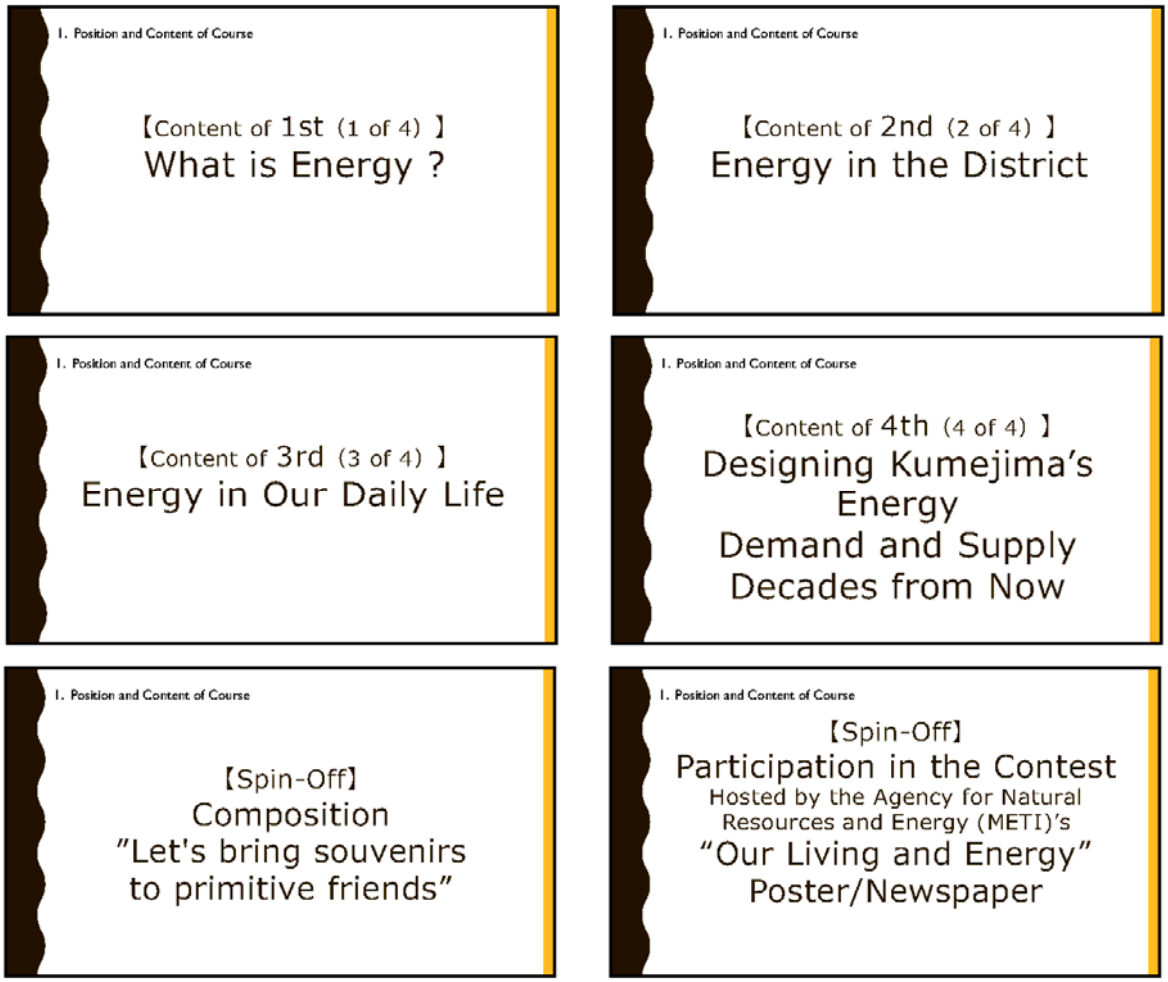

I will briefly introduce the background and details of the implementation, leaving details in the handout materials, and I will mainly talk about the second and third topics of this presentation's contents, "Aim and Concept of our Energy Classes" and "What I noticed when I tried it."

**1. Position and Concept of Course**

There are six elementary schools in Kumejima. This is for the 4th, 5th, and 6th graders (10-12 years old) from them .Basically, the program consists of four times in total. 2 hours each. Only for the tour we have 3 hours or half a day. Based on the school's convenience, sometimes we increased to more, or if required, we did only half of them.



Next, I will introduce the contents of each program.




First of all, "What is energy?" ... As an opening, in this class I mainly conduct power generation experiments that are easy for children to stick to and be interested in. What's going on behind the outlet there? Especially in Kumejima, we will trace the transformation of energy with a story about where electric wires are connected to and how electricity is made at the base.

Next, let's go to the places we learned about in the first class, because it is a great opportunity.

If you have half a day, all locations… To say all is 4 places, but you can also go around. It is a good point of the small island.

The first and second classes I concentrate on "creating" electricity, so the third time we talk about “using” it. In talking about use of energy, we also talk about climate change problems caused by using energy, and this makes the discussion a little bigger, so to bring “energy” closer to home, we play games and do work related to energy efficiency improvement in our lives.

Finally, then, what will become of Kumejima's energy supply and demand decades from now? Let's mobilize all the things we have learned and know so far and consider the future energy supply and demand of Kumejima.

This year, in a spin-off, I collaborated with a high school Japanese teacher and tried a composition class called "Let's bring souvenirs to primitive friends." Partly because of the topic of zero carbon emissions in 2050, the concept is that it would be interesting to imagine realistically what would

happen if we quit electricity and gas.

It was the most highly rated time by children so far. I was a bit jealous.

We also try to make an “Energy Poster/Newspaper” together during summer break for those children who are interested. However, only one group wanted to participate last year and the before last year.

Still, I'm surprised that both of the two groups won a great prize, which was the third place in the national competition of “Energy Poster/Newspaper Contest” hosted by the Agency for Natural Resources and Energy.

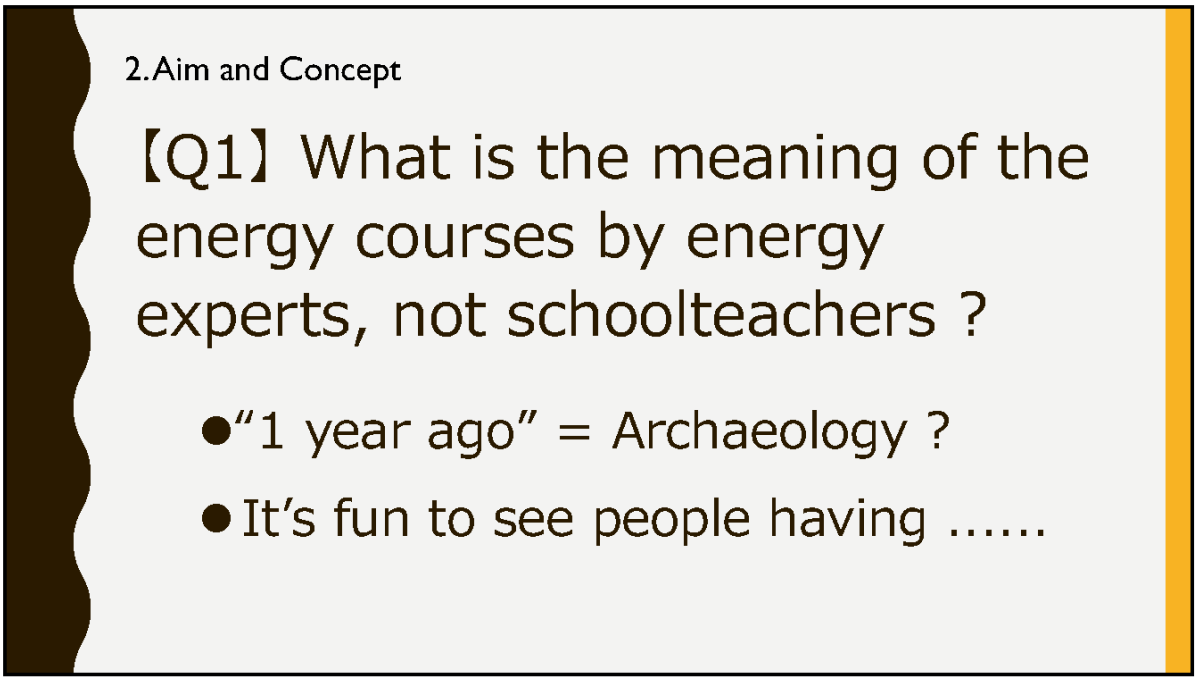
I've skipped through, so if you want to know more, please take a look as it is written in a little more detail in the PDF material.


Agency for Natural Resources and Energy's press release https://www.meti.go.jp/press/2018/02/20190201001/20190201001.html
Ryukyu Shimpo's article reporting the award https://ryukyushimpo.jp/news/entry-882545.html


Agency for Natural Resources and Energy's press release https://www.meti.go.jp/press/2019/01/20200131002/20200131002.html
Ryukyu Shimpo's article reporting the award https://ryukyushimpo.jp/news/entry-1104167.html

## 2. Aim and Concept

Next, I would like to talk about the concepts on actually conducting the classroom.




First, What is the meaning of energy courses by energy experts, not schoolteachers?

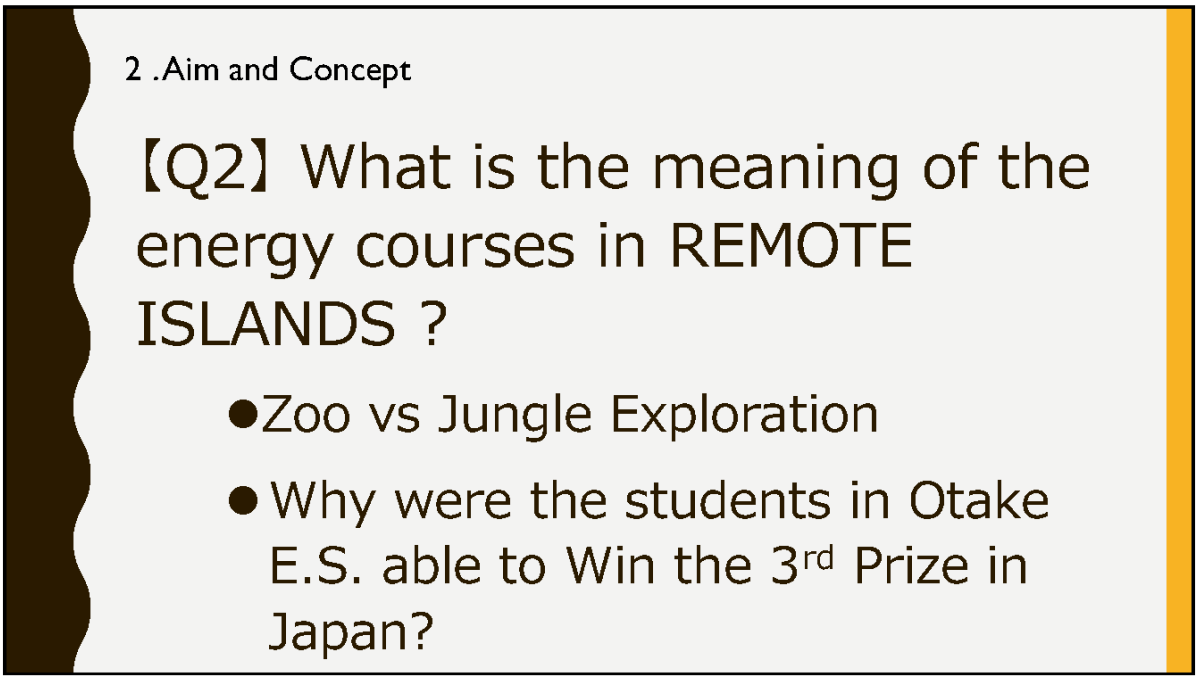
There is no doubt that schoolteachers have higher teaching skills. Also, especially in elementary school, it is a big advantage to be able to grasp the personality and environment of each child and respond accordingly.

So what can you do as an energy expert? So far, we've found two answers.

The first comes from the very fast flow of the energy industry. If you're in the energy industry and you're not constantly following the latest trends, information quickly becomes obsolescence. Professor Yo Yasuda of Kyoto University, a renowned expert in the field of power systems, expresses this situation as "The person who says one year ago is an archaeologist".

The second is that the child sees through quite accurately whether the person talking is really interested in what he is talking about or whether he is really talking. Also, probably, it's fun to see people having fun talking. Whether it’s a popular TV show or a YouTube channel, many examples are available. Then again, "Ah, there are beings that think about energy seriously," an experience similar to seeing a rare animal in the zoo may be achieved, too.

These are the two advantages of experts, and they use this as much as possible to cover low level teaching skills.




Second. What is the meaning for a remote island?

I'm from the suburbs of Tokyo, and my children are raised near Tokyo, so I'm keenly aware of the disadvantages of remote islands. In Tokyo, if you search the internet for a bit, you can find science experiments and craft events every weekend at nearby science museums. If you want, you can go every weekend.

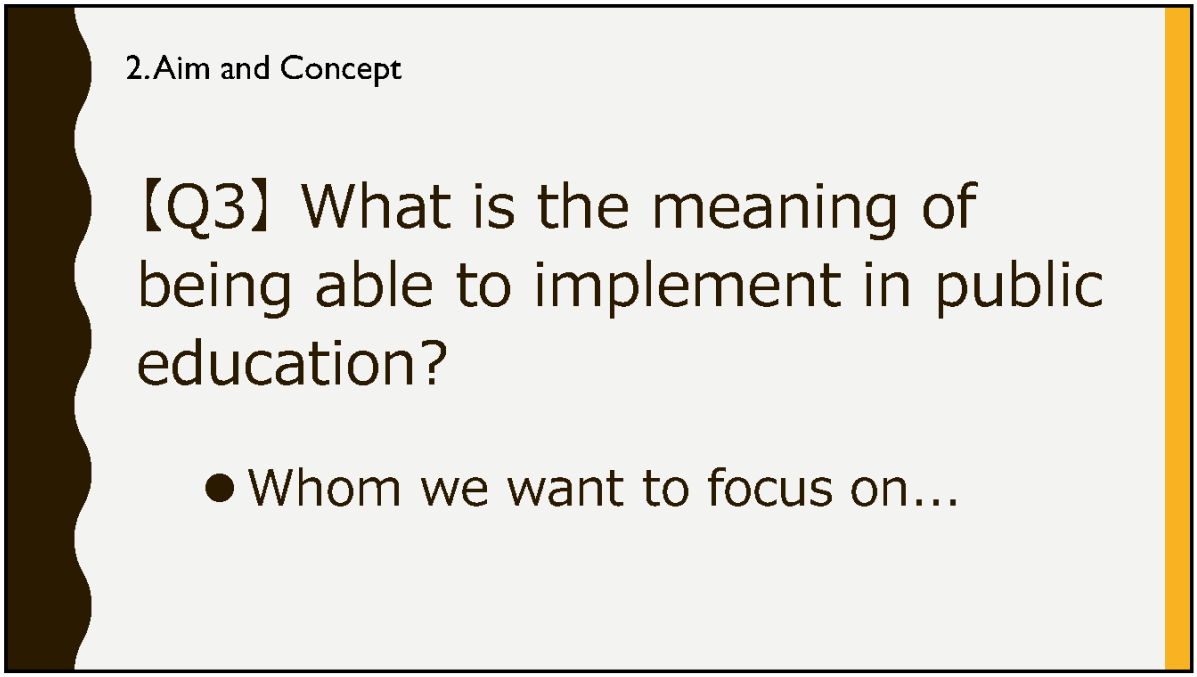
For Kumejima, opportunities may come once or twice a year. By far, much fewer.

On the other hand, the advantage of a remote island, is the strength of "being close to the real thing." For example, if you want to go to see a power plant in the city, you will arrive at a zoo-like "well-built" facility where there is a tour route for customers and a proper explanation board. However, when I tried to do the same thing in Kumejima, it started with "Huh? I've never had a child come to see it before." The tour application is not a search on the internet, but through tracking down an acquaintance. Instead of a zoo, you can have a jungle exploration-like experience.

I mentioned a little while ago that students ranked 3rd in Japan in the Agency for Natural Resources and Energy's poster newspaper competition, but a big part that was that students were able to go to get raw information by taking advantage of the advantages of the remote islands.

To add a little personal thought, such a contest is difficult to handle, and if you say, "you will win the competition for the city" or "pride of the region", I wonder if it is necessary. It is also a problem for children to worry about "Is this article going to get high evaluation from adult judges?". But at the very least, I think it's good to be able to serve as a "tinderbox" for active activities, and to lighten the urban complex that the island's children sometime have if they win a prize.

Also, I just talked about Kumejima, but Okinawa island is also a remote island of Japan, and Japan is a remote island of the world.



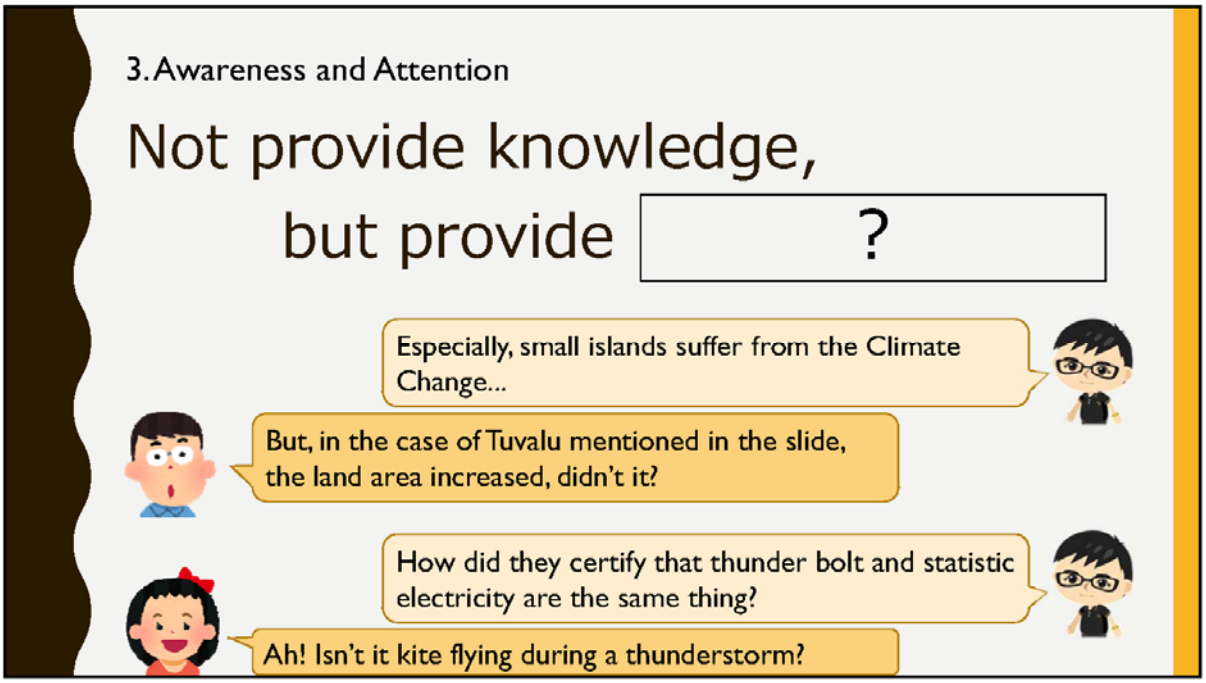

Finally, the meaning to be able to implement in public education.

This time, with the cooperation of the Kumejima Town Board of Education and each elementary school, I think it is very significant that it was incorporated into class time.

As I mentioned earlier, there is a certain proportion of families that do not have access to urban science museums, even if there are many opportunities. It is a particular problem recently as an educational gap between families. Kumejima also has few opportunities, but books and the Internet can be accessed if you are conscious. In particular, recent science manga and YouTube science channels are very high quality and interesting, so I think that it is okay to leave children who grow up in a highly conscious family environment alone. On the other hand, I'm happy because in public education, children who are not in such an environment can work together to provide the same opportunities.

### 3. Awareness and Attention

Here are three things I've experienced and become careful about during my two years in the energy class.




First, I strongly felt in the class that the value of simply teaching knowledge is being lowered.

In Japan, the enhancement of scientific manga for children has been amazing in the past few years. Survival series, experimental showdown series are best seller series for children. In addition, even in general manga rather than learning manga, there are many highly entertaining manga that incorporate specialized knowledge that even adults do not know, such as "Hataraku Saibou (working cells)" and "doctor stones." Even if it is not a manga but a book, the 2018 "The 1st Elementary School Students Choice!" The first place in the children's book "General Election" is "The Encyclopedia of Things That Are Not Possible" which is a biology book describing extinct creatures. There are many interesting science videos on YouTube, such as Denjiro Sensei.

If you want to learn knowledge, the amount and quality of materials that you can enjoy learning have improved from the past. The question is whether or not children can have interest enough to pick it up. Do we have the hook "interest"?

In the energy class, instead of giving the child a fish called "knowledge", we aim in such a direction as to give a hook or show how to make a fishing hook. As I mentioned earlier, there are a lot of delicious fish.

In the world of energy, I would somehow like to convey "How to enjoy the world," such as "Is this interesting in this way?," Is it interesting to think in this way?"

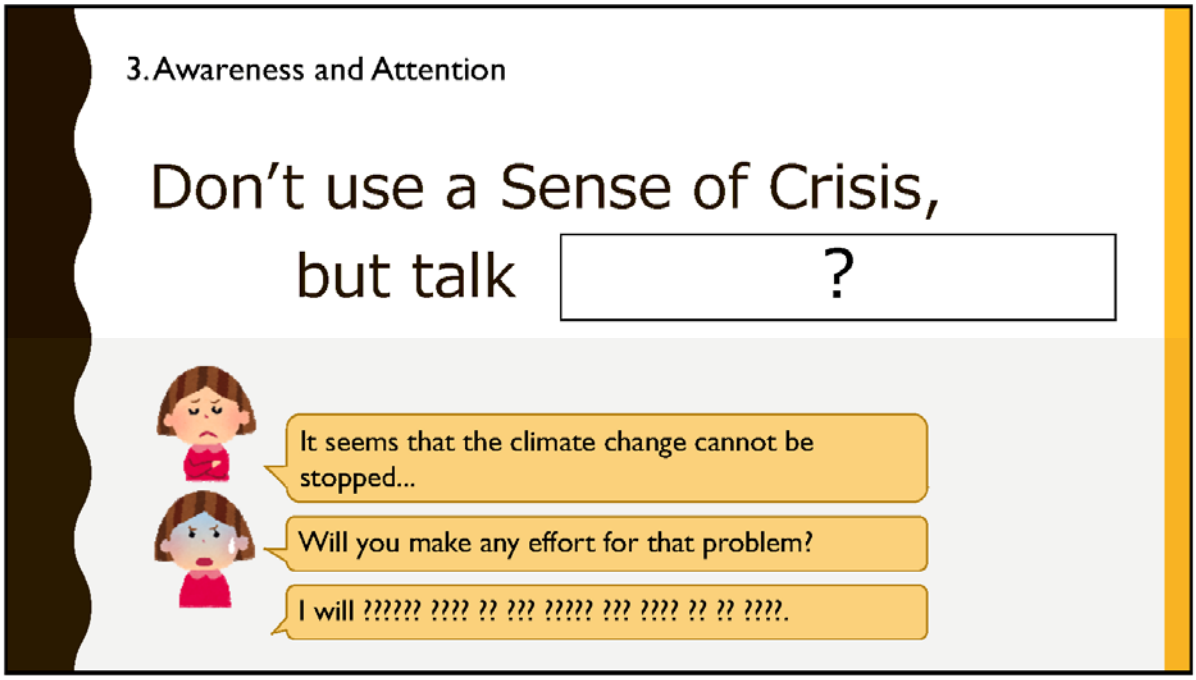
I can only teach energy, and if I expand to the limit, physics and machinery, but if the other adults can inspire an understanding of "how to be interested" in various fields such as history and earth science, the world will be full of interesting things, and children can live happily. Personally, I feel that is the ultimate purpose of education.

By the way, the story of Tuvalu written on this slide is the content that a sixth-grade student pointed out by looking at the photograph attached to the material as an example of the damage

caused by climate change. I didn't even know, but when I looked into it, it was a pretty complicated problem. It's interesting, isn't it?

Another story, when I joked the students wouldn't know about an episode of lightning and static electricity, a student who did know the story provided a spoiler. In the 18th century, a number of scientists died of lightning strikes in what is known as Franklin's lightning experiment, when subsequently trying to replicate it. This was a fourth-grade student.

Recently, if we compete with knowledge and trivia, sometimes we will lose to elementary school students (laughs).




The second is don't use a sense of crisis as motivation.

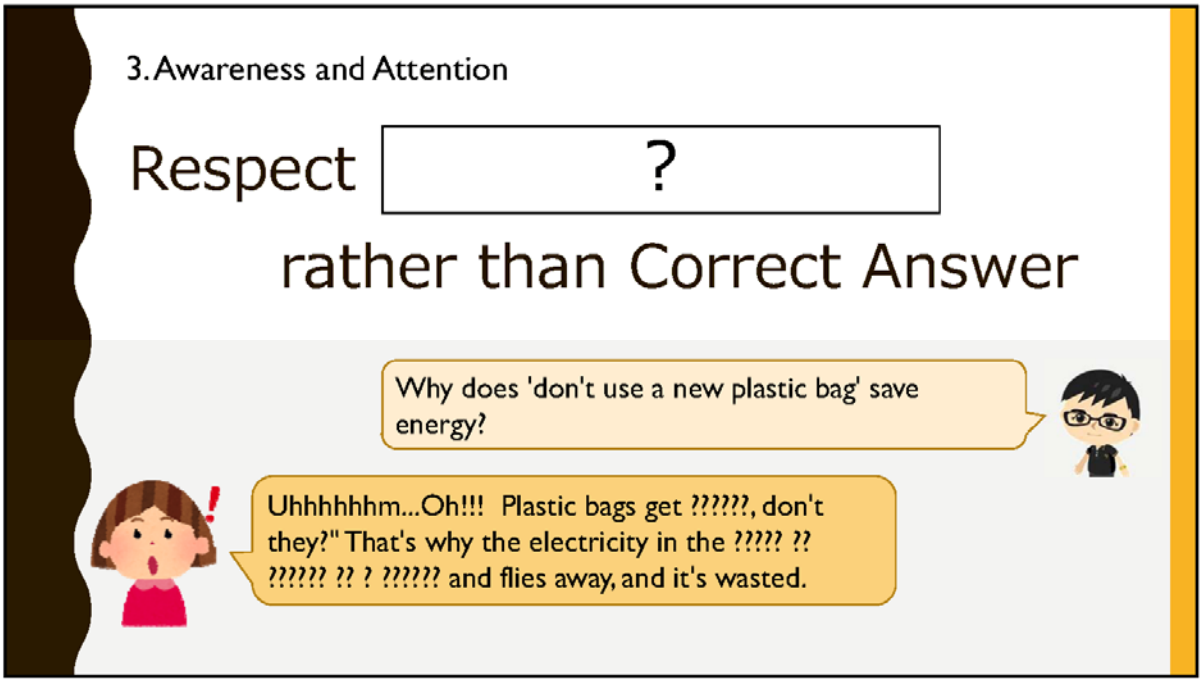
This is something we tend to do when we talk about climate change, such as, climate change is a very bad situation, so let's change our behavior with a sense of crisis! However, students are aware, even without being taught, that humanity is in a situation that seems to be dangerously near the fundamental point of sustainability, and they also know they cannot solve it with their own daily actions.

This is a thing that I heard on the side from a student who won the prize in the Poster/Newspaper Contest of the Resource Energy Agency while making a newspaper and talking with their four-person team. Their conclusion was, "I'll forget the climate change problem and live in an interesting and fun way until humanity is extinct," with a reply of "me too."

Certainly, a "sense of crisis" is powerful as motivation for action, but actions motivated by such a "sense of crisis" are not happy. In that sense, I feel that doing it, especially in education, is just a "putting the cart before the horse".

So, as they are inseparable from energy, I'm still struggling to find a way to teach "climate change" and "sustainability." At least, although it may not be sufficient, I think it's a requirement to talk about the wonders of what is as stake and how humanity has overcome these problems so far and what they are trying to do now.

At the same time, it is also important for adults who are talking about "climate change" and "sustainability" in front of children to be able to talk about what they think and how they are acting as being involved in energy.




The last is "Respect the wrong answer born by thinking rather than the correct answer from prior knowledge."

I tried to ask the question on the slide, "Why does 'don't use a new plastic bag' save energy?" this year to fourth graders. In the fourth grade, I couldn't get the right answer without some hints, but instead, there was a child who came up with this answer.

*"Plastic bags get static, don't they?" That's why the electricity in the wires is sucked in a little and flies away, and it's wasted."*

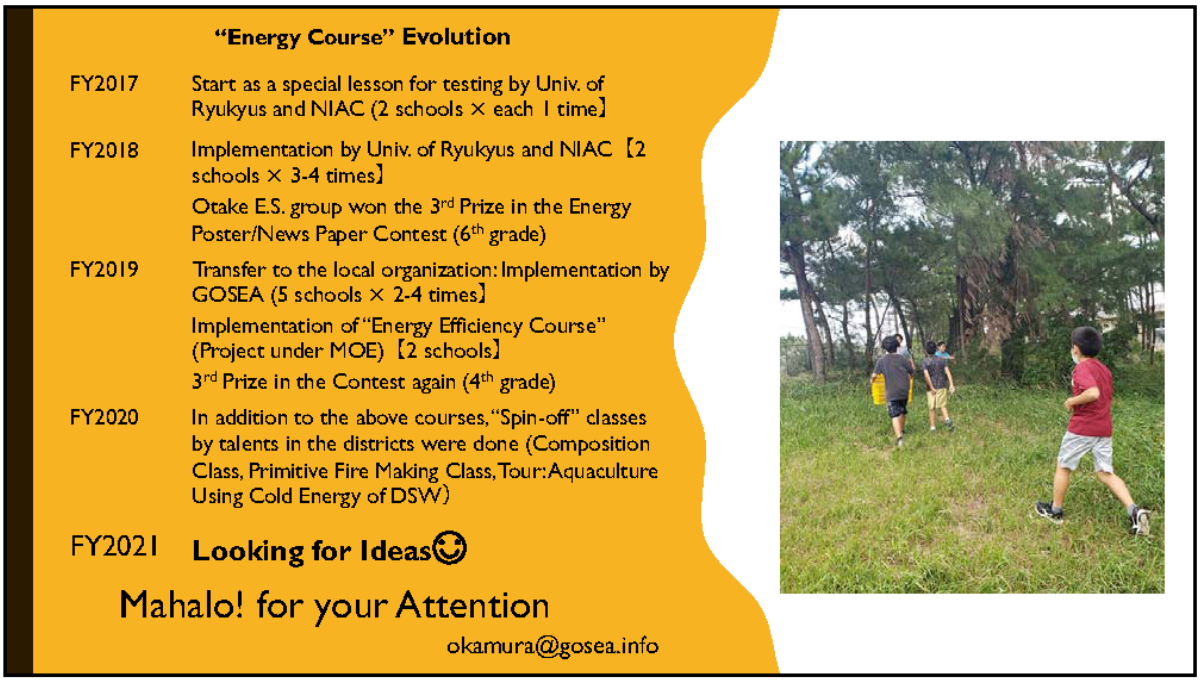
This is a much higher value answer than the correct answer, isn't it? It is a great answer that mobilized all the knowledge that they had and associated it with the topic. However, for the person in question, it is a shame that it is not a correct answer after all, and it may be a little embarrassing. The quiz format is easy to grab children, but if we use it wrongly, it will become like "the one with a lot of knowledge is amazing", so I try to be careful.

I think that it is better to repeat it every time, that it is much more valuable to think for yourself, even if it’s a wrong answer, than to know the correct answer.

It’s okay to say the wrong answer or say something strange. Rather, it is so-called "creating a safe environment to ensure psychological safety". At elementary schools in Kumejima, often have such a place is created in advance, but it was still more effective than I thought to make it clear at the beginning of the class.　NIAC, who was a lecturer two years ago said, “There is no correct answer for this map making,” and a former teacher said, “Today’s goal is when class is over for everyone to be happy.” The simple way of declaring it all at once is highly effective.

## 4. What I want to do from now on

Finally, I would like to finish by talking about what I want to do in the future.




I am proud that the output of making the Poster/Newspaper for the Agency for Natural Resources and Energy, though only helping the students, was a fulfilling experience. However, after all, it took a lot of time. Even with and A2 size, it takes many days to cover and build from scratch. The finished product can be surprisingly good, even for adults. The third place in the whole country is convincing.

On the other hand, I've done things like shortening the time and making newspapers without taking much effort during class hours, but after all, it is tedious. If it's boring, or rather the more precocious a child is, the more quickly and dexterously they make outputs like "It's like this when adults are happy" (laughs). This was counterproductive.

So, as a spin-off, I would like to someday try to create output with students after school and during summer vacation, where they will have time and can try to use their interests. Even if the form of the output is not a newspaper, for example, it is an energy-related work involving several people, or if you can get involved in the project of actual solar power generation, I think it will be an interesting experience for students.

This year, various people in the area came to this energy class as guests. In the next fiscal year, I would like to make use of the special skills that such people have to increase the range of outputs that children can enjoy.

Energy classes are still evolving.

If you have any fun ideas, please send them to this email address. Thank you for listening.