4. Citizen Space Feedback for SEG – Science

@14 February, 2020

Notes:

- This is a compilation of the comments received from the sector of the draft Science products as of 14 February. Engagement closes on 1 March but in the past week or two we have not identified any new themes. If new and relevant comments/suggestions come in between now and 1 March we will certainly share them. Similarly, if the qualitative agreement data shifts, we will send through updated graphs/data.
- It is important to note that of the hundreds of science teachers and other stakeholders we have received only 93 online responses, some representing groups from 2 to 25 but most from individuals (from what we can tell, about 180 people have been involved to date). This needs to be taken into account before attaching any statistical significance to the responses.
- These items are direct quotes – whole or partial comments, FYI.

	Positive Statements	Concerns	Things to Think About
Q.1	**The Science Rationale provides enough background information for readers to understand how the Significant Learning was identified by the Subject Expert Group (SEG) for NZC Level 6 / NCEA Level 1 Science.**		
	There is good description of the Significant Learnings.	The background information is so limited that for myself as an experienced teacher and HOD science I find this document confusing.	How did the SEG decide which content to put in? Reasoning to restricting to a single science course is not explained and not justified.
	I agree with many of the big ideas and how they have been presented. This would have been a difficult job to do in this tight timeframe.	I was left wondering about what other Big Ideas were considered and the process that went into narrowing them down.	Big Ideas are the "knowledge" in a subject a strong, rigorous and semi-standardised set of content and concepts that students have to work with is needed
	The rationale makes a case for change. Rationale was clearly stated with clear links to the Curriculum.	Significant learning is subjective and science is a very broad subject area.	Needs to be conceptual progression, unless all the "Big Ideas" in level 1 science are wholly independent of one another.
	Explained very clearly their reasons for the direction they took/ …each of the four ideas is well explained	I think that the SEG has been diverted away from focussing on the key' declarative, knowledge which is fundamental to science as if the focus on skills would be enough.	Instead of a broad background in science enabling students to move on with any of the specialist subjects at levels 2 and 3, it seems as though it is now left up to the individual teacher

	I am delighted to see that the overarching importance of the Nature of Science is finally being recognised	We do not know what Level 2 looks like. Without knowing this, we will not know if we are under-preparing them for the individual sciences in the senior school.	- What ideas weren't included...? What was deemed Not Significant? - What research into scientific literacy informed the development of the Big Ideas about Science? - Are the Big Ideas of Science solely the product of the NZC and the current standards or was some kind of Delphi process used to seek out from experts in each respective field of Science their views of the Big Ideas of Science?
	This better reflects the structure of the NZC with Key Competencies being in the 'front half' of the document. This package enables integrated learning models		
Q.2	**The relationship with te ao Māori section makes it clear how Science and mātauranga Pūtaiao are related.**		
	This is an integral part of the New Zealand education system and no student could study Science in New Zealand without it having a strong connection with Aotearoa.	They are clearly two very distinct systems of knowledge. I don't see how this could be incorporated into a program of teaching.	It does not make this clear. Mātauranga Pūtaiao can not be taught without significant input from Māori - with resourcing and teaching and must include local Iwi and community knowledge - how will the kaupapa be encapsulated in these standards??
	I love that this is finally prioritized in NCEA Level 1 and hopefully this will continue into other year levels 1-13.	I have no problem integrating Te Reo into modern scientific principles. You cannot parallel early Maori understanding with current gene technology.	A lot of knowledge here is assumed here: understanding of how this "knowledge generation" system works does it have its roots in myth and legend, is it an oral tradition, has knowledge been lost/distorted over generations?
	I think the goal is admirable	I disagree that they are easily related - and don't see them necessarily as 'equal' as the information suggests.	This should be introduced at an earlier curriculum level, with NCEA levels 1 to 3 being focussed on the science
	It makes a positive step to explain how the Maori perspective fits in science Some introductions in the matrix as to how it links with the science could be expanded	the history of mythical does not have a place within scientific discussion identification of which aspects and systems of Mātauranga are scientific, , spiritual or everyday knowledge.	Science has no cultural construct by definition Science has no cultural influence
		This is not reflected in the draft standards, expect for the tokenism use of te reo in the standards, rather than authentically incorporating the ideas.	If teachers from every subject at every school are calling on 'local iwi' to share their knowledge, the MoE will need to establish official, paid liaison roles.
Q.3	**The introduction to the Learning Matrix explains its structure and how it can be used.**		
	I generally like the structure - its focus on ideas about science and the inclusion of mātauranga.	It is a terrible direction to follow in the scientific learning area.	Scaffolded learning needed appropriate for teenage brain

	Generally agree although disagree with the simplification of science in general.	Clear links need to be made between the concepts, skills and NOS to the assessment tasks. The Learning matrix has no link to the generalised statements to assessment.	Presumably the declarative knowledge and 'traditional' teaching is expected to happen, but not assessed.
	It allowed me to visually see what you had explained further. From viewing this I was able to understand what you were trying to achieve with the changes.	Note that we seem to be wanting to credential everything apart from the bullet point "develop an understanding of the world, built on current scientific theories". Why???	Encouraging teachers to "start anywhere" is great but there's a logical sequence to presentation of contexts…need to ensure sequence is not random.
	Hooray - assessments, rationale NZC and the matrix are all emphasising the same things.	Unclear how this can be taught to students who will be continuing to Level 2 Science subjects. There is not enough Science other than Nature of Science.	this will need some more examples and clearer discussion to introduce the spiral idea and lead teachers away from a linear, assessment-driven teaching,
	The table of the science matrix makes it really clear how the different science contexts (living world,etc) can be explored through the four Big ideas. I also liked the suggestion of using a key context idea, like energy, to tie in all four context strands	There is also a big weak link in the assessment because it could be bent around very little knowledge of key science.	. It would be good to see more fleshed out ideas like this to inspire teacher who are not used to teaching in this way.
	We like that we can link to local curriculum and weave standards and content strands together. Possibly lacks a bit of reality.	I think this will need some more examples and clearer discussion to introduce the spiral idea.	
	This sets Mātauranga Pūtaiao as a valid, relevant, and required knowledge system to use. I love that.	(not relevant to Matauranga Maori)	
Q.4	**Big Idea 1 - Investigating in Science reflects a Big Idea of Science at Level 6 of the New Zealand Curriculum.**		
	Yes. Love it. (BUT – I am concerned that I could not myself "apply a mātauranga Māori framework" and therefore have no idea how to facilitate students to do this well.)	There seems to be 2 different sets of big ideas - big ideas and then big ideas of science - there is a difference and this is not clear (THIS WAS SAID BY SEVERAL PEOPLE)	Some forms of inquiry are not science, and we should teach students why this is! In addition, evaluating the suitability and findings of investigations in relation to scientific concepts and theories (i.e. "content knowledge") is the key skill here, and is what makes scientific inquiry useful. Therefore, we again find ourselves unable to escape the dreaded "content"

	Love the focus on NOS Like the emphasis that there are multiple ways to investigate scientifically instead of one stock standard template.	This thinking however does need to be started in year 7-10 so that there is more value at year 11.	A potential glitch would be to validly compare WHY different investigations in different veins of science incorporate different techniques of methodology. That would be very tricky for anyone at L1 to tackle...
	I like how this encourages the exploration of the quality of data gathered from different investigation types. It will increase the evaluative capabilities of students equip them with the ability to recognize valid data.	Also, if this expectation is to have the desired priority of 'AND', then it needs to be re-iterated in the table of Big Ideas of Science second column (pages 16-18 of this document) which is for some rows, but completely missing in other rows.	Investigation is a flexible word and means quite different things across the range of scientific disciplines. An investigation in biology is completely different from an investigation in physics - different outcomes, different process, different philosophy - without prescribing what sort of investigations are required, it is open to misuse.
	I like that this is a whole quarter of the matrix		I submit that secondary data should be used as well as primary data, e.g from space probes, satellites
	This is definitely a core part of Science and absolutely deserves its place in a new level 1 science subject		
Q.5	**Big Idea 2 - Use Science to engage in real world issues reflects a Big Idea of Science at Level 6 of the New Zealand Curriculum.**		
	Gives meaning to Science because this change really allows us to change the focus and to teach our ākonga about Science in the 21st Century.	Students at this level are highly unlikely to be able to engage in real world issues to the level described.	We seem to be jumping to what will end up being a very simplistic set of repetitive and uninteresting "inquiries" for students to do, without equipping them with a wide and deep set of scientific concepts with which to work first. It is unclear what is meant by students "bringing their own knowledge… to do meaning making and perspective taking." Does this mean learning scientific knowledge and using it to explain how and why certain phenomena (which may be relevant to their everyday lives, perhaps) occur? And to use scientific concepts and vocabulary to explain how something may be done about certain environmental or social problems?
	I think this Big idea is actually easier to understand than how it is phrased in the NZC.	Not really, not if you look at the curriculum document.	
	I am very happy to see it represented.	But a local 'solution' is not always there	
	This prepares students for their future community life and may improve mental health as they discover their voices are important.	(stated above already)	

	Another great Big Idea and good to see that depth is important here. It's great that it's all about taking action.	engaging with real world issues not the core thing we do / nor should do in the teaching of Science in NZ. Does not warrant being a big idea.	
	I like this Big Idea because it gives a framework to empowering our young people to engage in issues they're interested in. It brings in the idea of 'Think globally; Act locally' and helps to connect young people to their local communities, giving them a greater sense of belonging and purpose.	I am concerned about a loss of Scientific thinking and a greater focus on context.	I don't think that this fits as an idea about science - however I do think it is an essential part of science education
	This is so important for students in our changing world so that they can have an impact on real world issues. This also allows stronger connection to local iwi and local issues. The trick will be making sure these things are pitched at the right level		
	This matches perfectly with the Nature of Science in the NZC.		
Q.6	**Big Idea 3 - Science as a Human Endeavour reflects a Big Idea of Science at Level 6 of the New Zealand Curriculum.**		
	This Big Idea seems like it is on the right track.	I noticed in the "possible map" of ideas with shading to show how strongly each aspect is reflected by the big ideas this one seems to have much less. To me it doesn't fit.	, understanding how we came about our knowledge and understanding of the atom is interesting but knowing how atomic structure explains chemical reactivity is more important
	I think the inclusion of culture and technology in this learning is really interesting.	This is important but no way is it more important that particle theory, evolution or energy conservation. It is better to assess content knowledge and understanding	This is a very sophisticated idea and well beyong L6 of the curriculum - most active scientists would not describe this as an active part of what they do.
	I like the expectation upfront that the processes of gathering and developing understanding in western Science and Mātauranga Pūtaiao are both important.	Danger teachers just lecture about the history of science…need to ensure skills and process is transferrable	It does show that science is cultural, which many people don't recognise, so is good in that sense, but not at NCEA Level 1.
	So important for students to see where science comes from, and how lots of different political and ethical etc issues impact on the science being done. This idea is essential to science being evidence-based,	All of it (sort of) makes sense and you can see where the ideologists are coming from but we are over complicating something simple.	

	but also changing as evidence changes. (already stated)		
		Good to see this as well - especially if the contribution of women, different ethnic groups and groups of scientists are also recognised. It will be important that the history studied doesn't just go back to the days of the 'lone wolf' in the lab. These days large teams of scientists collaborate internationally and any discoveries are attributed to the whole team. This collaborative group work could be modelled in a classroom/lab. Need to remember that history can be very recent. For example, the coronavirus and climate change. Teachers need to remember to take smaller bites rather than overwhelm students.	
Q.7	**Big Idea 4 - Communicating in Science reflects a Big Idea of Science at Level 6 of the New Zealand Curriculum.**		
	It's good to see a shift of emphasis from "using vocabulary and symbols" to engaging with and creating scientific texts.	I like some of the ideas in here. e.g., the emphasis on conventions of communication that gives scientific knowledge its rigour (by enabling a common method of critique and challenge). I do think it probably belongs in Big Idea 3 though	…scientific conventions are, again, discipline-specific. skills such as critical thinking and critiquing information are not generic nor transferable the best way to teach students to evaluate scientific claims made in the media and on the internet is simply to teach them more science!. Teaching this properly will include teaching communication conventions at the same time.
	I really like how you can analyse codification of science knowledge in Maori texts such as purakau etc	…we are putting students off science by the overall emphasis of these assessments.	
		They will be limited to the context selected and very little more.	
	Communication in Science is critical and to have a focus on this is important to everyone. This matches perfectly with the Nature of Science in the NZC.		Will require a lot of good 'What does it look like' exemplars. Teachers will need to develop effective learning exercises and collect evidence throughout the year as well as having 'stand alone' topics. This also needs careful selection of topics and a list of suitable ones. This will be difficult for teachers to implement. Evaluation is going to be of texts and images requiring a range of written, visual and oral presentations. The key capabilities will be useful here. Finding topics at L1 will be harder - again there may be the temptation to poach stuff that is more suitable to L2 or L3.
	Essential for students to be able to interact with the science ideas in the public arena, and to be able to understand very subtle pseudoscience or incorrect science.		
Q.8	**The Knowledge Big Ideas from the contextual strands (in the column on the left of the Learning Matrix) reflects the important "content" of Science at Level 6 of the New Zealand Curriculum.**		

	The 4 ideas about science are far more important than the content they will come away with at L6 - all of these can be easily picked up at L7, should they wish to pursue science further. The key thing is having students care about their world, through a science lens.	This needs to be ACROSS ALL IDEAS. As a long term teacher this is TERRIBLE	whilst the communication and endeavor sections seem to build in capacity to avoid fake news, in fact this is an incredibly hard skill to develop. We've tried it with the Biological issues standard and the reality is, unless you have a broad conceptual background then you sink under the info.
		The big ideas should be the BIG IDEAS OF SCIENCE. E.g. Energy, Variation and Reproduction, particle theory. They should be well defined and logical. The NOS should be linked all content should not be there, however define what is vital for next steps, assessed in some way and have clearly defined levels..	
		the proposed assessment does not actually require that all the desired Significant Learning, or the NZ curriculum is actually delivered. This will lead to a fragmented curriculum being delivered. countries who best narrowed their achievement gap, were those who had a long multi-year arc of commonly learned subject	This is going to need a lot of good 'What does it look like' exemplars.
		The content here seems arbitrary, below curriculum level, and nowhere near detailed enough It is not good enough to say “start anywhere” and that “learning should not be linear”. Concepts in science are not independent of one another (this includes NoS concepts). They are best taught in certain sequences that build a progression of conceptual understanding.	What if a school wishes to create (or continue with) a Yr11 course targeted to a subset of these concepts (like L1bio,che, phy or others that currently exist)? What is the core content of these types of subjects? The document is of no help with these questions.
		there is also a need for some nation-wide must-have contents. The wide-open and non-prescriptive nature of this Learning Matrix makes it tricky for anyone outside any given school to know what any given student learned or understands after they’ve taken a “science” course at L1. e.g., if a kid passes S1.3 how will anyone know which content was involved? Makes it difficult for anyone outside of that school to help with future subject selection or capability for future programs?	I think it narrows the content to very set specific ideas that do not reflect either the fundamental base knowledge of these areas of science or the knowledge that will help students to understand key socio-scientific issues that are likely to affect them.

		(The following statement is typical of the comments made in this section – very concerned teachers, desperate for a list of 'content') Although this does contain important content, it leaves us wondering where all the rest of it went. There is nowhere near enough detail here for a course to be created from this. It needs to be much more prescriptive	
Q.9	**The language used in each Big Idea is appropriate for Level 6 of the New Zealand Curriculum.**		
	This will be really helpful for beginning teachers.	I would argue lower than L6 in content descriptors and higher in some other big picture idea descriptors.	The language in the blue boxes is okay. The language in the orange boxes varies between far too technical and too simplistic.
		Some of the more abstract concepts detailed in the big ideas are beyond Level 6.	
		It's not inclusive e.g. it's shutting the door on students with poor literacy skills	
		Basic English would be good. Flowery language is unhelpful. But you should provide a streamlined version for students and whanau Too many words. Too much ideology.	
Q.10	**The Learning Matrix clearly shows connection and alignment with Science at Level 6 of the New Zealand Curriculum (in particular the Learning Area Statement p28-29).**		
	The content from the four strands can easily be found online but learning NOS requires more teacher input.	"WEAK connections." "Not clear at all." "Skills wise maybe. Content no" "Not clear at all." There are some connections, but it is not well aligned.	
	The matrix aligns so well with NOS, and I think this will really help push science to be a learning area that is crucial for students in the modern world.	Nature of science strand is given utter dominance over the other 4 strands, which the matrix only pays lip service to. The curriculum was designed to enforce teaching of the 4 strands of Bio, Chem, Physics, Geo/Astro and the learning matrix is actively undermining that.	
	Great to see movement back to the front of the curriculum, and away from the AO's.	While it may show a connection, the alignment is questionable as the Learning Matrix is such a vast collection of various themes, content and concepts.	

Q.11	**Please comment on how the Learning Matrix could be improved. Where relevant, please indicate which part of the Matrix your comment relates to.**		
	The matrix looks like a good starting point	The contextual strands are too narrow	As the matrix is presented, it looks like a year 10 programme.
	It allows for flexibility and I think focuses on four very clear and important skills for Level 1 that will flow into Level 2-3.	I am concerned that there is no compulsion to include both Maori and Western science ideas - it is only an option. …this new system will still allow some schools and staff to operate in a Western bubble.	
	The four big ideas are great, and fit really well with the NZC	…it's the structure of it that creates the flaws, not the ideas listed in each column.	The learning matrix needs to have a significant focus on knowledge of Science. The knowledge component in the draft standards have missed this entirely. The matrix informs the standards which don't include the NZC strands of Science. Which mean that to complete a standard, schools will need to select a primary strand in which to place its context (e.g. Sea Level rise) --> links to some strands more than others, so pupils will develop large gaps in their knowledge.
	I think the matrix is well thought out and constructed.	The Learning Matrix is not clear and must be clarified/made more user-friendly.	
	This learning matrix is a flexible document that allows students and teachers to follow local issues.	Links with concepts to further science study - especially if we are keeping the current L2 and 3 standards and working from L1 upwards - Those taking L1 standards, how will they be prepared for current L2 and L3 Chemistry/Physics/Biology/ESS standards if they are not changed in accordance?	
	I like that you put a range of questions as this will help teachers structure their programmes. They could also give students a range of questions and then they could choose which parts they would like to pursue in their own learning programme.	I believe there should be 2 standards at least that incorporate Science knowledge recall. Without this grounding students will not be able to succeed in senior science subjects and students will not have the content and memory/ revision skills required for tertiary Science study.	**(Several people made this comment – believe there should be far more than 4 A.S)** Creating subject specific standards alongside these initial standards. This would allow for these core standards to be used alongside a couple of subject specific standards to create Biology specific (for example) courses, AND allow a student to also do a Chem specific course.
Q.12	**There is alignment between the Draft NZC Level 6 Science Learning Matrix with the Draft NCEA Level 1 Science Assessment Matrix.**		
		Report writing will also be a barrier to learning for ESOL (Kura Kaupapa) students.	I don't understand whether we are expected to teach ALL content from the 'Significant Learning' AND then the four contexts we choose and assess them all in one year?
		Catering to low literacy and international students with English as a second language may be difficult.	While they may align, the statement above the "we do not assess everything we teach" is the key. What we do assess determines where the focus will be placed.

			I think that this matrix will lead to a significant decrease in students collecting primary data, rather students will use research and secondary data.
Q.13	**The internal and external modes allocated to each standard are appropriate for the key outcomes in that standard.**		
	The focus on multi-modality is commended!	Workload, lack of content direction.	I'm interested to hear what the justification is for having a suggested word count only for the two externals(and a fairly small count given the credits involved). is it a decision that is in the best interest of the learner?
	Really like the suggested form of external assessment.	external standards 1.3 and 1.4 being the same report or portfolio-style is a concern NOT appropriate to assess all science understanding in the same way.	Numerous comments regarding teacher workload concerns with the feedback required from teachers before externally submitted as well as authenticity issues and concerns of marker competency
	I think it is great that there is a push to move away from content based teaching It's great that students get to work in teams, have access to any information, longer time frames and can submit their work in multiple formats. I would've preferred a bigger change, indicated by the "Big Opportunities" that came out in 2018. But this is a good start.	Standards 1.3 and 1.4 1. Both rely on students being able to basically rote learn an Excellence essay - this is not a skill that I would want to encourage Science students to have, let alone assess. 2. Both 1.3 and 1.4 are basically internal assessments that are sent off for marking to someone with no knowledge of the student. Is this really an external assessment? Should it be externally assessed?	They all feel like internal assessments, regardless of the label EXTERNAL, the teacher will still be having to do a significant amount of collation of material and storage etc. To give adequate feedback to students, teachers will spend large amounts of time reading work that is ultimately "marked" externally - they may as well mark it as we currently do with internal standards
	So fantastic to see no examinations!	I worry a little about the investigation standard... how can we have breadth and rigour without overassessment? Won't students just have to do six more times work? Although I do like the idea of the multiple forms of investigation. But the impracticality of validly and consistently assessing the S1.3 and S1.4 externally cannot be overlooked.	Stripping examinations away from the entire subject changes the subject completely. This is all effectively internal assessment, including the "external" reports. Even the externals have a large amount of lead-in and content provided before deadline. Parents are going to be writing reports for students. There is no easy way to check authenticity. Heck, turn it in can't even be used as students are allowed to have shared data collection.

		Limited number of contexts that could be valid for assessment – too risky. This could create tremendous issues in terms of integrity of marking, plus external markers will almost certainly not be competent in the wide range of topics that may come up.	There are many cognitive benefits to formal examinations. Formal examinations are actually one of the fairest forms of assessment we have. (most equitable)
Q.14	**The Assessment Matrix as a whole assesses the most important learning outcomes for Level 1 Science.**		
	Often if a kid doesn't 'get it' - for example, balancing a chemical equation for acids and bases - they will learn the process and then one day, in Level 2 or 3 or university or just in life have that 'eureka' moment It's OK to measure this student's Epistemic Knowledge, since it will be the 'doing' that will give them the opportunity to finally gain the Declarative Knowledge.	The new standards have stripped away content that underpins learning in L2 and L3 expected to apply meta cognition to topics such as the nature of science and science issues when they are still novices with little content knowledge.	My only concern is for schools that do a range of blended subjects.e.g. If we offer a "Forensic Science" course, we will need to consider overlap of standards for students who may want to take more than one science based course. This may be a reason to still consider Chemistry, Biology, and Physics as L1 learning strands.
	I think the assessments cover the four big idea perfectly.	I fear the big question from level 2/3 or even tertiary levels will be ... how do we know students understand the Knowledge Big Ideas? How can we ensure teachers are delivering opportunities across those big ideas about science?	NCEA Change Package calls for a more generalist or broad level 1 qualification, offering access to the breadth of the curriculum. This is a good idea, but these level 1 standards do not come close to achieving this. The breadth of conceptual and content knowledge needs to be systematically taught and assessed in our subject.
	Yes. For a foundational science qualification, it is the most important learning.	There is no compulsion to cover all facets of the Big Ideas in Science	It over emphasises the process of science rather than the content of science.
		Mostly agree here. But I think there is some 'numeracy' aspect missing. Science is fundamentally a numerate area	Will there be a dedicated set of standards for chemistry, physics, biology and ESS like there currently is? If so this is not a concern, but if there isn't then these standards are very limiting.
		Level 1 “science” is a multi-headed creature. Not every course is a “general science” course, nor should it be.	
		I do not believe the standards collectively allow for clear insight to be gathered into students' knowledge of the Big Ideas of Science.	

		Science needs to be assessed both as skills and content, otherwise how can pupils distinguish between science and pseudoscience. A direct lack of specific NZC science stands linked to these standards is VERY concerning. these 4 standards don't prepare pupils well for the senior Sciences.	
		I am very disappointed in the proposed standards. I totally support teaching and practising the Nature of Science/Capabilities etc but they are fundamentally soft skills that are very difficult to assess. They are all very broad and will be too much work to check for authenticity and too. 1.3 suggests students could submit a cartoon! That sort of task student invariably focus on presentation and less on the science. Fundamentally, assessments ought to be way more prescriptive in terms of content and tasks such as exams/tests where students can be correct or incorrect.	
		…moving from L1 Science to L2 Phys/Chem/Bio is already the largest cognitive leap they have had to make in their lives, and with the this draft curriculum I can see that cognitive leap increasing, How can we find a balance between the 50% of kids who finish science at L1, and the 50% who continue? By amalgamating the strands, we are being pushed down the Project Based Learning route, which research has shown to be less effective for novice learners.	
Science Achievement Standard 1.1 – Use a range of scientific investigative approaches			
Q.15	The Title provides a general summary of the requirements for this standard.		
	Love the fact that ākonga will need to use a range of approaches!	At this stage I have given up. ALL the Science Achievement Standards seem to be opinionated, touchy-feely, non-science rubbish. So, I will now tick Strongly Disagree and call it quits.	

	Investigations are crucial.	My main issue is that there is too much flexibility in topics, so students don't get a broad understanding of different strands in the sciences. One can argue that these strands are artificial, but for students to get a good basic understanding, we make it easier so we can focus on more ideal situations rather than real (otherwise we could teach acceleration including friction right away or even quantum mechanics)	
		Everything is too broad to make real sense of anything in this document.	
		this is possibly the best of a very bad and limited bunch of standards. This would be doable but tedious!	
Q.16	**The Achievement Criteria sufficiently specify the requirements for the award of each grade.**		
		There is nothing specific about the achievement criteria. It is going to be extremely difficult as teachers to be able to plan, teach, assess and mark confidently.	
		The achievement criteria, contexts and concepts, skills and content are poorly designed. This is as clear as mud.	
Q.17	**The Explanatory Notes clarify and explain the standard.**		
		Nothing is clear.	not enough standardisation between schools, and the assessment wil be so varied.
		Not sure what 'applying a mātauranga Māori framework' looks like.	
Q.18	**The Mode of Assessment (internal/external) suggested for this achievement standard is appropriate.**		
	Great to see a portfolio based assessment, rather than just one experiment. Also good to see students having to evaluate/summarise the range of investigations.	To broad, too undefined in nature and content.	
		'Structured report' is not very clear. Is it one report for three investigations? Or three different reports? Are they all the same style? And so on...	
	I do like the 'multiple' investigations approach	Suitable for high achieving students -	

		Bit worried that it is 6 credits. That's a lot for a student to mess up.	
		Teachers will still be unofficially moderating each other to ensure that what they are teaching will 'pass'.	
		To us it looks like "Project learning by stealth". Gender bias. It may lead to more boys leaning away from the sciences	
Q.19	**The possible contexts and activities for teaching and assessment are appropriate for exemplifying this standard.**		
	Really liked the examples and could see the change away from the standards we currently have. More flexibility for schools and less prescriptive!	The types of data which are acceptable and the level of complexity are not clear.	The possible activities made me a little unclear about the standard for the investigations required. Are they essentially just 3 lab reports? I was picturing longer investigations.
	I thought the contexts suggested were great.		students might develop an understanding of investigations but without careful thinking would not develop student knowledge of L6 content knowledge and therefore a large chunk of the science learning area is being missed. Also there is the possibility of teachers picking options that are not at an appropriate level and therefore would affect students assessment
Q.20	**Please provide some suggestions that might be useful for the Subject Expert Group (SEG) in further developing internal assessment activities for this standard.**		
		Need guidelines and clarification.	I think the group really needs to unpack what is meant by including mātauranga pūtaiaō. What framework are they referring to, where are the resources to support teachers. How might it look if a student uses an approach such as waiata or pūrakau?
		I also worry about over assessment coming with multiple investigations	Three-week external assessment window is far less stressful than an ongoing assessment model? When will the internal assessments happen during the transition? Will it clash with the externals?
			It seems the idea of hollistic marking is going to take on a bigger importance. This will be exceptionally difficult for teachers of small schools, or new teachers to judge.
			Clearly state what you expect students to have completed so that they have a good grounding in level 1 science which

			will allow them to apply science to their daily lives as well as allowing them to move on to specialist subjects
			The credit value for this internal should be 4. This is because the learning outcomes require less learning than those in 1.2 so I suggest the credit values be switched. The learning within this standard will be required for students to be able to confidently engage and be successful in new AS1.2.
Science Achievement Standard 1.2 – Explore a real-world issue and devise a local, science-informed action.			
Q.21	**The Title provides a general summary of the requirements for this standard.**		
		Too broad a title.	I think this is idealistic and has a lot of issues with implementation at the classroom level and also in marking
		Too early for most students.	
Q.22	**Achievement Criteria sufficiently specify the requirements for the award of each grade.**		
			…required action. This should be an option… and if the option is not taken, then an evaluation of why that was not done.
			The 2nd part of enforced or required action. implies “forced activism” across the +30,000 Yr 11 NZ students. This could quickly get out of hand and become a rehash of the top 10 social issue stories even though you try to keep the context “local”.
			There is a tension here - what if the proposed solution is based on poor science but is presented well or vice-versa? I can't imagine how much time teachers will have to sink into finding appropriate "local issues" that are suitable - it will result in a very contrived and inauthentic outcome.
Q.23	**The Explanatory Notes clarify and explain the standard.**		
		There is insufficient justification for this standard to exist.	The rationale states that this is different to a social science inquiry as it must use scientific knowledge to inform action, but then the statement linking to learning outcomes says that knowledge should come from a range of knowledge systems.

Q.24	**The Mode of Assessment (internal/external) suggested for this achievement standard is appropriate.**		
Q.25	**The possible contexts and activities for teaching and assessment are appropriate for exemplifying this standard.**		
	These are great as they give nice clear examples that teachers can use straight away and are relevant to today.	'When we incorporate mātauranga Pūtaiao into our programmes of learning it's important to avoid inserting it in...to Western Science' is in this draft statement. Yet some of the contexts suggest doing this.	the pressure to find a "new issue" each year or limit student's choices from issues that have been done-to-death by previous students will become an increasing issue.
	We like the activities which are designed to develop and show the reasoning behind the scientific action taken.	Given that 1.3 and 1.4 can both be addressed with little Science content knowledge as well, there is a risk the course gets taught with very little knowledge of Science developed.	The quality of the science understanding should be the way students are graded. The whole idea of taking action appears political
			Due to the idealistic nature of this standard I think that students will do a lot of 'copying' ideas from others.
Q.26	**Please provide some suggestions that might be useful for the SEG in further developing internal assessment activities for this standard.**		
	The Water Quality issue is great.		.
			Despite the SEG's claim that this differs from a social studies standard, the fact remains that it is largely the same thing. The core of any standard of this nature should be using scientific knowledge to devise a scientific solution to a scientific problem
Science Achievement Standard 1.3 - Describe attributes of Science that contribute to the development of scientific ideas and processes.			
Q.27	**The Title provides a general summary of the requirements for this standard.**		
		What does this even mean?!	I think this is beyond the scope of L6 processes/thinking
		It confuses me a bit.	standard 1.3 name is overwhelming
		It sounds so boring.	
Q.28	**The Achievement Criteria sufficiently specify the requirements for the award of each grade.**		
	The explanatory notes helped my understanding of what an attribute actually is	It isn't clear. What are these 'attributes' - such a woolly concept. It comes across a bit fluffy.	
Q.29	**The Explanatory Notes clarify and explain the standard.**		

	There is a good intent to this standard: the history and philosophy of science is the real "nature of science" that students miss in school, and it should be taught when introducing new key concepts. It is good that the standard is not attempting to separate out the nature of science from the content: you clearly cannot have one without the other in this case.	What is expected still isn't clear to me. Needs much more work.	However, how will we ensure teachers cover a broader set of content and concepts instead of just picking selectively examples that fit with the assessment requirements of this standard? Teachers doing this will severely undermine the coherence of the science knowledge on offer to their students.
		I am still struggling to understand what the students will have to do to achieve this standard.	
			This also makes me wonder how many feedback loops would exist to help students as they work towards a final draft… as well as how authenticity issues would be managed.
			I presume students working towards the draft S1.3 assessment would be weaving content they've learned throughout their explanation of the specific "human endeavour"... The trick(s) and trap(s) here is not to lose track of the backbone of science-concepts that back up the story
Q.30	**The Mode of Assessment (internal/external) suggested for this standard is appropriate.**		
	I think this is a brilliant idea for external assessment. I think a range of case studies will be very important	It looks and feels like a moderated internal.	
		The rigor of an 'external' assessment as we currently know it will not be there… not all classes have to be on the same timescale.	The proposed assessment mode is not any more equitable than an exam,. Students with greater content knowledge will still be advantaged in researching and writing up a report that makes scientific sense. The fact that the other external standard is assessed in this way doubles the opportunities for disengagement, boredom, repetition and waste of class time on assessment instead of learning about science.
			Report writing to assess content knowledge is not a subjective method of assessment for the sciences.

Q.31	**Please provide some suggestions that might be useful for the SEG and NZQA in further developing external assessment activities for this standard.**		
		Literacy, literacy, literacy…	
		Workload nightmare.	how can a 600 word report (or similar) show understanding of such a lofty ideal
		Removing this standard would be the best option.	too much scope for variation between schools, and too hard to keep the assessment fair
		Scrap S1.3 and work in tandem with the biology, chemistry, physics, ag-hort, earth and space SEGs as well as the various subject associations to create a workable matrix of standards that schools can select from to meet the various needs of students in their school. This would be smaller than the current matrix of L1 NCEA "science" but streamlined and able to cater for various schools throughout NZ, various (and non-overlapping) goals of NZ's students, parents and communities	Though the heading of this standard is a good idea, I don't think it should be an assessment focus. It should be part of the content knowledge being learned. For example, in level 2 Physics they learn about the structure of the atom, as part of the content they also learn about how this model developed over the years through different scientific developments. The development of this model is part of this standard but the standard is focussed on knowledge of the atom.
Science Achievement Standard 1.4 - Interpret scientific claims in publicly communicated information.			
Q.32	**The Title provides a general summary of the requirements for this standard.**		
	This is such a critical skill for all our citizens and I am really excited that this and the other 3 standards are presented with these rich NOS foci.	Much doubt about this standard – no positive comments.	
		The title is perfectly adequate, however I do not believe that this standard is sufficiently important to replace the core learning of the current standards.	
Q.33	**The Achievement Criteria sufficiently specify the requirements for the award of each grade.**		
		if that is all that is required at the achieved level (to identify relevant science information and draw a conclusion) then there is no way that authenticity and actual understanding can be guaranteed. As the report is carried out throughout the year, students	I would like more clarification around religious or ethnic belief systems. For instance, there are some deeply held and very personal viewpoints around evolution, homeopathy, vaccines, 1080, water pollution, and I would

		can collaborate in class, and with social media they will create groups to collaborate nationwide. Therefore large groups will have the same ideas and therefore at the achieved level all students should be able to pass, irrelevant of their actual understanding or capabilities. - *won't work as a portfolio gathered I class – use an exam*	not like to bring my teaching into conflict with the believes held by a family. This standard has the potential to politicise the teaching of science in the eyes of the public, something I feel should be avoided
			Students don't know enough to make informed decisions at level 1 about scientific issues. They need to know a broad base of scientific concepts first.
Q.34	**The Explanatory Notes clarify and explain the standard.**		
	good to have equal emphasis on western and other cultural science this was helpful	Clarify the wording.	In the rationale is states 'Scientific claims include those based on mātauranga Pūtaiao, which has its own science language and conventions.' Then in the explanatory note 3 Example modes of information communicated to the public include: » narratives, waiata, mōteatea, pūrākau, and whakatauki. Students analysing the validity of mātauranga Pūtaiao? What if students don't come up with culturally responsive answers?
Q.35	**The Mode of Assessment (internal/external) suggested for this achievement standard is appropriate for the standard.**		
	.	**Almost every comment in this section is concerned about this being external – great concern voiced.** Any report is basically an internal marked by someone else - should be some opportunity for completely unbiased, examination type conditions of assessment	Does external in this case mean an externally funded NZQA appointed team marking - Because it should! If it does, external is good. Requires high literacy!
			In one external standard (1.4) kids can choose different contexts. Markers may therefore mark 1000 different papers with different contexts a marker having to switch contexts every single paper, makes this a very demanding task.
Q.36	**Please provide some suggestions that might be useful for the SEG and NZQA in further developing external assessment activities for this standard**		

	This is a fantastic standard and will be an invaluable skill for learners. My only confusion is whether students assess given science communication artefacts, or source them themselves.	There is room for science skills it just shouldn't be the whole course.	What would a task based on, waiata, mōteatea, pūrākau, or whakatauki end up looking like? Cultures all over the world have myths etc, but these were never intended to convey accurate information. Could you make an example including these (outside of something that just references kaitiatiganga.
	Great to see this included as a standard.	students will get bored doing this standard.	
		This will not work with my less able learners.	assumes that critical thinking and reviewing evidence are generic skills. The best piece of knowledge to interpret, critique and evaluate scientific claims is science content and conceptual knowledge. students must rely on their specific, content-based knowledge of the discipline in question to be able to determine fact from fiction. This means that if we are to stick with this standard, then its focus must be shifted to ensure that it is assessed in such a way that allows for students to use, in-depth, the curriculum level 6 content to critique science communications.
		My only confusion is whether students assess given science communication artefacts, or source them themselves.	
		Rationale says that the standard addresses equity by "not privileging recall skills or written literacy" but you have a requirement for an 800 word report is the opposite of this as it requires kids to pull so many strands of ideas together and come to a consensus.	
		It is concerning that this standard is worth 6 credits yet it does not feel accessible lower level.	
		This one is better (by far) than the S1.3… It could survive and be incorporated into a Yr 11 "science" course if the school chooses to include it. But there are issues: … it is assumed that examples are drip-fed to students throughout the year and every now and then students work on one themselves to build up a portfolio of 3, to eventually be submitted at some time late in the year. This would require a bank of "decent" examples to be agreed on for all NZ schools in the TLAG. The danger of 1 school using an antivax (or other) example and detailing how that can be critiqued, while another school allows students to use that exact resource in	

		their portfolio is just one example of how hard authenticity issues would be to deal with. …	
Q.37	**These products provide the opportunity for all learners to see their language, culture and identity in their learning and assessment in Level 1 Science.**		
	This is something that all teachers should be embracing in class anyway!	there is an opportunity BUT most teachers don't have the skills to actually incorporate this effectively	**(Overall, the comments resoundingly answer, "No, – not all learners can see themselves.")**
	By being flexible we can cater to the different learning views and needs easier. I like how this view is now an accepted form of the Science area.		Explicitly saying that mātauranga and science ought not to be compared and contrasted is misguided. Students ought to be able to interrogate each system and provide coherent responses when asked about which kinds of question each knowledge system is able to answer and in which circumstances its answers have authority.
	It has made significant improvement on valuing mātauranga Pūtaiao	As a person who identifies as Maori I find the application of Mātauranga Pūtaiao as forced and outside what science is. Mātauranga Pūtaiao is a knowledge system that does exist, thought, it is not science. It should have its own standards that can be assessed	Very hard to tell this without learning programmes!!
	Opportunity!	I like that we are planning for those that don't take science in the future and helping them develop skills of a good scientist, however are we catering for those that do go on in science fields. Where there are conflicts (e.g. literal Bible interpretation) this needs to be handled sensitively. I don't think that the school science lab is the place to hammer this out and I don't feel that I have the skills to help a student who has conflicts.	We do have to mindful some aspects within every culture (including western ones) are lacking proof. Without dismissing the culture as a whole, we still need to be able recognise what is supported by evidence and what is not. I think these standards need advice on how we deal with this. For example: the maramataka could be a good context for 1.4. However, there is no rigorous evidence that supports planting according to the cycles of the moon. Similarly there is no evidence regarding moon phases affecting human behaviour. If this was used as a context would we allow students to come to the conclusion that these claims lack credibility? How could the support of these ideas not enforce observer bias and the placebo effect (e.g. anti-vax, homeopathy, "miracle" medicines etc)? I don't know the answers to these questions.
	I think the SEG has done excellent work at achieving this aim - it's bold, it's exciting.	All???	concern that the 'requirement' may lead to patronising inclusion of material

	…we probably do not give sufficient focus in our current curriculum for the 50% who do not go on to further science. And I commend the writers for clearly trying to address this.		The mātauranga Pūtaiao content knowledge should be explicitly taught and assessed and kept separate from Western Science.
			This is really dependent on the teacher and their teaching, not the task or standard.