**Maria James:** Hello, and welcome to this first presentation to support the implementation of the new study design for VCE Environmental Science. The accreditation period is 2022 to 2026. My name is Maria James, and I'm the VCAA Science Curriculum Manager. I'm delighted today to show you the key features of the study design, so that you can begin your familiarisation with it, and to think about how you will work with it, to present to your students.

I'd like to start by acknowledging the traditional custodians of the many lands across Victoria on which we are all living, learning and working from today. For myself, located at Fairhaven, I acknowledge the Eastern Maar peoples as the traditional custodians of the land. I would like to pay my respects to elders past, present and emerging for they hold the memories, traditions, culture and hopes of all Aboriginal and Torres Strait Islander peoples across the nation. I hope that they'll walk with us on our journey.

The purpose of this presentation is to support teachers in delivering the new study design. A special welcome to those of you who are new to teaching environmental science. I'll outline the VCAA resources that you can use in planning your teaching and assessment programme and then I'll explain the main features of the study design, including an overview of the content. We'll also look at assessment.

Both the VCE and VCAL Administrative Handbook and the VCE Environmental Science Study Design are mandated and should be the first place you go to for planning and to find any answers about administration. Whilst the study design is accredited for 2022 to 2026, it is important that you refer to the VCE and VCAL Administrative Handbook for the year in which you are delivering VCE in the environmental science. So for 2022, you will need to access the VCE and VCAL Administrative Handbook, 2022.

As well as the VCE and VCAL Administrative Handbook and the VCE Environmental Science Study Design, there'll be a range of resources available later in December as part of an updated VCE Environmental Science study page to support you. This web page will include planning advice, teaching and learning activities, assessment advice, FAQs, examination specifications, and a sample examination.

The study design is underpinned by the scope of the study, the rationale and the aims of the study. Spending time to understand these will allow you and your students to maximise the learning outcomes for each unit. We've updated the cross- study specifications and have included a new section, ‘Terms used in this study’ to explain how VCE Environmental Science deals with particular terminology.

We have four units, 11 areas of study with key knowledge to which you can apply relevant key science skills as suits your programme, and assessment information relating to both internal and external assessment. Each unit includes specific content contained within an area of study, and it's designed to achieve a set of outcomes for that unit. Each outcome is described in terms of key knowledge, which is complimented by relevant VCE Environmental Science unit one to four key science skills, they're included under the cross-study specifications at the front of the study design.

It's also important that you take the time to understand the safety and wellbeing requirements, as well as the requirements relating to the ethical conduct of scientific investigations. These are included on pages four and five of the study design.

I've posted the two aims of the study design here, which you can keep in mind throughout this presentation. The focus on Earth is a dynamic and complex set of four interrelated systems that undergo natural change and are affected by humans as well as innovative thinking and responsible decision-making are important aspects of this study design.

The cross-study specifications in the study design have been expanded to include a focus on key science skills, scientific investigation, critical and creative thinking, ethical understanding, individual and collaborative scientific endeavour and Aboriginal and Torres Strait Islander knowledge, cultures, and history. It's important that you take the time to understand these cross-study specifications and consider how you'll support these when you're selecting teaching and learning activities as part of your curriculum and assessment programme.

The key science skills are a core component of VCE Environmental Science, and apply across units one to four in all areas of study. In designing your teaching and learning programmes for each unit and in assessing student learning for each outcome, you should ensure that students are given the opportunity to develop, use and demonstrate these skills in a variety of contexts. Revisiting these skills across units one to four allows students to build understanding of how science knowledge builds on the application of these skills.

While there are similarities between the current and the new study design for Environmental Science in relation to the key science skills, there are some changes that you'll need to ensure you're familiar with. The main changes in the headings indicate they're in bold in our Teller size font that you'll need to refer to pages seven to nine to explicitly look at how these skills actually play out.

Key science skills should be integrated into the programmes. You can look at the set of key science skills and think, wow, that's a lot of skills to cover, but many are explicitly included in the key knowledge, such as the one in the table for unit three area of study one. Whilst you may be able to see where these skills fit into other key knowledge. For example, unit one area of study one or unit one area of study three, or unit four area of study three. It's up to you to work out what skill you want to teach in association with which particular key knowledge. Your teaching plan should account for all of these key science skills. Very key points to underpin, scientific investigations no matter what methodology you may use, so asking questions, testing ideas, and using evidence. Nine methodologies have been outlined in the study design and further information about these will be available in our support materials on our website.

Practical activities may be used to introduce and consolidate understanding of environmental science concepts and to develop scientific skills. Practical activities may also be used to develop assessment tasks such as the production of a scientific report or poster based on log book records, reflective annotations from a log book of practical activities or the analysis of data. We don't specify field work techniques in VCE, but we've listed here a few that you might consider.

So counting, things like citizen science projects, and many students are involved in these projects, they're very good in terms of reinforcing some of the knowledge and skills that are contained in the environmental science curriculum across units one to four. Many students are already involved in energy surveys, both of home and school. Measuring is another technique, certainly water quality assessments or salinity pH, dissolved oxygen temperature are commonly done across units two for example, and also unit three. Environmental quality surveying is important too.

So noise pollution is a new one that often is used in unit two and the use of bipolar scales for things like aesthetic values. Does this particular place feel good or does it make you feel comfortable, not comfortable? Setting up scales is actually an interesting thing for students to do. With change over time, it does take a long time. So it's not practical often for students to do, to take before and after photographs. So the idea is that you might access historical photographs, sketches, information about particular locations, and then have students visit those sites and take their own photos or sketches that they might do descriptions so they can do some comparison and they can look at perhaps degradation over time, or they might look at the effects of particular management strategies over time to see how effective they've been.

Questionnaires and interviews are great in terms of determining stakeholder opinions about particular proposed developments or innovations or things like introducing a carbon tax or whether something is going to be accepted in a community like wind power type innovations. For the purposes of VCE the use of log books has been extended just from being a record of students primary data to include other things like note taking by students related to the collection of secondary data, as well as supporting you to authenticate and assess student work. Data contained within a student's log book maybe qualitative and or quantitative, and it could be used by students in assessment tasks as a reference.

Consultation has indicated that teachers are really looking forward to incorporating Aboriginal and Torres Strait Islander peoples knowledge, cultures and histories into their teaching programmes. The following examples are part of a wider list of resources that will be included in the support materials on our website. Management of water resources and the use of cultural fire practises are well-documented. But check out the student design solution to local water pollution, that's applicable to unit two area of study one.

For unit three, the health benefits of Kakadu plums relates to provisioning services in area of study one. The six case studies for area study two are quite detailed and can actually be applied right across units one to four.

The ‘Terms used in this study’ section is a new inclusion in the VCE environmental science study design. In particular, definitions related to sustainability are important to understand in terms of how they apply to VCE and environmental science. So we look at things like stakeholders and decision-making and what affects their decisions.

Sustainability principles, we look at in terms of six particular ones, conservation of biodiversity and ecological integrity, efficiency of resource use, intergenerational and intragenerational equity, precautionary principle, and user pays principle. So students may be asked to evaluate particular things in terms of one or more of these principles. We're making it really specific. Sustainable development is a more generic term. Meeting the present needs without compromising future generations' needs, but it does have a focus on economic sustainability. Looking at two systems thinking approaches, that is earth systems thinking, which is in the current design and a new one is circular economy thinking which moves or transitions from a linear economy where we make things, we use them and then we throw them away to thinking about what we do with those throwaway products. Can that be repurposed? What else can we do to actually become more sustainable about their use? And value systems are really important too, because if you're looking at environmental decision-making, your particular value system is going to affect the sorts of solutions that you might come up with. So anthropocentrism, biocentrism, ecocentrism are familiar already in the current course, technocentrism is new. So looking at people's views where they think that technology is going to solve all sorts of environmental problems, it does affect the way that they propose particular solutions and how they evaluate proposed solutions.

With the unit one and two structure probably the first thing that you'll notice might be the series of questions. So these curriculum framing questions reflect the inquiry nature of environmental science. I like to think of it as a story. In unit one, we look at the interconnections between earth systems and then unit two, we move on to looking at pollution and food and water security as affecting those systems and how we can deal with it. At the end of each unit, at the end of each area of study, you might actually take time to work with your students to see their responses. Might be a class discussion, it might be reflections in their log books about the answers to these particular questions.

The story continues in unit three and four, by looking at biodiversity and environmental management in unit three, followed by climate change and energy options in unit four. Whilst reporting VASS as part of unit four, the unit four outcome three student design scientific investigation can be undertaken in either unit three or unit four or across both of them. The investigation involves the generation of primary data related to biodiversity environmental management, climate change or energy. So it does relate to either units three or four.

With curriculum assessment programmes we know that each school is different. Students are different, they've got different strengths, talents and available resources. Therefore schools have flexibility in the way that they can develop their programmes so that they do meet the needs of their cohort and the context in which students are learning. The only proviso is that any programme must be aligned to the VCE environmental science study design. And it must comply with VCE assessment principles. But a planning template, and although these planning templates are generally used for new schools delivering VCE studies, they're really useful for all teachers in planning their programmes. Our sample teaching plans in our support resources on our website really utilise these templates to give an example of how you may sequence a teaching programme. You can also use the QR code to access the template for your own purposes.

With school-based assessment, there are two forms that you need to consider that are distinct from each other. First of all, there's satisfactory completion of an outcome, which is reported as an S or an N to the VCAA. And that applies across units one to four. And then there are levels of achievement. They're school-based in units one so you can report them whichever way you want to, whether it's percentage, whether it's pass or fail as N, it might be a grade, but for school assessed coursework, that's moderated against the external examination and we have particular rules with that.

I mentioned before that all programmes and assessment must follow the VCE assessment principles. So what are these principles? There that assessment must be valid and reasonable. It must be equitable, balanced, and efficient. What does all that mean? So looking at validity, it's about the task being fair and reasonable, but it's one of the tasks that are designated in the study design that they're conducted under fair conditions for students and that you include clear instructions for each task. That need to be equitable in terms of being accessible to all students in your cohort and that it doesn't privilege a particular group of students or a single student, or that it doesn't disadvantage them either. If a student misses an assessment task, then any alternative assessment tasks need to be comparable in both scope and demand.

We talk about balance and what we mean by that is that a variety of task types are used so that it's not always about having a test at the end of the unit. It's about enabling students to be able to demonstrate their capacity in different ways. On the representative parts of outcomes key knowledge and skills can often be assessed in school assessed coursework for units three and four. Needs to be efficient so that we're requiring a minimum number of assessments for you to make a determination about the rank order of your students. We've only got 50 hours per unit. How much of that time do you want to spend assessing? So really assessment should be part of the regular teaching and learning programme and it can be completed or should be completed mainly in class time within a limited timeframe so that it does meet all the principles. Importantly for integrity and authentication purposes you need to make sure that students submitted work is clearly their own. So your school should have policies about how that's undertaken, what the breaches are, all of those rules and regulations you should be familiar with.

With units one and two assessment, it's underpinned by assessment principles all as I said earlier, all units one and two assessment is school-based including procedures. On page 23 of the study design, we've got a list of possible tasks for outcomes one and two for unit one. And on page 28, we've got a list of possible tasks for outcomes one and two in unit two. They're not mandated. They're simply there to provide, or to give you some ideas about what you might do. You can select quite different ones, but if multiple tasks are selected for any outcome, they've got to be different and you can't use the same task for more than once across outcomes one and two, again, that's for assessment balance.

We do mandate though for unit one outcome three, that students produce a report of a student adapted or student designed investigation. And for unit two outcome three, it's a response to an investigation about pollution or food and water security. With unit three and four assessments, it's little bit different. So unit three coursework contributes 20% to a student's study score and unit four coursework contributes 30% to a student study score. The end of year exam is worth 50% of that student study score.

For outcomes one and two, we've got four designated tasks that need to be selected once across units three and four. With allocated and approximate time of 50 to 70 minutes per task, and 10 minutes for a multimodal or oral presentation although you might want to reduce that if you've got a large class size. For outcome three, we have the communication of a student designed investigation through both the structured poster, which is assessed and log book entries can be assessed as well.

So I talked about the different assessment tasks. These are all new. So we've got four tasks that you can see in the assessment tasks column. You need to select which of those tasks you're going to apply to which of the outcomes. So for example, let's have a look at unit three outcome one, biodiversity, a typical activity is that teachers look at the threatened species and they often undertake field work and they collect data about a particular threatened species. So you might allocate the first assessment task about the presentation of recommendations using data to make an evidence based decision about something to do with that threatened species. And then you might look at unit three outcome two the environmental project and think, okay, that might involve earth systems thinking.

So you're using the last task to assess unit three outcome two. Climate change in unit four outcome one, you think, okay, it might be an issue or challenge, you know, like increasing sea levels and the impacts on communities. It might be the students are expected to respond to that. So that would be the second assessment task, which would then leave the unit four outcome two for energy options that would be a task related to sustainability principles and stakeholder perspectives. But any of those outcomes can apply to any of those tasks. And it's up to you as to how you're going to manage that both within one year and also another year, it might be that you change what you do. You change the tasks for the outcomes the following year, or you might simply have the same tasks but you change scenarios.

This is the template for the scientific poster. Note the decrease from a thousand words in the current study design to 600 words in the new study design and the focus on communication of this scientific investigation conclusion. Please click on the QR code when you have a moment for a rationale as to why succinct scientific communication is important. Here's an example of what part of a poster may look like. So in this case, the student investigated the question regarding natural fertilisers, are tea leaves or coffee grounds better? And what we're expecting is that they present their conclusion very clearly. So in this case, the example is that the students said that used coffee grounds make a better natural fertiliser for tomato seedlings than tea leaves. And I've used this example because you can apply this sort of experiment right across the board.

So if you've got mixed classes, if you're teaching units three and four or one and two differently, you can actually adopt to this particular experiment. So you could look at it in unit one area of study one in terms of nutrients that might be required in unit two area of study two, it might be in relation to food and water security. What sorts of plants might need more water, less water, et cetera. And for unit four climate change, you might be looking at which particular types of seedlings, whether it's tomato, lettuce, or radishes, whatever might respond better to increase temperatures. So it has scope for lots of different experiments.

Assessment is not just about summative judgement of student performance at the end of a topic or unit. Formative assessment is really important in enabling you to help students progress and to take ownership of their own learning. Being able to work out next steps for each student in your class is enabled through assessment.

All of these resources provide advice for teachers. Some resources are available via the VCAA website. Some are available as part of school policies and procedures and others are available via the school's VASS platform. If you haven't already subscribed to the VCAA Bulletin, you can do so via the QR code included. I look forward to hearing about your planning and implementation of the new environmental science study design, so please stay in touch. We've planned Q&A sessions for 2022, but please contact me if you have any questions in the meantime. My contact details are on the slide. Thanks for your attention today, I hope it's been helpful.

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