

>>> **Transcript of “Eco Houses ~ STEAM Education from Queensland”**

This is a transcript of the video “Eco Houses ~ STEAM Education from Queensland”
While you are watching the video, you can use this transcript for your better understanding of the contents.

Introduction by Jack (the host)

0:09

Hello, everyone.

My name is Jack.

And I am the navigator today.

I usually work at TGG.

Today, we will be joining a video of a lesson taught in Queensland, Australia.

In the video, you are going to experience a Queensland classroom virtually.

You might find various differences from your daily classroom in Japan.

Let's try to imagine as if you were in the real classroom.

Think about the teachers' questions and listen to the others' opinions.

The topic of today's session is Eco Houses, which is provided as a course in sciences.

Eco houses are gaining more attention in Japan primarily because they create a smaller burden and less pressure on the environment.

This is achieved by making the best use of the natural energy according to the climate of the area, the characteristics of the land, and by using resources or materials available in the location where they are built.

As a warm up, I'll introduce the key vocabulary to help you with understanding of the session.

Let's prepare for it together.

Sustainable, you try.

Sustainable.

They built a sustainable home with solar panels.

Energy efficient, you try.

Energy efficient.

The lighting in his building is now more energy efficient.

Eco friendly, you try.

Eco friendly

A lot of people tend to want eco-friendly products.

Ok, I'm sure we are all ready for the class.

Now let's join a real Queensland classroom together.

Join the classroom from Queensland

3:18

Hi, I'm Paul Sahanek.

I'm a science teacher here at Varsity College.

And I'm Adam Scott.

I teach graphics, architecture, a bit of engineering and then building construction as well.

Um, this unit that you guys have seen us put together for you obviously runs over quite a lengthy time, but we get the kids to really get involved in the inquiry-based learning.

So we pose questions, get them to research and, you know, use theory they've maybe learnt to come up with answers or solutions to whatever the problem might be.

To, in this case, build a sustainable home and then model it, which is pretty cool.

And one of the major things with inquiry-based learning is that we encourage the students to lead it, first of all.

And then we also encourage them to make mistakes so that they can learn from those things.

So if they make suggestions that aren't necessarily correct, we kind of encourage them to keep trying until they come up with a better solution or they can navigate around that problem.

Um, in this unit as well, we've actually really focused on teamwork as well.

So we've got guys working in small groups to then hopefully come up with a bigger product at the end so they can bounce off each other.

They can build on each other's answers and questions and whatnot, discuss things in small groups and then to the larger group as well, to hopefully come up with a more sustainable design in this situation.

This morning we're gonna talk about eco-friendly housing.

So our learning intent will be learning about everything that is going into a sustainable housing development.

So we've got an image up on the screen here of two different, quite different houses.

You can see there's quite a stark difference between the two of them.

So what I'm going to get you to think about is, which one of those houses would you rather live in?

Okay, so when you start thinking about that, I want you thinking about the factors that you're using to come up with that decision.

So what are you basing your decision upon?

Right, so, Harrison, for example, your view may be completely different to what Riley is thinking about.

And what we're gonna try and get you to do.

And we are going to have a discussion about this when you finish, we'll bring you back together, is what was it that prompted you to decide that you're going to live perhaps in this house as opposed to this house.

Okay, so we're going to get you to have that discussion now in your groups, okay?

Righto, guys, I'll grab your attention again back up the front and let's see what you guys came up with.

So, who came up with what?

What house were you going to choose, the left or the right?

What do we think is more sustainable?

What would we prefer?

The left.

The left? Interesting, yeah.

Why have you gone with the left?

I think it's the most cost efficient house because there's obviously a price for electricity, and it's a lot more, uh, it retains its heat a lot more than a glass house because glasses are very insulated compared to brick.

And something like, say the insulated foam stuff in the walls that would be there.

So that would obviously cost electricity.

And then, also, glass is a lot more expensive than, say, a brick.

So then, that would cost a lot more to build.

Nice.

So, in case you guys didn't hear, essentially what we're saying is, looking at materials, this house is obviously made of some form of brick.

It could be like a brick veneer.

So there'll be more insulation there.

And this one's obviously clearly made of glass, okay, which we were saying down the front that it's not going to be very insulated.

So I suppose we start then looking at climate which is where we're sort of leading there.

So, if we were in a warm climate, which house do you think you would prefer regardless of anything else if you're trying to stay warm?

Yep, yeah.

I would pick the one on the left.

Yeah, exactly, because like, again, coming back down to the insulation, that house being of brick, do you think it's going to retain the heat?

Or is it going to kind of disperse the heat, being a nice solid brick material, regardless of any other insulation that might be in the actual wall?

It's going to...

Disperse.

The brick, do you think it's going to disperse the heat or retain it?

I think it's going to retain it.

Yeah, it's going to retain it.

It's going to keep it warm.

Okay, so again, it's going to be brick, brick is going to retain the heat.

But then they also quite often do what they call a brick veneer home which means inside they have like a timber frame inside the brick house, which again creates more insulation on top of that brick which is naturally going to retain heat.

Over here, if we're in a snow field, I guarantee you would not like to be in this house, okay.

It's gonna be extremely cold.

Okay, um, it's not gonna be a fun experience, so it's gonna be very, very cold.

What else did you guys come up with?

That's one thing, looking at climate and possibly the materials.

The light efficiency in terms of electricity.

Yeah, nice.

You would probably have to use more lights in the house on the left because if the walls don't allow light to pass through, whereas on the right, it's more open structure so the light flows through.

Yeah, nice, so we've got interesting things coming in there.

So, looking at light, energy, okay?

Obviously, on this home here, what we're saying is we're gonna be using a lot more lights, okay?

Now, obviously lighting is energy, okay?

Naturally, in a sustainable home, we're trying to limit that sort of energy usage.

So we're trying to obviously be more sustainable.

Um, like we said over here, okay, obviously a very, very bright house.

Okay, it is full of, well, it's glass, okay.

So, naturally, the natural lighting that you're going to get, like we said, is going to be much, much greater.

So, there's going to be obviously a lot less energy use.

If we said, however, let's run with this house because we're in a cold climate so we can't have our natural lighting,

What could we do to try and be more energy efficient, knowing that we're going to have to have those lights?

Probably Solar panels?

Cool, yeah, nice solar panels, anything else?

Solar panels is one, yeah.

A wind turbine.

Nice, yeah, or a wind turbine possibly.

Water mills? Or like, water tank system?

Yeah, water tanks and water mills and stuff like that, 100 percent.

So then, we can start to kind of balance because, again, there's no perfect answer here.

Okay, we can't just say we're going to run with this every day of the week, because we can't.

All right, again, it could be cold.

It could be hot.

We have to think about those sorts of things.

Um, anything else?

Any other discussions that happened around the class?

I think the left one is more livable, but the right one is more, like, sustainable.

Yeah, I think that's an awesome answer, to be honest.

This is a very livable house.

It is what we're familiar with, which obviously also makes it feel more livable.

But if you look at this particular design, um, what makes it, I suppose, less livable?

Lack of privacy.

Lack of privacy is a very good one, yes.

Lack of privacy, although you are in this beautiful forest, there is a lack of privacy.

Your neighbors probably don't want to stare at you the whole time.

What else do you think?

There's also big tree in the middle which is blocking up space for other things you might see, and like a child, they'd need a bedroom, but the third floor is covered by an entire tree.

It's a very interesting point.

So, yes, we have this tree in the middle of this glass house.

Okay, there's positives and minuses, so it's always going to be a bit of a balancing act.

Okay, you've got this tree in the middle which, what's going to happen as a tree gets older?

The leaves will fall.

Oh, yeah, it could be what we call a deciduous tree which loses its leaves.

That's not going to be nice.

What else might happen as this tree gets older?

It'll grow.

It's going to grow, okay.

Again, depending on the tree, it potentially will be growing.

Now, hopefully, the designer and architect has thought of that.

But like we're saying as well, it's going to take up a lot of space.

So, apart from possibly losing its leaves, growing really, really big, we've got this third floor here which is pretty much the tree's floor.

Okay, it gets the entire floor there, so use of space isn't particularly good in this design.

Okay, so that's something we can think about.

If you had a family of five or something living in here, probably not the most effective home, is it?

Anything else?

I'd say the right house is like much smaller, like, in width, you know.

Yeah, nice.

It reduces urban sprawl.

Yeah, fantastic.

Like more farmlands, stuff, and like trees, so putting less effect on the environment.

Awesome answer.

So, what we're talking about there is the physical footprint of these homes.

Okay, if you look at this home, obviously the footprint that the physical size and space that it's taking up is pretty big.

It's pretty massive.

Okay, when you look over here, it's a much smaller footprint which allows for, like, we're just saying, a bit of greenery.

The farms, the forests, all that sort of stuff to remain in their sort of natural state.

So we're not taking away from the environment.

What do you reckon this looks like at the front here?

I don't know if it is or not.

It's a bit hard to see.

Is it a pool?

I think it might be a pool.

What do we think about a pool, good, bad?

Good.

Good, hands up for good.

Who thinks it's a good thing to have a pool?

I love a pool, but is it good for sustainability?

No, I'd probably say it's not.

I agree, I don't think it really is.

Why do you think it's not particularly sustainable?

Did you have something?

I felt like when you swim in it, you could use the waves' motion to like convert energy.

Yeah, that's a really cool idea.

It's so scientific, I love that.

It is very scientific.

I don't have much in that in that sense, but I really like the idea.

Whether or not you could do it, I'm really not too sure.

But it's something that would be cool to look into, yeah.

Harnessing the energy from the pool.

But again, in the sort of, if we couldn't do that, hypothetically, probably lean on that sort of side of maybe not being super sustainable, I wouldn't have thought.

What do you think makes it unsustainable?

Yep.

It needs constant treatment, and like, heating and things.

Yeah, fantastic.

Yeah, it needs constant treatment, so things like the filter system, heating, again if we're saying that this brick home is probably in a cold climate, that pool is probably not even going to get used that often.

But the filter is going to be running a lot.

Let's say that there was grass on the roof here.

Think, I just want you to think about what implications does that have from a structural point of view.

And then also maybe from a scientific point of view, and talking about energy efficiency.

House structure and sustainability?

13:12

The teacher has asked us an important question.

The question is, "What implication does grass on the roof have from a structural point of view and energy efficiency?"

Let's consider this question together.

What's your opinion?

Here we go back to the class and listen to the opinions of other students.

What, just think about those two things for a second.

And we'll get you some...

Has anyone got a response to that?

Straight away, yeah, boys.

It's going to be a heavier roof, so it's going to need more stuff to keep it up, and that's going to be, yeah.

So, what implication does that have, "more stuff to keep it up" ?

Let's try and use some more specialized language.

What kind of "stuff" is the "stuff" that will hold it up?

Like steel beams and things, and you're gonna need like maybe even wood, I dunno.

And, like that's gonna need to have a roof, a layer of roof and then the dirt.

So what are you using more of now?

Materials.

Right, and is that, if we're looking at an eco-sustainable kind of carbon neutral house, is that good or is that bad?

Ah bad because it's gonna need more work in processing the carbon things, carbon emissions, to make that stuff to put into the house.

What a fantastic answer.

You know, you've thought about...

It's a great answer, you've thought about the sustainability.

So you've thought about, okay, if there was to be living, growing things on the roof, you're going to need to actually have structural integrity underneath that.

Otherwise, you're going to end up with soil on your face when you're watching the TV, right?

So, the implication for that from an eco-friendly point of view is that more resources are going to be needed to be used.

And therefore, it's more demand on the planet's resources.

Righto, this is what you guys have pretty much come up with.

These are the things that Mr. Sahanik and I think are probably the most important factors of a sustainable home.

And let's see how well you went.

Solar panels, we've mentioned solar panels, they're pretty strong or pretty obvious sitting on top of the roof there.

Wind turbines, we did mention wind turbines in there as well.

Not always the most visually appealing form of energy.

But depending on the climate and where they are, a possibility.

Water tanks, I don't know if we mentioned water tanks.

But, truth is, in images, water tanks are not particularly attractive.

So when you're getting a nice shot of the home, you're probably not going to be seeing it or probably hiding that water tank somewhere but obviously something really, really beneficial.

Double glazed windows, Riley mentioned.

Tinted windows, same sort of thing.

Double glazed windows insulating those windows so when you have something that's like this, for example, we have those windows that are double glazed or tinted to, hopefully, keep the house warm or cool, depending on what we're after.

Installations of walls, we've mentioned.

Brick veneer walls, you've got the brick.

You've got a little cavity and then you've got the actual timber wall on the inside, keeps it nice and insulated.

Garden food compost.

So, we keep talking about gardens up here, and we're talking about maybe grass on the roof not being particularly viable depending on, you know, structural integrity, engineering and all that sort of stuff.

But having a simple little veggie garden can solve the problem, too.

We don't have to have it on the roof.

So, looking at that might be an option.

We finished off there with looking at the elements that are the special features that are in an eco house.

And you guys kind of came up with those yourselves, so well done.

What we're going to do is just go in, just pose you a couple more questions.

We're going to go quite quickly through this, just pose you a couple of questions looking at these features of the house.

For example, how would you create power?

So they're talking about this electricity.

How would you create the electricity in an eco-friendly house?

It's quite an obvious question.

Solar panel.

Yeah, you're going to use a solar panel, right, so they're becoming obviously increasingly more frequently used in especially in a climate like ours.

We're quite blessed.

We get like 364 days of sun and one day of rain on the Gold Coast.

We're quite blessed.

Obviously, that's going to be a little bit more challenging in different climatic areas.

Yeah, you've got my joke there.

You got that, um, it's kind of the other way around where I'm from.

So, somewhere where the climate's a little bit more challenging, like England.

Let's talk about England, where it rains for 364 days a year.

Solar panels might not be quite as energy efficient in producing that.

But, certainly in a climate where you've got lots of sun, solar panels are obviously very, very useful where they convert the sun's energy that that light energy into electrical energy.

What about, um, there we go.

See, you cut that bit out straight away.

Okay, so similar, how would you create power from nature?

Kiko?

What is it you would use other than the sun's rays, what else can you use?

Wind turbines, right, excellent answer.

I don't know where you got that answer from.

That was brilliant, inspired..

Yeah, obviously wind turbines.

But I think Mr. Scott said earlier on, they're not the most aesthetically pleasing.

Although there is a bit of a movement in the world, especially in Europe at the moment, to get more of these using, especially on the coastal regions where it's quite windy.

The trouble, of course, with that is what?

What's the trouble with building these on the coastal regions?

Restrictions by nature?

18:54

The teacher has asked us an important question

The question is “What’s the trouble with building wind turbines on the coastal regions?”

Let’s consider this question together.

What’s your opinion?

Here we go back to the class and listen to the opinions of other students.

What’s the trouble with that?

It might get damaged from the natural, uh, like the waves.

The tidal waves could destroy the,

Yeah, so especially this one looks like it’s kind of built out in the ocean, yeah.

So, yeah, that’s a good point.

Yeah, what else is the problem?

Sometimes it’s not always windy, so it might not be as effective.

Yeah, so it’s not as reliable as flicking on the switch from our coal-fired stations, not as reliable.

No, we can’t rely on that all the time.

It also makes the coastline less aesthetically pleasing.

Yeah, so again, we’re back to that idea of, what are the factors that are governed that will govern whether you use these or not?

You know if you’re purely after clean sustainable energy.

Okay, what we’re gonna ask you to do now is, I’m going to, I’m going to throw this wide open to you guys.

I’m going to invite one or maybe two of you to come up to the board.

Maybe the two of you in your group.

And I’m going to get you to communicate back to the group what your specific changes are.

If there’s only one or two, that’s great.

Just come up and show us your changes, and we might build upon those ideas.

If another group has spotted something different, they might take over from there.

So let's start with this house, the first one.

I'm going to throw this now open to you guys.

Please feel free when you're ready.

Just come up and point out to us what changes that you would make and where you would put them.

Design your own Eco houses

20:50

The teacher has asked us an important question. The question is “Point out what are changes that you would make and where you would put them.”

Let’s consider this question together.

What’s your opinion?

Here we go back to the class and listen to the opinions of other students.

To the roof, and the water tank to the side of the house.

Fantastic, nice.

And maybe a veggie patch in this space around the side of the house.

Perfect, yeah, heaps of space for a veggie patch, hey.

Yeah, nice we got some sort of food, something to take control of that, in terms of veggie garden.

Some energy generating solar panels um and water tank.

Fantastic, anything else?

Yep, do you want to come up?

What would you change?

Okay, so there is a lot of space here and here, so you could have more open floor plan to let a lot more light and wind in.

And you could also add more windows for the same thing.

And also, there’s a lot of space back here and on the roof so you could also add wind turbines, like those nice looking vertical ones to not displease aesthetically.

Fantastic.

So we could also add something like wind turbines, make them as pretty as we possibly can.

I really like the idea of possibly making this a more open sort of floor plan because that’s going to encourage things like lighting if you have lots of walls inside.

Naturally, it blocks your light.

Also, it’s going to allow for that breeze to go through the entire house to cool it down.

So, that’s a really, really good point.

Anything else?

No, let's have a look at another one, huh?

What about this one?

Who would change what in this particular design?

Someone who we haven't had.

Do you want to come up and show us some things?

It's an interesting little home.

Oh well, what I'll change is, it appears that there's a lot of space in the background, so I would think to put wind turbines.

Yep.

And there will be less uh there'll be more wind because there's less uh things in the way.

Yeah, nice,

I would think to put double glazed windows to travel heat or exclude heat.

I would also put solar panels.

Yeah, fantastic.

Let's pretend this particular home is a little bit too small.

If we wanted to make it bigger, maybe to suit sort of more people, we could potentially go two stories.

That's definitely something.

What happens when you're higher as well?

Generally.

More heat.

More heat potentially, what else?

More sun.

More sun.

More of a breeze.

More of a breeze is what I was going for a little bit there.

So, potentially, when you get higher, naturally it usually gets a little bit breezier, so sometimes going up, you can actually capture that breeze as well.

Righto, so we're going to break up into groups, guys.

You're going to start doing a little bit of group work and talk about possibly how you would design your sustainable home.

So we're gonna have three groups.

Okay, these front two tables, you're gonna spin your tables around.

Okay, close your laptops and stuff before you do that and then you'll sit at each side.

You guys back here and I'm gonna get you two to move to this side of your desk and we'll move those together so then you can work as a group there.

And on this side you'll do the same things.

You'll move yourselves around this side, you're going to push that table back and then you've got a nice little group of four.

Okay, again make sure you close your computers down, move those desks and just be a little bit careful when you do that for me.

Okay, so in front of you guys in your groups, you will have three big pieces of paper.

And this one here is the main one you're going to be working with.

You're going to cut out these modules so there's three different modules.

They're going to be cut out and you can arrange those however you see best or how you think it's going to work best to make this the most sustainable home.

Okay, so if you can imagine these would be built off-site, okay, which means they're built in a factory.

They come out on a truck and then you can position them however you like.

You can join these modules with a deck, okay, to make sure that, obviously, you can get from one module to the other because these three modules make up one home.

Now you have two other pieces of paper in front of you as well.

Okay, and this is Example B, but you have example layout, so these are the same modules that I just showed you.

They've been arranged in a certain way, joined with decks to make one home.

Okay, now your job, like I said, is to take the original one that I had, okay, cut these modules out and think about how you might position those.

Okay, thinking about what sort of double-glazed windows, triple glazed windows you might have.

Thinking about where you might have positioned your water tanks.

Thinking about where you might have solar panels.

What type of windows you might have to, hopefully, create some cross ventilation to keep this cool in summer.

Thinking about what side of your house if, you know, upwards north, what side of your house would be the hottest.

Probably the west, for the afternoon sun, so you might try and plant some trees on the west to try and keep it shaded on that side of the house.

You might think about what rooms are going to be positioned in what areas.

Okay, again, the west of your house or the westerly sort of side of your house will be the hottest so if you have all your living areas in the west, it's not going to be ideal.

So, think about where things are positioned, where you can put water tanks make this the most sustainable home you can possibly get from this.

Does that make sense?

Any questions, no?

So, cut this one out.

These ones are just examples.

You're going to come up with your own ideas.

Okay?

Righto, so this is our final product.

Obviously, we had a sloping block of land which meant we had a raised house which allowed for a few different things.

But obviously we had to have our house raised, like I mentioned, but the guys decided, or the students decided to have the water tanks underneath the house to keep it visually pleasing.

They also wanted to try and utilize our sea kind of view and our sea breezes, which is obviously what this is replicating down here, the water.

So they've tried to give a northerly aspect to this house.

They've got all the living areas at the front which is where they're going to spend most of their time if they're living here.

They've obviously got a nice big deck joining the modules together, facing the water to give them really nice views and to get all those nice sea breezes.

They've tried to put these solar panels as best they can facing the north to get the most out of those during winter and also in summer.

They've got a few, probably hard to see on shot there, but a few trees at the back here which is going to, hopefully, block and shade those westerly sun or afternoon sort of sun that comes from the west.

They've got their nice wind turbine here to help generate some extra energy or natural energy to help those solar panels and help them working as well.

Closing by Jack (the host)

28:33

How was the Queensland class?

In today's session, we've learned about the characteristics and the design of environmentally friendly and sustainable homes.

In the session, we also learnt the following words and phrases.

You might have found Queensland students are not only interested in knowledge but also sharing different ideas with other students through inquiry-based learning.

Through expressing your own ideas and listening to others, you can incorporate various thoughts to deepen your understanding.

Collaborating and respecting differences in ideas are essential skills for you to create a better world through working with various people in the future.

It may have been difficult to follow a lesson offered by English native speakers, but I'm sure it has been a valuable experience for you.

Thank you for your participation.