**S1 to S37 are pupils. R is researcher. T is classroom teacher. Transcribed by the Descript software.**

**Video 1 22:50**

S1: Um, so our idea is to make like a pie chart out of these plates. So make a pie chart out of these plates. So, we're trying to represent waste, uh, like in, How much one person, uh, how much waste one person is produced by one person in five countries. So 25% of it is made by U. S.

S2: For this one. What 83, I believe that but um, so um, 2, so we're at 100, so 18 (percent). Yeah, 18.

S1: Um, before you make this, uh, how do you visualize, uh, your work? How do you make this thing? I thought I was going to do something completely different than, like, the different, um, word that we saw there. Um, then I changed my mind, and I, like,

S2: But then we're just going to make pizza out of this. So, um, 25% is too little. Hopefully we add some color. Okay. Yeah. Are you finished or are you, I think we should make

S1: Okay. Yeah, go ahead. I think we should use, um, pencil color.

S1: what do you think is the best? So, um, what I mean is this is like a So you have like, on top of this, you have like this pizza. You roll the pizza. And then you see what, um, meat is inside. I think that is a really good idea.

S2: So, um, do you eat this? Yeah, I eat it. So this, USA, is a slice, you know? Yeah.

**Video 2 30:57**

R: Can you two also tell the camera what you're doing?

S3: Yeah. We're basically, um, he had a plan of making a truck with windows, and then pipe cleaners, and um I'm making a truck with windows, If there's plastic waste, the windows will say plastic waste, and it will show how much waste has been wasted from the plastic waste. 14% of plastic waste. This is plastic waste.

S4: You have to write 14% of the truck..

S3: How bout we, on the top, write waste, and then just write glass or plastic, and then add pipe cleaners, and the number of percent is the centimeter.

S3: Do you want to make a truck, should we? Because a truck is a...

S4: Just don't make a truck, just, why don’t we make like a, um, a box or a, uh... where you like, open and then like, the thing pops out.

S3: Oh, the thing could be like pipe cleaners. Yeah, with 3% plastic waste. Should we do that? Fine.

S4: Do you know how to make a box?

S3: I don't know how to make a box.

S4: Okay, so bad of you. Just make, um, these ones, and then you like cut it out. (sketching a cube net), and then make a box.

S3: Could you make like those, um, foldy, uppy thingies? Yeah. I don't know, what's it called? Okay, I'm just going to call it foldy uppy thingy. He has to make foldy uppy thingy. We've changed from a truck to making trough to making a cube also known as a foldy uppy thingies with foldy uppy thingies inside of it and then we're going to do cushion, And then there's going to be templates saying the different kinds of waste on it.

S3: So, what we're going to do now is, instead of making a truck, we're making a cuboid thingy. it's called a pop up box. Okay, we're making a cube, which when you open the flap. And technically we're naming this the pop up box. And when you open it, um, you will be able to, for the screens to see what waste has been. This is supposed to be a truck, It's supposed to be a truck, but it was too hard to make. And it wouldn't stick on this box. So we made changes to the plan to make a cube. And he's supposed to be cube, because he knows how to make a cube, but I don't know how to make a cube. Can you make the cube?

S4: How am I supposed to make two things at once. I'll make this. (S3 took over the spring making, and leave the cube making to S4)

S3: so you have five springs. With the length of the spring representing the Um, we could make length, but then we also have the sheets of paper written like plastic 43%. Oh, so you're... And with the, um, pipe cleaners, that's what represents how much is wasted or, yeah, the waste. Oh, so you are going to... there's gonna be a paper that we attach onto the spring. So that it has definitely more space.

S4: From one centimeter three, we get a cube of one that's equal to one, two, and three. We'll fit five screens. Huh? We'll fit five springs. What if we, um, make another cube and attach it to here so that it has, like, space to fit the five springs

S6: Where does the pipe cleaner go?

S3: well , these are small (springs), but we can still put paper on it, and the paper will, it will still, like, spring up, and the paper will have the pipe cleaner on it. And how long the pipe cleaner Is the amount, like, if it's 14... Then it's a little, yeah. Then it's only a little bit. So 43 is gonna be…? 43 is gonna be long, it might even go off of the paper.

S4: How do you plan to measure that?

S3: Estimate. Or we just use a ruler.

**Video 3 10:31**

S5 Trying to stick a cover to a cup (small difficulties in crafting)

S5: Each of the beads is one hundred kilograms, and then we gathered (the kilograms) of all of the countries. Alright now you can count, make sure there's exactly 22 of them, okay? 22. Okay, we need to, we need to take the whiskers on Kitty. Where's the... How long to take the whiskers? I just got the answer. That's USA. Which is India?

S6: India's the purple one. Oh my god. It's so small. No way. 140 kilograms of trash. Oh, and this is all of them together. .

When they realized that just the whiskers are not clear enough to represent which country is which, they added labels…

**Video 4 17:45**

S7& S8 Decorating the country shapes.

S7: These don't look as good as I though. Do you think we should try and do the end? The end.

S8: this one is okay, but this one is very, um, surprising.

S7: I mean, I can do India again real quick. Only if we have time, okay? I can quickly trace, I'm good at tracing. If we end up having time after I do that. Cause I need, um, we also, I'm also decorating here.

R: Do you want to, um, write numbers on those continents?

S8: Yeah, we're going to write the name of the country. We're going to make like little labels and we're going to put them under. Or on top.

R: So you're gonna rank them?

S8: Yeah, but we might do it in a circle because we don't have enough space. So we might do it like in a circle. Don't blame me if it's not the size of the hand. And how you're going to position them is going to be based on the weight. This lady screams that I have made them too big. But I have specifically said, I will make them the size of my hand. (because each shape was too big, they just laid the countries out in circle)

**Video 5 17:45**

S9: Look what I made. you pull it.. I was thinking of making a country then putting a spin wheel. Yeah, actually also work. This can work. So we could like, um, put a pie chart. Yeah. We can make the information right here. We'll just pull it. And then with those we actually like... Uh, we have a name of the country and underneath it the answer, underneath that, and we could have like a, look, a spinning wheel.

S10: Um, how will we fit five countries on that? I'm so confused, um, which paper is which. I don't even know which plate is which anymore.

S9: Look, so it's going to be like this, one whole pie, okay? Pie chart. And then this is how much... I'm going to have this representing, this is how much waste India does, for example. Just give me a pencil, please. Like, this is how much waste India has, okay? Yeah. And then we have this much is China. Uh, China. This is just China. And this is U. S. Yeah. We have the whole data on this. Yeah. It's just a fun way. Do you want to try it once?

S10: And then we can do my idea?

S9: Yeah, then we'll do the board game idea with the spin board. Uh, not the board game one. The spinny one. The spin one with the board game. Yeah.

S10: So like, we spin the wheel?

S9: So we'll color it in how much which country to have which what. Yeah. So we can have a flag of how, which, so we represent which country…

S10: You need to have it measured, right?

S9: Oh, I mixed it.

S10: How do you measure?

S9: For example, if I wanted to know how much India uses, I could measure how, like, how much uses. I could just, like, into a fraction. A fraction, yeah, yeah, yeah, yeah, yeah. that would work.

….otherside of the table

S11: So, each bead means a different amount of trash that is, that Uraguay has produced. Blue, usually would be 100. So 300. Greens are tens. So they produce 100. Three hundred and sixty. Yellows are fives. So, three hundred and sixty five and reds are ones. So, it's three hundred and sixty seven.

**Video 6 24:12**

S13: I have an idea, so for compost and food we can fill it up until halfway or something (putting the pom poms in the cup to explain the idea) (referring to the cup) say this is the recycling thing. And fill it up that much. Like, really little, for five percent. Then, say, for this one (compost), we fill it almost halfway. And then, for say, um, plastic. Say we don't have enough of glass. We can stuff some paper underneath and then put this on top to make it looks like more full. Because in a box you can only see what’s on top.

S14: Oh and we can put a mark on the front to say how much of it is inside, but you could also look inside to see like how full it is. So...

S13: So, yeah. And we need some more cups. So we need five cups. So then we could just write, uh, plastic waste, and then fourteen percent, and then plastic.

S14; So then, um, how much we fill the plastic?

S13: We have to fill exactly the same as the paper.

S14: What if, to make, say, the plastic higher, we can put this on top here, and then we put the lid… (they did not have enough plastic lid, but they thought of filling something else inside frist to show that there is some volume of plastic) And then we can fill that. It's full of plastic. So wait, but is this 14% about?

S13: This one has to be filled slightly more…(% for plastic and % for paper) So the plastic it has to be filled exactly the same.

S14: That looks kind of the same.

S13: Yeah, that's fine, that's fine. Although, this has to be more than this (pointing at the cups, comparing the volume of things filled in the three cups)... The tin is 5%...

S14: So, this is 10% compared to 5%. That's about half. (both of them looking at how much they filled in the cup, estimating)

S13: Yeah, I think. Look, I had this fun experiment. Let's dump them all into one and see if that makes exactly a full cup. A full hundred percent. I don’t think it will because I think it’s a bit too much.

That makes about a full 100%.

S14: It’s a bit over, right?

S13: Okay, I’m taking out one of each just to make it slightly smaller.

**Video 7, PYP1A 26:04**

S15: okay, so now we need to divide it into hundreds, tens. This is 5, and then 5, this can be 10, this is 10, and then 100. This is maybe a hundred.

S16: We could have opened it.

S15: Yeah, We could have... We could have made it cuter.

S16: Yep.

S15: Okay, I need to... Boom. Maybe just destroy the cube. And then we're destroy, but take all the tape out.

S16: Yeah, so that it's easier to... So... To make. I think just one side, it will be fine. Oh, nice!

S15: Okay, let's open it. Maybe we can stick this on here and then we say right on here. Is it too fragile of this thing? Then let's stick it just here. Let's just take a small test. Let's say, uh, one, zero. Oh, it's too big, actually. I'm just gonna do again.

S16: Yeah, that's why I was saying maybe that's half big and half.

S15: I just try my best to do one thing.

S16: Yeah, I think this can be one hundred, this much, this much is one hundred, the way I folded it, and then another one hundred, and then that's the ten. Okay? Good? And then just fold it. Oh yeah, and then you can stick it. Now we need to use...

R: Are you measuring it? How are you coming up with that length?

S15: Um, we just made a certain, uh, amount for like one hundred, a certain amount for ten, for one, and a certain amount for five.

S16: No, but then they're going to ask how did we measure this one. So maybe like one hundred. Put a plate under it. Could be this much. That smart is it?

S15: So, how many centimeters?

S16: It is… 9 cm. One hundred is 9cm. Ten. Ten could be maybe one.

S15: Okay, yeah, one centimeter because this is exactly, ten is one centimeter. Now I need to get like a smaller version of, USA. because, you know.

S16: No, no, no, not that. That's too small.

S15: Do you think this will fit on this?

S16: Wait, let's see. If it can fit on this. I like that it's in color, so it's so easy to trace.

**Video 8 33:06**

S17: I'm making you show how much weight this is. Yeah, and this is an accurate representation of the people from different countries. Which one were we doing?

S18: I think India probably has lots of plastic. And maybe some cardboard. Because it's quite a big country and has lots of people in it. Wait, can we use the iPad to see, technically?

S17: Yellow there.

S18: No, yellow for Egypt! And blue.

S17: No, it's for the Netherlands because of water!

S18: So, like, we need to actually... One hundred kilograms equals one centimeter. Three centimeters. Perfect! Okay, so I'm gonna go look if there's any better format.

S17: Exact number?

S18: Yeah. No, not exact. Five. Oh yeah, I might have done something wrong. Uh, 2 times 3, 6. why is there yellow and red pieces?

S17: Um, because like, um, I'm trying to build, like, eight, like, either, U. S., U. S. A. has, like, waste, uh, U. S. A. has, like, eight hundred, one, eight hundred and twelve kgs So I'm trying to create, like, separate, separate it. Like, like this is gonna be eight, this is gonna be one, and this is gonna be two. So all the red ones are eight. Easy for people to understand.

S18: This one. For example, this one, how many centimeters is this one's just... These ones are the actual ones. For example, this is USA, and this is India.

R: This is eight?

S18: No, like, we did an equation, like, for each hundred, um, kilograms, we times it by, like, three. Otherwise, India would be too small to, like show. So, so this is... Three centimeters. Three centimeters. Ah, otherwise it would have been one centimeter. Why did you decide to times it by three? Because, if you times it by two, it still would be, India, it still would be small.

S17: We're just gonna like, uh, write, then, we're just gonna put it in like a paper. Mm hmm. Like a, like a line chart, like this. Yeah, and then we're gonna place them like this.….. One more right here. One, two, three, four, five, six. One, two, three, four, five, six. No, no, no, not six. This is the total. One, two, three, four, five, six. This is eight centimeters. One, two, three, four, five, six. So, see, the USA is the largest one.

S18:Many of these Legos are fake, so I had to like, change colors. Yeah, so you don't have all the colors you need. Yeah.

R: So colors doesn't represent anything?

S18: Yeah. It's just a height.

R: Is it a height, or also the, how wide they are, the volume? Or just a height?

S18: Um, it's just a height, but for the middle one, it's a zero.

**Video 9 8:29**

**Presentations**

**Balloon set up**

S19: The first one in this country produces a year, um, so for the lightest we have, uh, Vietnam up here, which is with 110 kilograms, the lightest of our five bungees. Then comes India with 140 kilograms, also really light, slightly heavier though. And then, we're going down a big drop, Austria has 588 kilograms. So, pretty heavy down here. Then we have Germany at 600 and 900 grams. And, lastly, we have, we have a little bit of a problem in Germany. So, our challenge was that we had a balloon pop. And we just decided to make, uh, just a fake balloon. That's just hanging there, and it works. It looks pretty real. And we have USA, which is at 812 kilograms.

S20: We made it this way. Because, um, it was really easy to show the way, like, how the weight was, like, weighing them down. Like a hot air balloon. Yeah, like a hot air balloon, like, it was being weighed down by its weight. And we chose these materials because they were very lightweight, um, and easy to work with.

S19: And, um, if we could do it differently next time... We would make, like, the countries, like, a little bit bigger and, like, maybe our balloons a little bit bigger and a bit more detailed and spaced out. And what we, what I, well, personally, what I liked about this activity is what that we were, we were given a lot of freedom to use our creativity to its fullest potential.

 R: So, before making this, how did you came up with this idea? So after you get the data, do you have an image in your mind? Like what, do you immediately know what you want to do?

S19: No, I, I, I chose to first look at what materials we had. And when I saw a balloon, I just, I just saw a balloon and other materials. I just thought you can make a hot air balloon and so.

R: Ah, okay. And then you did a hot air balloon. Um, did you, when you were visualizing how you're gonna make this, I see you also made a stand for it, did you already imagine how these are going to be displayed?

S19: No, not really. Actually. Not really. And after when I was done with all the balloons, I just sculpted myself. Oh, well, I guess I could also make any like a stand that's like this. Yeah. That's standing upwards on the table. Mm-hmm. . And then I noticed that it wouldn't, it wouldn't just fit all of them and it wouldn't be high enough. So I noticed I could just flip my stand over and it would fit perfectly on the wall.

R: Ah, and then you thought of the way of using the, the strings.

S19: I always thought of the strings before, but.. But before you were thinking of standing on a table and then the strings would fall down, like this. Yeah.

R: Did you make any changes or when you were making, did you change your plan or you, uh, you know, improvise a bit or added things?

S19: Only the stand, I guess. The stand, yeah.

R: How do you think it helps others understand the data?

S19: Um, I think just, um, to, um, to make a good data physicalization presentation, I think it's, it's, it's to use stuff that they recognize, and that is, that they understand how it works, like gravity and hot air balloons. Yeah. Lots of people know how that works, so I just, Yeah. Yeah. And the weight. Yeah, that's simple enough already. To represent the weight of the trash. Yeah, because if you do something really confusing... Like, let's say you use a super hard math algorithm to explain it, not everyone. Yeah, of course. I made it as simple as that.

R: Yeah, that is great. Any challenges you faced when making this?

S19: Um, tying the knots in the balloon. Yeah. That's... I found out a cool way to do it after like a while.

**Beads set up**

S11: Um, this represents um, what, um, what. Waste per person. Yeah. Waste per person. Um, is in USA. And these are like, um, so in each, each color from the beads, it counts as one, or something. So the blue one, here counts as 100. So the blue one would count as 100, and the green is 10, the yellow is 5, and the red is 1. So USA creates a whopping 812 kilograms of one person every year. Except that the Netherlands also create a lot. Each person creates every year 580 kilograms. Three hundred, um, Three hundred and sixty... Three hundred and sixty seven. Seven. And then we also have Poland has a lot and Poland has a lot. But we tried to learn from our mistakes because I accidentally did it wrong when I was doing Poland. I did yellow instead of green. So I decided to color them green.

T: So why did you choose those countries?

S11: Um, well, one of those we really like. We like USA. I'm from Poland. Uh, U. A. and Spain. I choose Uruguay because I am English.

T: Why did you choose those materials?

S11: Um, because we didn't know what we were exactly going to do. So we walked there to check out what we should write down on the paper when you gave it to us. We walked there and the first thing we were like, The beads. The beads. We took the beads and started threading them. Some of these have straws, because at the beginning we folded straws into a little thinner so we can put beads so they don't bend. But then the straws ran out, so we started using pipe cleaners.

R: Okay, and uh, What did you like the most about the activity?

S11: Uh, we really liked the activity because it's a way to express your mind, how you think. And not just for example, if we did it on paper and we was meant to be in writing, it would look a lot different htan this.

R: And what did you find the most challenging about the activity?

S11: Um, most challenging, um, putting the beads into straws.

S21: Yeah, it's very hard. USA we had a problem with, cause we ran out of space. Cause we had not enough straws.

S11: Well, we had, but the space...

S21: We did, but USA had a very thick straw.

S11: No, no, not also that. So, we had to fold it and push the beads through. And also, um, because that was that one that you... stretch and then you bend. So we had to pass the beads through that.

T: What would you like to do next time? What would you do differently next time?

S11: Um, we would probably try to remember the colors. Because, for example, Poland I did wrong because I did yellows instead of greens. He's from Poland. But except that I think it looks pretty good. We should work on our handwriting a little.

S21: And we should plan on it. Cause, um, before we wrote with it under already. But we thought it was very unneat. So we put tape over it so you couldn't see it. And then we wrote down again. That handwriting was mine.

T: I had a small suggestion actually. Listen, yeah. Because, um, some of the, because the blue is a hundred, well, people can also see. So some of the a hundred is at the top, some of the a hundred is at the bottom. Yeah, we should fix that. Yeah, and also, um, it's still the same order, even if it's... Yeah, if it's all in the same order, then I can see, oh, the USA is so much more blue than the other countries. Then it would be very obvious.

S11: Yeah, it would be.

T: So normally, sometimes you can... See within the blue, so you can see which one has the most, most, but then when it comes up to these three, they have the 300, then you gotta count the green ones, so then you know which one, but it won't.

**Clay person & straw model group**

S22:  So we took five, we took five countries, and each of them are represented here. So this is the USA, which is the largest, um, then there's Germany, then there's, then the UK, and then the US. So, like this? Okay, yeah. And then we also, well, I made this, which is a little, I researched all the different types of waste that the USA was making. So it had 70% of metal waste, um, 68% of paper waste, 31% of glass waste, 30% of glass. Um, organic waste and then 12% of plastic waste. So I did you research the U. S. then…

T: Why, why did you find it interesting to do more research about the U. S.?

S22: Because I wanted to do a little thing extra. Okay. So I just, we did this. So it has all the numbers and then since we were done, I did this as well. Okay.

T: Are you somehow related? I was born there. My dad is from there.

S23: Um, the biggest challenge was actually choosing the material. It was really hard to actually choose the materials, It was hard. I think if I were to do it differently, next time I'd create a smaller mess and be like a little bit more organized. So like, yeah.

R: And what did you like best and what did you find most challenging?

S23: Like, um, I liked making this the most.

R: Why?

S23: Because it was like fun to cut all the tiny little straws.

R: Did you measure it or you estimated the differences?

S22: No, we, we actually, we actually measured it. We actually measured it. So this, so every five centimeters is like a hundred?

S23: No, ten.

S22: No, a hundred.

S23: You said ten.

S22: A hundred. I meant a hundred. Okay, so, and for the straws as well. So this is, yeah, it's, yeah, it's measured and for the straw and for this, for the straws as well. It's measured by the little, tiny, tiny ones. Tiny marks.

**Pom pom model**

S24: What I did, um, was the five types of waste in Sri Lanka, which is the country my mom is from. Um, so, I just, I saw the pom poms, and I used the biggest one to represent the organic waste and food waste. Because it's the most. And then, I used the little blue one for the glass waste which is only 2%. And then, I used the orange one for paper and cardboard waste. I made it because, yeah, I just saw pom poms and I thought, Oh, that looks like it's easy to work with. What I did, um, was the five types of waste in Sri Lanka, which is the country my mom is from. Um, so, I just, I saw the pom poms, and I used the biggest one to represent the organic waste and food waste. Because it's the most. And then, I used the little blue one for the glass waste which is only 2%. And then, I used the orange one for paper and cardboard waste. And, yeah. I made it because, yeah, I just saw pom poms and I thought, Oh, that looks like it's easy to work with. I like this activity because you get to use your creativity to show the information. It wasn't really much of a challenge for me because...I do this a lot. If I could do it a little differently, I would probably, like, write down what each pom pom means, or yeah, I would write down the meaning. Like, the percent.

**Pompom plate group**

S25: We are representing the waste at our school, the types of waste. So we decided, if the pom pom big, then the amount of, then the amount of waste is big. So, like, very little was tin and glass. But a bunch of it was compostable. So, we bought a balloon filled with multiple pom poms because there was no pom pom big enough.

T: Why do you think other people would understand it easily?

S25: Because, if you know what these pom poms are, you can see what is, what is, which one is more than which one. So, you don't, you have to read to get the exact percentage, but you know which type of trash is more than this type of trash.

**Watercolor group**

S26: Uh, so it's a chart of the five countries we did. Netherlands, Mexico, South Korea, South Africa and India. So it's the waste produced by each person.

S27: Yeah, so what we found most challenging was making the countries because some of them got destroyed, um, today because we found out that they stuck together. So we have to start all over again.

S26: Okay, so we listed the countries, uh, that have the most waste per person area. Um, so it's here, and then we also did it in, like, order for the countries as well. So it goes like first, and then goes up, and then down over there. Um, so we decorated the countries to look like they were kind of full of wastes, because we wanted to... But, but this doesn't represent how much waste it's actually done because this is just decoration. Yes. And then we have the labels here. Netherlands was the most, and they had 508 kgs. Um, Mexico was second, and they had 422 kgs. So that, South Korea was next. They had 396 kgs. And then South Africa was second to loss. They had 357 kgs, and then India was lost and they had 140 kgs.

S27: Um, uh, for the materials I thought of what we could do. So, um, as soon as as I saw all the materials, I was like, yes. So I went around and I grabbed all the random things I could find, because I was like, I, I thought, I did think, but I was like, this is the perfect representation of trash, because this is what we usually throw away. This is mostly what is used as trash, so I'm like, yes, I will, I will take it. So we chose materials that look a lot like this. Just small little bits of trash, kind of, and then we stuck it all around on the desk. Um, so what we enjoyed the most, but also what we had like the biggest problem on, it was making these, like, Um, trash countries. Well, okay, so let, let us give it to you in a short summary. What we didn't, what we didn't like the most, making, making these countries.

S26: What we, what we had the most fun making, these countries. It was, two ways. It was fun doing the challenge, and it was also fun like, just throwing waste on it, and just painting it. And it's struggling with me. Yes, so it was quite nice.

R: What would you do differently next time?

S26: Um, I think we would make this like our main thing, because this was supposed to be the side thing, but it actually became like the main thing. And then, like, so we would and then this would be like our main representation. And time management.

S27: Yeah, and do the time management. Because on the first, like, day, we were struggling. We had too many ideas scattered around, so. Maybe being a bit more organized, too.

**Audio recording 1 24:29**

S3: I'm going to make a train instead. Okay, I'm going to make like a, um, I want to make a truck. I'm making a train. And my truck is a passenger vehicle. It's going to show percentages of this country, And I'm also, I'm going to make like passengers, and then I'm going to like... We're going to put these... We're going to put the straws over this, and then the straws are going to measure how much. can you like, um, make an internal label. How much, like, it shows how much. And then on the window. Then, say, for this one, we can show it on the pathway. And then, say, uh, a facet. I was going to write the percentage and what, how much is wasted on everything.

S28: Okay, so, I'm going to stop playing with the Play Doh. I'm going to draw like a face, so basically, this is going to be a horn. So, you know like the thing on top of their head. I'm going to make this thing on top of their head and put all the Masking tape. I'm going to make a truck sort of thing. I hate masking tape. It always happens when I use masking tape.

S29: Um, we're making, like, so, We're making sort of diagrams of how much weight is there in a certain way. Yeah. And then we have to show how much is used, yeah. Aw, this scissor doesn't cut that.

S30: Aw, come on. Just rip it off.

S29: No, but that makes the whole thing messy. And my brother has taught me.

S29: Russia is small though, it's like the biggest. Yeah, and they have less people though. Give me that tape.

S22: Okay, so I've got several ideas. For the USA, each of this one has, look, so these are the different straws. We cut them shorter for each one, and then at the top you can see what they are. Okay, so I'll put it on a piece of paper, and you can see it. Alright?

S23: Twelve percent? Wow. Percentage of metal waste in the USA?

S22: Alright, I'm going to need the ruler. Four hundred and sixty three, wow. And I thought, hmm, wow. Now how am I going to measure it? Alright, how many do we have?

S23: So, this one is bigger, and this one is bigger, and this one is smaller. USA is a little bit smaller, and, Which is a lot. It gets even smaller.

T: What are you trying to do today?

S22: Well, I'm trying to represent, um, The waste in the USA. So, um, I was actually a bit surprised. Yeah? So the organic waste is at 30%, the gas waste is at 31%, the paper waste is 38%, the plastic waste is surprisingly 12%. So I've written different forms. So this is for the U S A, this is this.

S23: Oh. Then for the UK it's gonna be like Play-Doh.

T: Ah.

S22: And for Germany it's gonna be these stick things. And then for Spain it's gonna be cotton ball. Then SHE has the plan for Vietnam

S31: So, I made with my partner, like, this design to show how much waste our school produces and which type, which type of waste we produces the most… So it's the bigger they are, the more trash. And then, the rest is 14. And then the pom poms, the bigger they are, the more trash comes in that. So they, so, like, this is really small, it's 10. 5% of the trash, of the 10. 10% of the trash is of the glass. 14% of the paper, cardboard slash paper. Plastic is also 14%. Compostable waste is a whole 43%. And I guess Compostable Waste has made out of quite a lot of things. So we put the balloon with tons of foam in it.

**Audio recording 2 34:14**

S32: Do you think this could work? Is Play Doh like glue?

S33: Nope. Oh, I can do like a sign. Okay, my first good idea of 2023. That is, how many kilos did you say again?

S32: Like 812 I think.

S33: Yeah, thanks. You say 812. Now, we have to choose the…Okay, I hope this doesn't break. Oh, wait, no. Yeah, this is gonna stay full. Now it's gonna be this. What’s second? Germany?

S32: I'm literally using a scissor as a saw. This is not gonna work. Time to resort to plan B. Everything go in. Yep, I just broke my stick. Watch out. Yeah. They're gonna, they're gonna pop I think.

S33: Oh yeah, they are getting really big. But it's cool.

S32: Oh wait, I think I know what you are doing. One color represents one. Is it one color represents one, uh, country?

S33: Right. No, so, um, there'll be a hot air balloon. I guess a color represents a country. And they're all hot air balloons. And they're, and then you'll see how much, and then, and then the lower it is, the more they change.

S32: Sorry, I made Austria a bit too small. Oh wait, but it's a scale, I forgot that.

S32: So I am making a scale of, uh, the five countries that I picked, which were U. S. A., Germany, Austria, Australia, and France. Which, these countries are the, it's a scale of the biggest to the, to the fifth one. So for example, the biggest is USA, second biggest is Germany, third Austria, and so on. And I am making a scale, and USA is the biggest stick. It's a full stick. Germany is a bit smaller, Austria is a bit smaller, and it's each, uh, each country, which is a less kg, it gets even smaller, the stick Oh, that it's on. And uh, and it has a little sign on top of the kg. Okay.

R: Why did you choose Play Doh?

S32: So I choose Play Doh and sticks because, uh, and sticks because, um, plates, like plastic plates don't really go well with glue, and Play Doh is a really, it's a, like a renewable source, so, yeah. Mine is going pretty well, but there's a problem. Play Doh is going to dry. Play Doh is going to dry.

S33: What do you think my red balloon will be?

S32: I think red, it can symbolize love, but it can also symbolize, like, red country. Which one's country? Like, are you doing my country?

S33: No. No, but I'm doing the top three and

S32: Can I see it?

S33: It's either Austria, USA, or Germany. Germany.

S32: USA? Austria. It has the most red in the colors, I think. Purple, what's purple gonna be? I don't know. USA's gonna be low…The USA is so much bigger than, um, Vietnam. Can I see you? Which one's your number? Is it Germany? Purple shall be Germany. This is France. Because blue fits more to you.

S33: I feel like I agree. I mean, I'd say lime because they drink a lot of Gatorade. And Mountain Dew.

S32: Uh, no, I am using plates.

S33: Oh, you're still using plates?

S32: These are the insides of plates. Uh, but I have, uh, realized that it's better to make, like, the bottom not like this. Like this, because then it's, it's better, because like, if you do it like this, then it's connected to the stick so it can't fall. But if you do it how it was, then it falls easily.

S33: Um, so I'm making a bunch of hot air balloons, and since it shows in kg, the lower the air balloon is, the more kg they carry. Each air balloon is a country.

R: Did you put stuff in the air balloon?

S33: Um, no.

R: So it's gonna be heavy? I'm gonna, it's not actually gonna be heavier, it's just gonna be lower.

**Interview with S32 9:43**

R:  Are you ready?

S32: Yeah

R: so, uh, what did you make?

S32: So I made this scale, which is representing the five biggest, uh, kilogram countries. Uh, on the, on the chart, on number B, uh, well, letter B, and USA is the biggest one with 812, Germany, 809 kilograms, and so on down. And, uh, it's the biggest, the lowest of the five biggest. Um, and each stick, the USA stick is a hole for one, it gets smaller each time, as you can see.

R: Yeah, yeah. That's very clear. Um, so, uh, before you made this, um, how did you visualize, uh, you were gonna, how did you think you were going to make this data, this visualization?

S32: So at first I thought I was going to do something completely else, like the, the different, like the, like the keyboard on the board that we saw, uh, but then I changed my mind and I looked at it kind of like something that's up, like, uh, which is the highest, which was paper. Which I was gonna tape here, but then, uh, the tape didn't work, so I used Play Doh instead, and I put it like this, and then I, yeah, then it worked out.

R: So, How do you think your data will make it easier to understand for other people this data? Um,

S32: well, maybe I could uh, like, add a paper down here that's saying five biggest countries on the letter B. And then it's from biggest to the smallest and the five biggest. And you can see that I wrote down the pages as well.

R: But how do you, uh, do you think it's easier to understand than like the raw data, like in tables?

S32: Because on the paper you have to search for the biggest ones. Here you can just see the biggest ones. So I I made it like that because, so you could see the highest countries of produced, uh, kilograms from highest to, to fifth smallest. That's why I showed it like that.

R: Um, so, did you also have some challenges while trying to come up with this visualization? Instead of, like, the making of it?

S32: Yeah, I had problems at first with my original idea, which was tapered glue, because I tried gluing it to the stick. But apparently it's not that compatible, the stick and glue. And, and the plates, because this is a plate, not just normal paper. So, uh, then I, then that was a problem because I didn't know, but then I re researched and then I did the play doh.

R: so how did you enjoy this activity?

S32: Yeah, I liked it a lot. And I liked that, like, you had to work on it, which with limited time, and you had to shop for your materials, so you could do it independently. And I like that.

R: Okay, so if you can do it differently, what would you do?

S32: Um, I probably would have done, like, countries that I know. Like, Italy, because I'm from Italy, or other countries like Germany and stuff. Yeah, yeah, yeah.

R: But the way you present it, do you want to change anything?

S32: Maybe from... Smallest to biggest, instead of biggest to smallest.

R: Why?

S32: Because maybe some people see it differently, that it’s more important to produce more or less.

**Interview with S31**

R: So what did you make?

S31: So, I made with my partner, like this design to show how much waste our school produces and which type. Which type of waste ISD produces the most. And the larger the pom pom, the larger the, uh, the more materials.

R: Okay, so before you made this, did you, uh, how did you imagine, uh, it would look like?

S31: More like you had a couple thing and then we had piles of this sudden material., so... I'll decide in color, and then the bigger the color, you know.

R: Okay. So, during the making this, did you also change your idea?

S31: Well, sort of. There was no big cardboard platform, so we decided maybe make, so maybe make smaller cardboard plates and use two of them.

R: Oh, so you divide it into two. Yeah, I see. Um, so do you also think that this way of representing data makes it easier to understand?

S31: Yeah, because it does say which percentage, and it says pom poms. Yeah, pom poms amazing.

R: What were the challenges you had while making this?

S31: Actually, for the compostable waste, we put the pom pom inside it. Yeah, it's really hard to put the poms inside of it…the pom poms sizes weren't enough, so we decided to put multiple pom poms in the balloon.

R: Oh so you combine them together. I see. Very cool. Well, thank you.

**Interview with S22 and S23**

R: What did you make?

S22: Uh, basically, um, We chose to make, um, Well, S23's doing the rest we chose to do Germany, USA, uh, UK, Vietnam, and, uh, Spain. So, S23's doing, uh, the blue ones, and I went for the, uh, UK, and so I'm not sure about Vietnam yet.

S23: Um, so, basically first we made a... So, first we, um, we sorted... So, first we each made one of these, which I made mine about the USA. So this is the metal waste, the paper waste, the glass waste, the organic waste, and the plastic waste. And then I showed you which percentage. And then this is all of them compared to each other. And then I also made one about, um, Play Doh, one about the kids solid waste. Um, this is him. And,

uh, the graphs.

R: So, before you actually made this, did you, how did you envision you making this product?

S22: Well, we were kind of envisioning more about this than the actual presentation. So, um, we, well, my vision was that we made one of these for every single one. And then we, we did, um, one of these. Um, but we didn't have enough time.

S23: So basically we, at the end, we just made our home countries. And then, yeah. Um, well my vision was, is we, uh, we collected the data from there, from the iPad and the sheet. Then we make a presentation with, uh, analyzing the data. My vision was to, like, make one of these (the paper straw model) for all of the countries. So to represent the metal waste, the paper waste, the glass waste, the organic waste, and the plastic waste. Um, but at the end, um, and I thought we were gonna make another... So, I thought we were gonna do that for each country and then make one of these.

S22: But it didn't turn out that way.

**Interview with S9 & S10**

R: Why do you like this activity?

S9: It was fun. Um, we also did math calculating it up into percentages. So that was quite fun. And just making it.

R: What was the biggest challenge?

S9: It wasn't really that hard. But the biggest challenge was just to find what we wanted to do. So I just came out here to see what materials we have so I know what we can use. Cause first I had a different idea.

R: Oh, what was the different idea?

S9: It was, like, something, like a board game, but it represents the, um, things. But I didn't think we had enough materials. Like the materials we needed. So we went outside and saw the plates, and then we were like, we can make something.

R: If you could do it differently, what would you do?

S9: Uh, I would not represent it in percentages.

R: So Instead, you would choose to?

S9: I would have not made the plate.

R: But what would you do instead if you were doing it a second time?

S9: I would've made it, like, not, like, in percentages, definitely. And this time it was waste produced per person, if it wasn't, I would've stayed with this idea. And I would have also made it a whole, because there was a little bit left (on the plate) Yeah, because you estimated it, yeah. One estimation was wrong, I guess. It should have been to 25. Yeah. Instead of 20.

**Interview with S35**

R: What was the biggest challenge for this?

S35: The biggest challenge was to like, just like, like first, you know, I still thought about making a diorama, but then I think that it would be too...

R: A diorama?

S35: Yeah, like a... A 3D model to show them.

R: You mentioned a pyramid, right?

S35: Yeah, like the diorama of a pyramid. A 3D pyramid. And then I thought that it would be too much complicated and I thought that Yeah, because you have to make it stand up like a 3D thing. Yeah, like, we, we were said then, like, uh, to make it quickly. So I just thought to make a chart out of like, I cut it out some papers and then I stick them on the white piece of paper and I wrote the country's name. So for an example, I think, uh, Netherlands were the biggest. So like I cut it a big chunk of paper for Netherlands and a small chunk for India because the number was smaller, was like a hundred something. And you measured kind of like, so for India, you measured that was like one centimeter. Yeah. Yeah. And the Netherlands was 500 something, so it was 5 centimeter. The width. Yeah, okay.

R: So, if you could do it differently next time, what would you do? How would you make it differently?

S35: I would try to make a pyramid if I get more time.

**Interview with S36**

R: you made it that way because?

S36: it was just fun, so that people can see it instead of like, having like, 802 pages of just saying how big the computer is. So that's why. Yeah, I think that it was kind of hard because there were many fake legos. I don't know why, but yeah.

R: people kind of have to count, like, this is eight, this is one, this is two, right? how do you think it's better or helping people to understand it?

S36: You also have the blocks, and the and the, like, the shape, and also and then you like, uh, like add it in a, in a, not in the, like adding, well, like two plus two, not that, I mean like, like eight, one and two. Yeah, you combine it. So you get 8 1 2 kgs of s a, yeah. Yeah. And 6 0 9 kgs of Germany. So I, that's why I thought that people, uh, will understand the height and the block number of it. Mm-hmm. . So I decided to make them as, as like the block, block side and the block straight and then like show which country was it and the cages was it.

R: What’s the advantage of, I guess, the 3D?

S36: Like, you know the stock market that they show? Like, 49% of the stocks were high in this market, 50% was this. that's why I was inspired by them, by the graph. So I thought that maybe I could like make it ah, as like the Legos graph, market looking Legos. But I also name it as like a gar garbage, how much it is. Yeah.

R: Ah, so you're kind of inspired by the, by the bar chart. Hwould you do it differently next time?

S36: Well, Have like, a rope that goes, a rope and then mark it, like, If I have a hand, then I would count like, I would count like, eight, one, like um, 1, 2, 3, 4, 5, 6. How many centimeters are there? Mmm! And then, and then mark it that's like 8 centimeters, 1 centimeter, and then 2 centimeters. Like that, and cut, uh, cut it, and then, uh, like, paste it on the paper. And then write it, this one's 8, this one's 2, this one's 1, and this one's 2. And like, and like, uh, combine them and then...

**Interview with S26**

R: When you got the data, did you thought that you're gonna do it this way?

S26: Actually, I immediately thought of I don't like doing dramas. We did brainstorm ideas. So I wanted to do, like, maybe, like, something, like, to show the amounts. I mean, on we're going to write the name of the country. We're going to make, like, little labels and we're going to put them under, or on top. We're going to lay them by how much, how much grass they can eat. Who has the highest and who has the lowest.

R: So you're going to rank them, like this.

S26: Yeah, but we might, we might do it in a circle because we don't have enough space. Yeah. So we might do it like this.

**Interview with S15**

S15:I thought of what if we make something that. Yes. And I made, and I hmm. So, of course, I can make a cube. Mm. Just a cube. Yeah. Um, so, and then I just put the pieces together. Yeah, like the, like the idea of the, yeah, like the idea of the octopus, kind of.

R: Yeah, okay. So what do you think the biggest challenge was when you were making it?

S15: So the biggest challenge was... So my first challenge was... Like I make a cube. Like a few pipe I can't stick them. Because it's not that good. So I have to remove one side of the cube. And I put like the pipe cleaners through it.

R: And I noticed you did make like a little knot. In the end, to secure it. Yeah. Yeah, that was, that was great. Have you made something like this before?

S15: Yes, I did make bracelet.

R: if you would do it differently, if you can do it differently, what would you have done differently? Um.

S15: I could have, uh, Like, just... Just make a, blank paper. Yeah. Uh, and I shouldn't have. So I just take, cut out the shape first to make the cube. But, and then I could trace the cartoons easier. So that it, so that like I'm not applying paper to make a country. Just cut it out and that's it.

**With S37 and S24**

R: Why did you thought about combining the, uh, the pom pom stick and the straw?

S37: Oh, um, because then you could sort of see the whole thing and then put, like, what it was.

R: If you are going to explain it to someone else, how would you explain it to them?

S37: Um, it's an octopus representing, um, how much waste, and each waste there is a different weight. Because this goes at the top, and then you'll have these ones come out, and then you can see the difference between them. And they're all different, but some of them just look closer.

R: Did you try to imagine how people are going to look at it from different angles?

S37: It depends what you mean by different angles, because people can look at it from all around, the head of it is round, like they can go around it to see the different, um different legs of the octopus.

R: When you first saw, like, before, when you see the data, after you see the data, did you immediately thought of something you can make?

S24: No, I was like looking for it and I was like... See the materials? Let me look at the materials to find something to work with. When I was looking, I first tried using the big pom pom and then some beads. There aren't enough colors. Also, it was hard to find out, oh, this one's this, oh, this one's that. Yeah. So I just, then I saw, oh, there are different sizes of pom poms. Ah. That's how I found them. So I was going to use pipe.

R: And you estimated how big and how small the pom poms would be?

S24: Like, I did the biggest one for the biggest amount. The smallest, The same size as this object.

R: so you picked a big one, and then based on that big one, you decide how much smaller the rest should be?

S24: yes, yeah.

**With S3 & S4**

R: So, why did you make the change from the truck to the... Boxes?

S3: I was doing the truck, I was supposed to make a little scrap, but that did not work. And then I was supposed to make it like, um, with a plastic box, but the paper wouldn't stick onto the box. And it was too hard to draw on the box. And also the box was broken at the top. I wanted to use a little bit of the idea from what I wanted to use on the, On the truck. So I just got an idea from my toy.

R: From which toy?

S3: The toy where you, the box opens and, the thing that comes up.

S4: Jack in the box.

S3: Yea Jack in the box. And also, at first we used Play Doh for the thing because we couldn't find tape, and then I had to remove the Play Doh because the Play Doh got stuck onto the paper, so it was a little hard and did not look good.

R: Okay did you want to check to see if your visualization represents data well?

S3: The length is a good representation of, let's say, 14%? Oh yeah, that I checked.

**Interview with S35&S36**

R:You made changes. The last time, remember, you had the beads and the Lego. Yeah, I changed it a lot. Why did you change it?

S36: Well, because the items that I did not find were limited and the beads weren't there. And also, I thought it would be really bad of presenting beads, which, which roll out. So I use Lego, paper, scissors, and tape.

S35: And I wanted to make a pyramid, but then I thought that it would be better if I made something more simpler, which is easy to understand for people and this would take a bit less time. So I just made a bar to represent.

R: So for the bar, did you calculate how long they are suppoed to be?

S35: Yes.

R: So you think it's an accurate representation?

S35, Yes. So, for example, to cut down the paper, for example, the Netherlands was five hundred and eight pages maybe. So, I took the size, I took the ruler and I cut it to five (cm). You took the five, okay. So, five, so, like, tilde five. So, like, five hundredths for five. If it's, if it's, like, I think, uh, uh, UK was four hundredths, so I took it to four (cm).

R: Ah, so you changed, uh, the side length.

S35: Yeah, I simplified the number.

R: Before even starting making this thing, do you have an image in your mind, like, okay, how am I going to make it? and how is it different from your imagination?

S36: Yeah. It was really different because, I imagined of having like, making beads. Uh, and the beads are, I'm having an art. Like, I'm representing beads as, like, five.

R: Oh, you wanted to make a number five with the beads?

S36: Yeah, I, I didn't have an idea back then, that’s like, kinda, good, so, so, yeah, now I had an idea of representing, like, you know, a graph of the box, like, uh, say, like, 28% this, uh, uh, Like before, twenty eight and nine, thirty percent this, this year. (gesturing a bar graph) Like something like that, so. Like, I tried to evaluate, like, the graph, and I came out, and then I realized that I have to use Legos as, like, pieces to represent, like, the height of the piece, and also, like, if there are small pieces, they represent zero. And the, like, the numbers. And yeah, pretty much, yeah.

R: So would you say previously we're thinking of laying it all down, like a, like a 2D, like a picture.

S36: Yeah, 2D, yeah.

R: And for you?

S35: Um, I was like, mine was opposite to S36, so I first think to make, first I thought to make a pyramid, a diorama thing. Something like a, like a 3D thing, yeah. Yeah, but then I thought that, like, it would take a lot of time, and I'm really not that good at making crafts.

R: But you have an idea, but it's just like making-wise, you think it's quite, it's going to take a lot of time.

S35: Yes, it's going to take a lot of time and I would love to get all the supplies and I really don't know how to do it. And after that, representing. Put them in a, uh, pyramid, it's like, tough. And then I think of like a simple way, like other than the pyramid, I thought of a simpler, like, a figure, so I just got a paper and I just did it.

**Interview with S13 & S14**

R: Before making it, uh, what kind of image, well, when you got the data sheet, right, and before Before you grab the materials and stuff, what kind of images do you have in your mind about how this is going to look like? Did you have a plan of how it's going to look like already?

S13: No, I didn't have that kind of plan, but, um, sort of like that. I thought we were baking in a box, like a, um, like a garbage can with a box. But afterwards we choose cups for the...

R: So the cups is kind of also similar to garbage?

S13: Yeah.

R: how did you form this idea of making this representation, and why did you put it this way?

S14: Um, like, we chose, like, um, we were, like, how much waste is in our school. So, like, waste made me feel like, um, trash can, a trash can. So there were different, like, plastic waste, glass waste, paper waste. So we took, first, I thought about the box, and then afterwards I thought about the cup. So we put it, um, A trash like we made and just put mm-hmm.

R: Did your group make any changes?

S13: So we needed to make everything add up to 100 percent. Then we, um, took all our cups and put it in one cup. It was a little bit much more, so we removed one white stuff from the cup. Okay. And then it was equal.

R: So you, you first, did you first count the, well, you had the number and then you counted the numbers, but eventually when you put it back in one cup, you realize it's...

S13: Too much.

R: Well, why do you think it's too much? Is it because of the different materials?

S13: Um, yeah, like, in one, there was, I guess, plastic waste and paper waste should be the equal, like, um, 14%. So it was difficult for us to, like, um, measure them both. Yeah. To make it equal. And paper, like, they squish together.

R: Yeah, okay. But it was, you actually meant to have the same amount of paper right? How did you decide that? to, like, pieces of paper, I guess?

S13: Yeah.

R: Okay. How do you think your visualization will help others understand the data better? Or how would you explain to others, tell a story of the data?

S13: I have a plan that, um, so, like, we could, um, We could use, like, using not that much paper, not that much plastic. Um, so we could use it like this. Um, we could show them, like, how much, um, amount of plastic we have. And then we use them.

R: Okay. If I understood it correctly, you think you used, uh, actual paper, actual plastic, so others will immediately see that, okay, this is waste produced.

S13: Yes.

R: What are some challenges you faced when making this?

S14: It was when we had to make it equal for the plastic waste send the paper was to make it equal. To make it equal. Yeah. So we add more paper so that, yeah, and then we left some of plastic, and then we, um, bring, remove some lids and then we, um, cut of the straw and just them in.