

Lespakket: Leven na Fukushima

Hoofdstuk 3 – Straling meten in een burgerlabo

Eindoelen

Nederlands	
2.7	De leerlingen nemen notities voor eigen gebruik bij het lezen en beluisteren van teksten in functie van doelgerichte informatieverwerking en communicatie.
Wiskunde, natuurwetenschappen, technologie, STEM	
6.10	De leerlingen gebruiken concepten met betrekking tot straling en elektriciteit om fenomenen en toepassingen ervan uit het dagelijkse leven te verklaren.
6.14	De leerlingen gebruiken met de nodige nauwkeurigheid meetinstrumenten, hulpmiddelen om te observeren, te meten, te experimenteren en te onderzoeken in wiskundige, natuurwetenschappelijke, technologische en STEM-contexten.
6.18	De leerlingen gebruiken op een gepaste manier meetwaarden, grootheden en eenheden in wiskundige, natuurwetenschappelijke, technologische en STEM-contexten.
6.36	De leerlingen gebruiken op een gepaste manier meetwaarden, grootheden en eenheden in wiskundige, natuurwetenschappelijke, technologische en STEM-contexten.
Sociale wetenschappen	
15.1.1	De leerlingen reflecteren over politieke processen en instituties en de interactie ertussen op lokaal, nationaal en internationaal niveau.
15.1.2	De leerlingen analyseren kenmerken van hedendaagse samenlevingen en de dynamiek ervan in die samenlevingen aan de hand van sociologische begrippen en theorieën.
15.2.2	De leerlingen analyseren waarom en hoe verschillende stakeholders gemedieerde massacommunicatie inzetten.
15.2.3	De leerlingen beoordelen op een onderbouwde manier effecten van gemedieerde massacommunicatie op de maatschappij en op zichzelf.

Te voorziene tijd

40 minuten

Materiaal/media

Deel 3 Prezi presentatie/website: Straling meten in een burgerlabo

Werkbundel deel 3: Straling meten in een burgerlabo

Online quizen:

- Welk apparaat kan je best gebruiken?: <https://forms.gle/ibu8iD1nEq5X19qk8>
- Extra: interview met Suzuki Kaori (burgerlabo): <https://forms.gle/EELUQsqYr5yai8di7>

Spel Explorad te downloaden via de website: <https://datatransfer.sckcen.be/public/download-shares/cfsjPjzFTpCkRdjg3Nh81Of9FEy8nIaY>

Interview met Suzuki Kaori: <https://fukushimatestimony.jp/en/live/7.html>

Werkwijze

Dit onderdeel is opgesplitst in twee onderdelen: een deel dat dieper ingaat op de vraag hoe radioactiviteit gemeten wordt en een deel dat het ontstaan en de activiteiten van burgerlabo's bespreekt.

1.1 Radioactiviteit meten

In het eerste deel wordt kort uitgelegd hoe radioactiviteit gemeten wordt. Daarbij ligt de nadruk op het gegeven dat radioactiviteit indirect gemeten wordt, d.w.z. de eigenschappen worden gemeten. De leerlingen maken kennis met de verschillende meetinstrumenten aan de hand van een schema. Dat schema moeten ze gebruiken om een oefening op te lossen, waarbij ze voor ieder opgegeven materiaal moeten achterhalen of ze een staal moeten nemen en of ze een mobiel of vast apparaat nodig hebben. De oefening staat in de werkbundel en is beschikbaar via deze link:

<https://forms.gle/ibu8iD1nEq5X19qk8>. Deze oefening heeft als doel de leerlingen voeling te geven met het meten van radioactiviteit. Voor ieder materiaal moeten de leerlingen achterhalen welk meetinstrument ze best kunnen gebruiken. Nadat de leerlingen geleerd hebben over de verschillende soorten meetinstrumenten, kunnen ze via een spel zelf radioactiviteit meten. Met een Geiger Counter moeten ze zich een weg banen door een landschap en vier radioactieve bronnen opsporen. Daarbij moeten ze zichzelf zo min mogelijk blootstellen aan radioactiviteit. Als ze zichzelf blootstellen aan te hoge dosissen, krijgen de leerlingen een waarschuwing. Als de leerlingen de bronnen gevonden hebben, moeten ze het spel zelf afsluiten en terugkeren naar de website of de presentatie.

Om het spel te downloaden ga je naar de webpagina van de lesmaterialen of gebruik je deze link:

<https://datatransfer.sckcen.be/public/download-shares/cfsjPizFTpCkRdjg3Nh81Of9FEy8nlaY>. Het spel wordt gedownload als een zip-bestand. Open dat bestand met Windows Explorer (Ga met je muis op het bestand staan > rechtermuisklik > openen met > Windows Explorer). Dubbelklik vervolgens op het bestand genaamd 'Explorad.exe'. Het spel begint automatisch nadat je de instructies gelezen hebt.

Extra:

Er is extra informatie over het meten van radioactiviteit voorzien in een apart deeltje. Die info bespreekt de technologie achter het meten van radioactiviteit. Daarbij worden ook de drie soorten meetapparaten voorgesteld.

1.2 Burgerlabo's

In het tweede deel komen de leerlingen meer te weten over het fenomeen 'burgerlabo's'. In de nasleep van de Fukushima zijn er tientallen burgerorganisaties ontstaan die radioactiviteit meten. De leerlingen leren aan de hand van tekst en beeldmateriaal meer over hun ontstaan, hun activiteiten en welke noden zij invullen.

Extra:

Aan de hand van een Engelstalig interview met Suzuki Kaori, een van de oprichtsters van Tarachine, een burgerlabo in Iwaki, kan je een burgerwetenschapper aan het woord laten. De leerlingen kunnen zo meer te weten komen over de motivatie van burgerwetenschappers om zelf te meten, alsook dieper ingaan op de maatschappelijke conflicten die aan de basis liggen van de oprichting van burgerlabo's in Japan. Het interview kan je terugvinden via volgende link: <https://fukushimatestimony.jp/en/live/7.html>. In de bijlage van dit document vind je het volledige interview terug (zonder foto's). In de werkbundel vind je een reeks vragen omtrent dat interview terug. De vragen zijn ook beschikbaar via deze online quiz: <https://forms.gle/EELUQSqYr5yai8di7>.

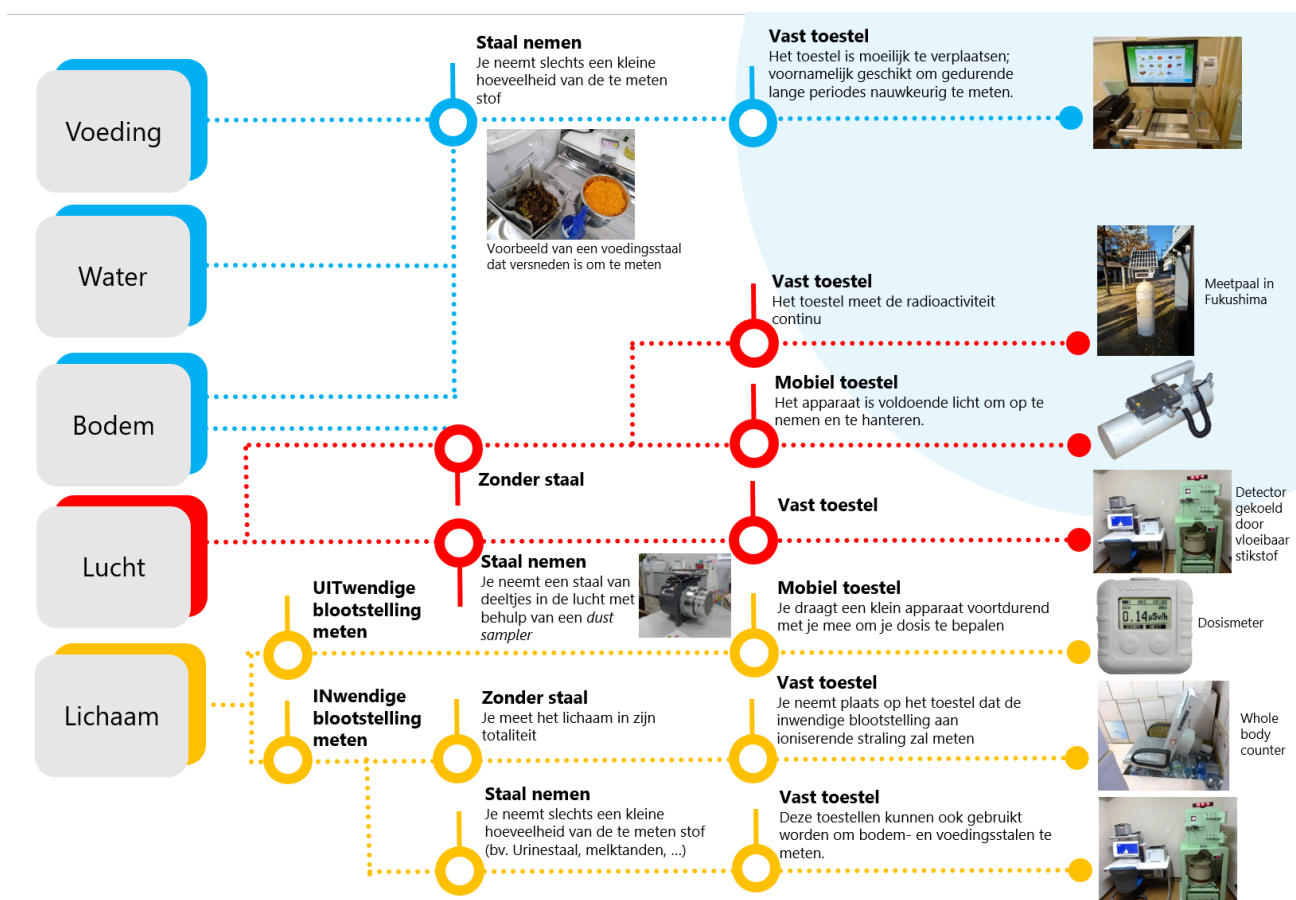
Deel 3: Straling meten in een burgerlabo

Inhoud:

- Een geschikt meetinstrument kiezen
- Extra: interview met Suzuki Kaori

1. Welk meetinstrument is het meest geschikt om de volgende elementen te meten? Volg het schema hieronder en duidt voor ieder element aan of je een staal nodig hebt en of je best een vast of een mobiel apparaat gebruikt. (Meerdere opties zijn mogelijk)

Wat wil je meten?	Staal nemen	Geen staal	Vast apparaat	Mobiel apparaat
Inwendige blootstelling in het lichaam (volledig)		X	X	
Groenten uit de tuin	X		X	
Zeewater	X		X	
Gemiddelde dosis op de speelplaats		X	X	X



2. Ga naar het interview met Suzuki Kaori, een van de oprichtsters van het burgerlabo Tarachine in Iwaki (Greenpeace, 2021).

Het interview kan je lezen via deze link: <https://fukushimatestimony.jp/en/live/7.html>.

Bekijk het artikel en lees het aandachtig. Beantwoord daarna de volgende vragen:

1. Welke activiteiten organiseert Tarachine?

	Juist	Fout
Radioactiviteit meten	X	
Medische activiteiten (schildklier screening, ...)	X	
Psychologische begeleiding	X	
Infosessies en andere informatieve evenementen	X	
Studiegroepen organiseren	X	

2. Wie werkt in Tarachine?

15 leden: 13 vrouwen en 2 mannen; voornamelijk moeders

3. Hoeveel kost het nu om een staal te laten meten door Tarachine?

	2000 yen
	20, 000 yen
	500 yen
X	gratis

4. Wat bedoelt Suzuki met "What we eat should be a matter of choice"? Leg uit in je eigen woorden.

De Japanse overheid heeft de standaard voor voedingsmiddelen op 100 Bq/kg geplaatst. Alles onder die standaard is volgens de overheid veilig om te eten. Tarachine is echter van mening dat individuen zelf moeten kunnen bepalen wat veilig is voor hen en wat niet. Tarachine plaatst iedere mening in perspectief, maar ze werken niet met een limiet of een standaard, want die standaard is een persoonlijke keuze.

5. Op het einde van het interview, vind je volgend citaat terug. Wie of wat is het "Establishment"?

"If we knew as much straight after the accident as we do now," reflects Suzuki, "we would have been able to avoid a lot of unnecessary exposure. In the beginning, all we were doing at Tarachine was stepping up to provide a service where we felt the establishment was failing. Now we also want to stress the importance of everyday citizens arming themselves with scientific knowledge."

De Japanse overheid, Nucleaire industrie, Wetenschappelijke instituten, Wetenschap

Waarom vindt Suzuki het belangrijk dat "citizens arming themselves with scientific knowledge"?

Wetenschappelijke kennis kan burgers helpen om zich te informeren en beslissingen te maken als er zich een (nucleaire) ramp voordoet. Burgers kunnen zich 'bewapenen' met die kennis om zelf te kunnen meten, zodat ze informatie en data ter beschikking hebben en maatregelen kunnen nemen, onafhankelijk van de overheid. De Japanse overheid slaagde er niet in om burgers op de hoogte te brengen van de gebeurtenissen die plaatsvonden op de site van de Fukushima Daiichi kerncentrale na de tsunami van 11 maart 2011. Door een tekort aan informatie waren ze zich niet of onvoldoende bewust van de radioactieve deeltjes afkomstig uit de kerncentrale en stelden ze zichzelf en hun gezin onnodig bloot aan die ioniserende straling. Ook na het ongeval slaagde de overheid er niet in om de informatie en data beschikbaar te maken die burgers nodig hadden.

6. Vind je dat Tarachine een vorm van burgerwetenschap is? Geef enkele argumenten om je mening te onderbouwen. Gebruik daarbij de informatie die je online of in de Prezi presentatie kan terugvinden.

Tarachine wordt beschouwd als een voorbeeld van burgerwetenschap. Het is namelijk een organisatie die betrokken is in wetenschappelijke activiteiten en volledig beheerd wordt door burgers. Via hun metingen willen ze andere burgers helpen om meer te leren over radioactiviteit en de gevolgen van de Fukushima kernramp op het dagelijks leven.

INTERVIEW MET SUZUKI KAORI

Bron: Greenpeace Japan (2021). Lives of Fukushima - Profile: Kaori Suzuki. Beschikbaar via <https://fukushimatestimony.jp/en/live/7.html>

Transcript (Engels)

"I look at children and young adults, and it reminds me that there are babies still being born today who will carry the burden of decommissioning in the future, all because of a radiological accident that had nothing to do with them. The adults of our generation need to be more aware of this."

Profile Kaori Suzuki

Kaori Suzuki was one of a group of local mothers who set up the "Iwaki Citizens' Radiation Measurement Centre - TARACHINE" in her hometown of Iwaki, Fukushima prefecture, back in November 2011. Taking their name from a traditional word for "mother", their initial goal was to shield children from radiation exposure following the disaster at Fukushima Daiichi. TARACHINE carry out measurements on food, soil, and other environmental samples brought in by the general public, as well as providing thyroid screenings and whole body exposure testing.

The Iwaki Citizens' Radiation Measurement Centre - TARACHINE" (hereafter "Tarachine" for short) has caught the attention of individuals and organisations not only in Japan but worldwide. Although hard to imagine, in less than ten years the nonprofit group has grown from a small effort started by three local mothers into a professional operation with its own testing laboratory and clinic. Tarachine now employs 15 full-time staff – 13 women and 2 men, but is still run by neighbourhood mothers.

From humble beginnings to a "citizens' science" movement

"Back when we started, our biggest concern was whether or not our food was safe to eat. But at that time, we had no access to professionals who were prepared to come to Fukushima to take these sort of measurements. If we wanted to protect our children, we felt we had no option but to do the job ourselves."

Kaori Suzuki recalls the early days of Tarachine back in 2011, when she served as administrative director.

After establishing Tarachine, the team had to do their own research and teach themselves how to take accurate measurements. In 2014 they brought in a state-of-the-art beta ray detector that demanded a high level of expertise, considered difficult to use even by seasoned analysts. Their skills grew by the day with the help of professional scientists who, impressed by the hard work of the Tarachine mothers, provided support and training. As mothers proficient at running households, they were quick to pick up the precise tasks of preparing and measuring samples. In order to offer reliability and precision, they assembled a collection of top-quality instrumentation covering everything from measuring scales to radiation detectors. They made sure their results could be relied on by cross checking with third party laboratories as needed.

Tarachine is the only private sector laboratory in Japan capable of testing for beta-emitting radionuclides such as strontium 90 and tritium in addition to caesium. For Suzuki, providing strontium testing was not a difficult decision, as its long half-life allows it to build up in the skeleton. Through their online and offline activities, the group raised awareness of their vital work, an approach that enabled them to attract strong financial backing from both within Japan and overseas. Ultimately, this led to the Tarachine team being able to purchase the beta ray detector, a piece of equipment that would normally be well beyond the means of everyday citizens. Everything the group does shares a common goal: ascertaining the reality of radioactive contamination from Fukushima Daiichi, and reducing the exposure risk to their children.

When public fear of radiation was at its highest back in 2011 and 2012, citizen-run testing centres began appearing all over Japan. Most of these centres charged measurement fees of a few thousand yen (about 20 - 30 USD) in order to stay in operation. However, Tarachine adopted a different model, aiming to keep fees within reach of ordinary citizens. Initially they charged only 500 yen (about 5 USD) per measurement, and nowadays, they will test free of charge in principle.

Tarachine's running costs are covered by support groups and donations from the general public. Things were not easy in the beginning - due to the almost complete lack of testing revenue, in 2012 Tarachine found themselves facing bankruptcy. This led to a desperate campaign to secure funding, a strategy which, as Suzuki explains, eventually led to solid financial backing that has allowed them to continue operating.

"Since 94% of our running costs are covered by donations from the general public, we in turn take our obligation to share our work very seriously. Right from the beginning, we have used our website to fully disclose our activities, including monthly summaries of measurement results. When we can, we also upload information in English since this is an issue that goes beyond Japan."

Tarachine's continued reporting and transparency have earned them respect and support, and their operations are now enabled by a strong support base spanning both generations and national borders.

What we eat should be a matter of choice

The majority of Tarachine's work revolves around testing food destined for home consumption. Requests for soil testing (samples from agricultural land, garden vegetable patches, and the sandpits of children's playgrounds) are also common. Although happy to accept requests from both inside and outside Fukushima prefecture, most come from in and around the city of Iwaki. In the early years, Tarachine processed around 300 samples every month. Even though this number has dropped by half in the last few years, Tarachine's equipment is still running at capacity year-round.

Around the middle of 2013, the levels of caesium-134 being detected dropped away as the two year half-life of this isotope came and went. However, mushrooms and other edible plants gathered from the wild continue to give high readings. Another concerning development is that pinecones, acorns, and other natural objects that children like to pick up and play with still contain detectable amounts of radioactive isotopes. Similarly, some soil samples continue to give positive readings*. Many people also ask Tarachine to test the fluff from their vacuum cleaner bags and appliance filters in order to find out the level of contamination in their homes. This sometimes reveals contamination that spreads around the home through floating dust particles.

"When we test a sample, we provide the results not only to the client but also share them online. The government tells us that anything up to 100 Bq/kg (Becquerel per kilogram) is safe to eat. At Tarachine, we don't give a cut-off point for what is or isn't safe. As the victims of this disaster, in the same way that we should have the freedom to choose whether or not we want to continue living in the disaster area, we believe that what we do or don't eat is also a matter of personal choice. Instead of simply repeating the government advice, we also share information from consumer cooperatives, overseas authorities, and so on. Beyond that, it is a matter for the individual to decide."

Damage to the rural way of life

Although in principle Tarachine provides its services to household consumers, they will also test samples of agricultural produce and soil brought in by commercial farmers. In particular, many farmers want the peace of mind of knowing their soil is safe before planting out.

"Farmers don't want to sell their produce if they think it might be contaminated. Back in 2012 and 2013, locally produced rice showed levels of radioactive contamination. Naturally, parents didn't want this rice to be fed to their children in school meals, but what was striking was that even the rice farmers themselves joined in to put pressure on the local authority. It shows the pride they take in their role as food producers. For me, this really drives home our own responsibility in the role of data handlers."

In rural food-producing communities, the giving and receiving of homegrown produce is a key part of day-to-day social interactions. For this reason, Suzuki finds it especially poignant whenever a client asks her to test food they intend to give to a neighbour, or food that they have received themselves. Even the traditional social ties of the rural community have been tainted by the fear of contamination.

Keeping sight of the original goal

Around five years after the Fukushima Daiichi disaster, Suzuki was struck by how many parents were still unable to shake off their fears for their children's health. This led Tarachine down the path to providing clinical examinations as well as consultations on physical and mental wellbeing. From its early days, Tarachine has been offering thyroid inspections and radiation exposure testing using a whole body counter. However, Suzuki came to realise the importance of providing psychological care at the same time.

In 2016, Tarachine took steps toward opening its own clinic and hiring a doctor. They found the money through a combination of donations, subsidies, and crowdfunding. The following year, Japan's first citizen-led testing centre-affiliated clinic opened its doors.

"There wasn't really anywhere in Fukushima where you could get a test whenever you wanted, or discuss your concerns about radiation freely with a medical professional. In the case of the Chernobyl disaster, we know that children started to

develop thyroid cancers and other illnesses about five years after the radiation leak. Considering that timeline, we felt we had an obligation to provide this service.”

In the case of Fukushima, it is not so much actual symptoms as the anxiety and uncertainty surrounding possible complications that has weighed most heavily on the population. The ability to speak to a medical professional gives concerned parents and their children access to a balanced understanding of the risks, and this in turn serves as a form of psychological support. Tarachine provides thyroid screenings free of charge to anyone who was a child up to high school age at the time of the accident, whilst full body radiation measurements are available for free to anyone up to the age of eighteen.

As part of Tarachine’s evolution to accommodate the needs of children and their guardians, they have begun hosting events to disseminate knowledge about the nuclear industry and radiation. Recent events have provided a space to gain a deeper insight into the “Fukushima Innovation Coast Framework”, a recovery-focused scheme that is being promoted in the Hamadori (coastal) area of Fukushima prefecture.

“One part of the recovery plan is a fabulous school, to be built close to the ‘difficult-to-return’ contaminated zone to try and tempt more children back to the area. It’s made to sound like a fantastic opportunity, and the region is awash with money shelled out in the name of ‘recovery’. People have concerns that some questionable schemes might be seeking to exploit the tenth anniversary of the disaster, and it’s important that we keep a close eye on what’s happening.”

Tarachine was born out of providing support and trying to alleviate citizens’ concerns. From radiation testing and clinical screening, the project has grown to encompass mental wellbeing and study groups. But everything shares a common thread, namely trying to improve the health and livelihood of the people affected by the disaster.

The role of Fukushima and the adults’ responsibilities

The past five years have seen an increase in requests for full-body radiation screenings from workers who were involved in decontamination efforts in heavily contaminated areas of Futaba district. Young men in their twenties are especially prevalent, explains Suzuki.

“I look at children and young adults, and it reminds me that there are babies still being born today who will carry the burden of decommissioning in the future, all because of a radiological accident that had nothing to do with them. Even the generation born after that will still be working on the Fukushima Daiichi cleanup. Once you start thinking like that, it’s hard to feel optimistic. I think the adults of our generation need to be more aware of this.”

Tarachine started from a simple concern – “will our dinner tonight be safe to eat?”. The group has grown organically from these humble beginnings, and increasingly finds itself in the role of educator, seeking to spread the message of the reality of life in Fukushima to other regions – and to future generations.

“If we knew as much straight after the accident as we do now,” reflects Suzuki, “we would have been able to avoid a lot of unnecessary exposure. In the beginning, all we were doing at Tarachine was stepping up to provide a service where we felt the establishment was failing. Now we also want to stress the importance of everyday citizens arming themselves with scientific knowledge.”

The radiological accident has brought in its wake new fears and new tasks – testing of schoolyard and garden soil, regular health checkups, recuperation in uncontaminated areas, as well as psychological care for exhausted parents.

“We need the world to understand how the reality of daily life has changed for anyone bringing up a child in Fukushima. It’s imperative that the same thing never be inflicted on another community. As the people living every day in this new ‘post-Fukushima’ reality, I think us Fukushima citizens have a duty to speak up and share our experiences.”

*Around 70% of the samples tested by Tarachine are of soil and food products. As of the end of April 2017, around 30% of these samples showed detectable amounts of radioactive contamination. The lower detectable limit varies depending on equipment and method.

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