MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA

Public Engagement on Additional Options for Science at NCEA Level 1 Analysis Report

Feedback received as of 10 August 2020

Drafted by: s 9(2)(a) [redacted]

Document Control

Document Information

Project name:	Review of Achievement Standards
Owned by:	Simon Laube, Senior Manager
Lead Author:	s 9(2)(a) Project Adviser
Document Title:	1.0

Input From

Name	Version	Role	Group
James Gavey	1.0	Principle Adviser	Senior Secondary
Terry Fenn	1.0	Manager	Senior Secondary

Formal Review

Version	Date	Reviewers	Description of changes
1.0	10 September 2030	Name Surname Name Surname	Approved Document

Project Management Endorsement

Name	Role	Team	Date approved
s 9(2)(a)	Project Manager		10 September 2020

Owner Approval

Name	Role	Team	Date approved
Simon Laube	Senior Manager	Production House	0 Month 0000

Further Approval

Level	Date approved
RAS Project Board	10 September 2020

Contents

Purpose

This report outlines the feedback received on the alternative options for Science at NCEA Level 1. It aims to categorise responses based on themes and trends in response to the 3 proposed Science Subject Options. In this way, conclusions can be drawn from responses which will support decisions on the subjects to be developed within the Science Learning Area at NCEA Level 1 and inform the ongoing development work with the Subject Expert Groups as part of the Review of Achievement Standards (RAS).

Background

1. In July 2019, Level 1 Science was selected as a trial subject for the Trial and Pilot phase of the Review of Achievement Standards as the Science curriculum significantly differs in construction from other subjects involved in this phase at NCEA Level 1.

2. Over 2019, draft Level 1 Science matrix and assessment resources were developed by the Science Subject Expert group (SEG). The SEG committed to developing four standards reflecting the Nature of Science (NOS) to capture and assess the most significant learning in Science in line with Cabinet expectations. The phase 1 draft Science products were shared with the sector in 2019 for feedback, closing March 2020.

3. These draft science products received significant feedback. Several strands of themes were illuminated through this feedback process. Much of this was concerned with the perceived significant changes in structure of Science in NCEA as a subject at Level 1 NCEA.

4. Following Cabinet's confirmation of changes on 20 February 2020, the Provisional Subject List (PSL) was released for public engagement. In the Provisional Subject List we recommended a single general Science subject to be developed at NCEA Level 1, rather than specific subjects reflecting the individual strands within Science as currently exist.

5. In particular regard for Science in the PSL engagement, feedback received covered similar themes to that of the draft Science products. Due to the feedback received, particularly in response to the draft products for the Level 1 Science as part of the trial and pilot process, we released two further options for public feedback alongside the original proposal. Public feedback on that process is documented in this report.

6. Option A was presented as the initial proposed single General Science subject at Level 1 with four standards focusing on the Nature of Science.

7. Option B was presented as the General Science subject, along with two Contextual Science subjects, with examples of these being given of Physical Science (encompassing Physics and Chemistry with two standards each) and Natural Science (encompassing Biology and Earth and Space Science with two standards each).

8. Option C was presented as the General Science subject, along with four Contextual Science subjects of Physics, Biology, Earth and Space Science, and Chemistry, each with four standards.

9. In the analysis of feedback in this report, the PSL Feedback Report has been considered. Overall the PSL Feedback Report indicates strong support for the Ministry contemplating further alternative options for NCEA Level 1 Science. The character of feedback was in general in concord with the feedback in this report.

Approach

Feedback Questions

10. The online questionnaire on the Ministry website has four areas for feedback:

    a. Which is your preferred option and why?

    b. Feedback on Option A (one subject). Please consider:

- What are the positives and negatives of this option?
- Do you believe it meets the seven criteria, particularly the vision of NCEA Level 1 as a broader, foundational qualification?
- If this approach is finalised, what could the Ministry and Subject Expert Groups do to ensure all schools are able to teach Science effectively?

c. Feedback on Option B (three subjects). Please consider:

- What are the positives and negatives of this option?
- Do you believe it meets the seven criteria, particularly the vision of NCEA Level 1 as a broader, foundational qualification?
- If this approach is finalised, what could the Ministry and Subject Expert Groups do to ensure all schools are able to teach Science effectively?
- For this option, what would you think would be the best combination of contextual strands to incorporate into each of the two subjects?
- The example above suggests Physics and Chemistry make up one subject matrix and Biology and Earth and Space Science the other. Would different combinations fit together more naturally (e.g. Chemistry and Biology)?

d. Feedback on Option C (five subjects). Please consider:

- What are the positives and negatives of this option?
- Do you believe it meets the seven criteria, particularly the vision of NCEA Level 1 as a broader, foundational qualification?
- If this approach is finalised, what could the Ministry and Subject Expert Groups do to ensure all schools are able to teach Science effectively?

11. The online questionnaire feedback was exported into an Excel sheet. This serves as the original copy of responses for cross reference and verification when drafting the intended Ministry documents.

Analysing the data

12. Preference of options was quantified where an actual ranking was provided. This was only done where language clearly indicated a different level of preference for each option; where this was not clear, only first preference was able to be discerned. Preference was coded as;

    a. 1 – preferred option as selected in feedback field 1

    b. 2 – second preference based on feedback in feedback fields 2-4

    c. 3 – third or least preferred based on feedback in feedback fields 2-4

13. The responses to feedback fields were then coded and analysed for themes based on thematic language and tone.

14. Given the volume and the similarity of the answers from the respondents, it was logical to lay out the themes based on overall trends and then by individual options, as opposed to an analysis by feedback field. This also enabled the feedback received via email to be analysed alongside the questionnaire responses, even when it did not follow a similar structure.

Report structure

15. This paper is divided into the following:

    e. General Overview and themes;

    f. Option-based analysis

        i. Level of Support

        ii. Quantity of Feedback

        iii. Discussion of themes

    g. Next Steps

16. Please note that the content in this report does not reflect the opinions of the authors. The report aims to thoroughly and accurately reflect the views presented during public consultation.

General Overview

17. As at 10 August 2020 965 responses had been submitted. These are broken down by preference below. Rank preference 1 is the preferred option (in field 1 respondents were explicitly asked their preference of the 3 options). Rank preference 2 and 3 are based on the respondents' responses to fields 2-4 which asked for feedback on each of the separate options.

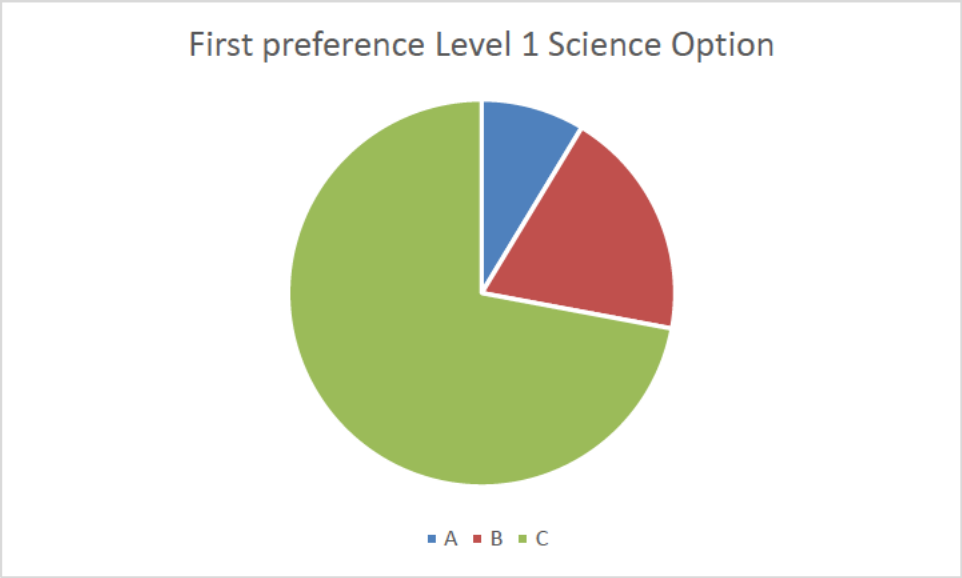
18. Ranking preferred options was not applicable for every response, as many did not include feedback for each option, or the remaining two options were equally preferred. Therefore, ranking was only possible when the respondents demonstrated a clear second and third preference in their comments.

Rank preference	1	2	3
Option A	83	68	361
Option B	185	343	16
Option C	691	41	75
Total	965		

83 respondents ranked Option A as their first preferred option, 68 as their second preferred option, and 361 as their third or least preferred option.

185 respondents ranked Option B as their first preferred option, 343 as their second preferred option, and 16 as their third or least preferred option.

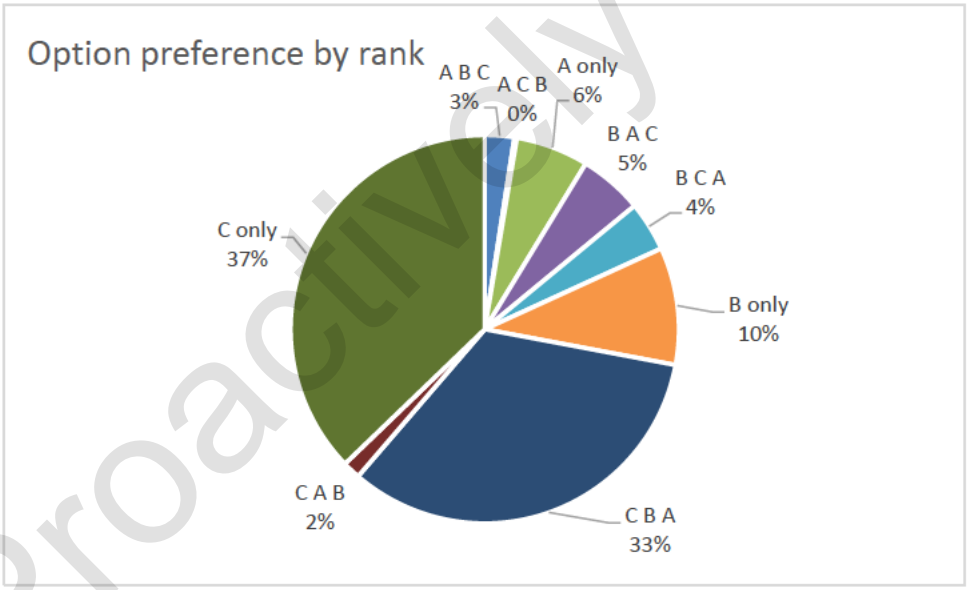
691 respondents ranked Option C as their first preferred option, 41 as their second preferred option, and 75 as their least preferred option.



19. There were clear relationships between the first preference option and the second and third/least preferred options (or lack of a second and third/least preference). Approximately half of those who preferred Option C indicated Option B was their second preference, with low regard for Option A.

20. Those who preferred Option B were split approximately in half with having a second preference of Option A or C, or only preferring Option B.

21. This was similar to those who preferred Option A, with the exception that only a quarter of those who responded as preferring option A as having a second preference of Option B, and none who preferred Option A had a second preference of Option C.



Demographics

22. Respondents were asked to select who they were submitting feedback as – student, parent, teacher, tertiary representative, or industry representative. However, due to a technical fault this data was not recorded on responses before 1 July 2020. 513 responses have the demographic data associated with them.

23. Of the responses with available demographic data, 455 indicated they were a teacher, 45 parents, 13 students, 10 tertiary education representatives, and 5 industry sector representatives. These categories

were not mutually exclusive, and 14 respondents submitted both as a parent and teacher, 2 as a parent and tertiary education representative, 1 as a parent and industry sector representative, and 1 as a student and teacher.

24. It can be assumed that the overall makeup of respondents follows similar trends as to those whose demographic data was recorded. This shows that the overwhelming majority of respondents were teachers, and so this engagement is most likely to reflect the views of the teaching profession.

Group responses

25. There were four pre-written responses that were submitted more than three times each. All these "shared" responses were in support of Option C, with secondary support for Option B. One standard response in particular was submitted five times from a specific school.

26. Submissions on behalf of Tokona te raki – Māori futures collective, and CSTA – Canterbury Science Teachers Association were also received through the online engagement survey. CSTA also submitted separate feedback via email which was also considered as part of this analysis.

27. NZIP – the New Zealand Institute of Physics submitted their response via email, outside of the online engagement survey. This feedback was considered as part of this analysis.

28. Some responses indicated that they were on behalf of a group through the use of 'we' and 'us', but were not explicit as to who they were representing as a group in their response. Through this, and the use of pre-written responses that were circulated, it is impossible to know how many individuals these responses represent. Taking these factors into consideration, our quantitative analysis counts each response as a single item, but have attempted to weight those responses on behalf of a group in the qualitative analysis.

Feedback on the engagement structure

29. Some respondents had an issue with being asked to comment on the three Level 1 Science options without knowing what Science would look like at Levels 2 and 3. They lacked clarity about students' pathways through Science in a future NCEA, so displayed a lack of confidence in sharing definitive views. There was criticism that is was unreasonable to seek feedback on all options without more detail as to what any new Level 1 standards would cover.

30. There was also some criticism towards the Subject Expert Group (SEG) and the Ministry of Education regarding how they engaged with the Science community on changing the subjects currently offered. This was general criticism with specific feedback on a range of different aspects of the RAS work and PSL engagements.

7 Criteria

31. The engagement with whether each option fit the 7 criteria of a Subject at Level 1 under the vision for NCEA being a broader, foundational qualification was low. The criteria were often used to discredit Option A, but were not often considered for Option B or C. Those who chose Option C were more likely to disagree with the concept of the 7 criteria more broadly. In this way there is a lack of engagement with the rationale for the changes in the Subjects for NCEA within Science within the feedback overall.

32. These criteria were provided as part of the survey as below;

    1. How the subject fits with the policy vision of a **broader, foundational NCEA Level 1 with increasing specialisation at Levels 2 and 3**.

    2. The extent to which the subject **supports the inclusion of important and rich learning from the National Curriculum**, with as little overlap as possible.

3. The extent to which the subject **supports coherent and robust pathways into NCEA Level 2 and further study or training.**

4. The extent the subject contributes to supporting schools to **create well designed and coherent local curricula, which support pathways for individual learners.**

5. Demand for a subject and the sector's capability to deliver the subject.

6. How the subject **supports the Crown's obligations under Te Tiriti o Waitangi.**

7. How the subject **supports the credibility of NCEA as a qualification overall among stakeholders,** including its credibility as an internationally recognised qualification.

33. There was also different interpretations of 'broader, foundational' in the context of the Science Options. Some interpreted it as supporting a broader range of options available to be assessed as per Option C, which would then provide foundations into the continued specialisation in Levels 2 and 3. This interpretation indicates that there was a different understanding of the 7 Criteria and proposed changes to Science compared to that of the Ministry.

Overarching Themes

Pathways

34. There was a great volume of concern for students' pathways and which option would best serve students in preparing for Science subjects at Levels 2 and 3 and support student retention in the subjects.

35. There was a concern from those who did not prefer option A that having only a general Science matrix would create too great a jump in knowledge to specialised Science Subjects at Level 2 and 3.

36. Those who preferred Option A and B were concerned about the potential narrowing of pathways for students when multiple Science subjects were taken at Level 1. This was taking the broader suite of subjects a student could be taking at Level 1 into consideration, stating that those students who wanted to undertake the full suite of subjects under Science would have little space to choose other subjects, limiting pathways at an early stage.

Nature of Science

37. There was broad support for the inclusion of a set of general Science standards that focused on the Nature of Science (NOS). However, the NOS standards were sometimes described as being too 'vague' and not sufficiently related to the separate contextual strands of science available at Level 2 and 3. Some feedback suggested the emphasis on NOS in Option A devalues the importance of the contextual strand specific knowledge being taught currently.

38. Although NOS was seen as important, within Options B and C the NOS standards had the potential to be ignored in favour of specialist standards which would be closer to the current Achievement Standards with prescribed content.

39. In responding to Options A and B, comparisons were drawn between how Science and other Learning Areas were treated in the original Provisional Subject List. There was a perception that other Learning Areas with the same breadth in content (such as Social Sciences) were not collapsed down to as few subjects as Science at Level 1, and so the 7 criteria were not seen as being applied equitably.

40. There was a perception that the proposed changes to Science were 'change for change's sake' and that the current configuration of Level 1 Science in NCEA meets the 7 criteria adequately.

Workforce

41. There were concerns that removing Science specialisation at Level 1 would impact the workforce as specialist teachers would no longer being required.

42. There were also concerns about how confident specialist teachers were in teaching Science contextual strands outside of their own speciality. The implication is that if Option A or B were to be implemented, some teachers would struggle to teach outside of their speciality.

43. The draft general Science standards include a te ao Māori focus, and some feedback raised concerns with the current level of knowledge of te ao Māori within the science teacher workforce, and whether this could be taught authentically. However, there was wide general support for its inclusion.

Implementation

44. There was a concern in particular for Options A and B as to how these new options would be implemented. A strong theme in the feedback was the need for significant PLD to support any change in the way subjects were grouped in Level 1 science.

45. Another strong theme under implementation was that with more subjects (and therefore more standards) available, students are likely to sit more standards. It was frequently mentioned that Option A will have 'less marking'. This ties back to the concern of teachers as to how any potential NCEA changes could impact on workload and wellbeing of the science teaching profession.

46. The desire to create tailored courses came through strongly in those that preferred Option C, however some responses considered this only feasible at large schools with a large pool of specialist teachers. Conversely, Option A could greatly benefit smaller schools with a smaller pool of specialist teachers.

47. Consistent feedback on all options was their impact on continuity for students who transfer schools part-way through the year. For Option A, if the same standard was being undertaken with a different focus, this may negatively affect a student. For Option B and C, if certain standards were not offered, as with the current system, this may cause students to be unable to complete work towards a standard they were undertaking previously.

Option A

Level of Support

48. Option A received the least support, especially from those who identified option C as their preference. While a small minority of respondents, those who preferred Option A were very enthusiastic about the shifts the NOS standards signal for Science teaching and learning at Level 1. Some respondents acknowledged that the NOS standards had merit, but would need to be supplemented by other contextual standards to work for them. Overall, perceptions of a single subject at Level 1 (Option A) were negative, compared to Option B and C.

Quantity of feedback

49. 83 responses selected option A as their preferred option. 68 responses indicated that option A was their second preferred option.

Themes

Limiting

50. Option A was seen as limiting by those who did not prefer it. This was viewed as both limiting high-achieving students, as well as limiting pathways generally.

51. It was also seen as limiting the breadth of knowledge able to be taught to students by only having 4 standards available. This was perceived as having the potential to create gaps in students' knowledge when moving to Level 2 and 3 science specialisations.

Too broad

52. By not having specified standards for the various strands of Science, some who were not in favour of Option A felt that this option was too broad. It was suggested that specialist teachers may find Option A difficult to teach and so some strands within Science may be at risk of not being taught well due to limited teacher knowledge. If option A were to be implemented, significant PLD resources and support would need to be provided to ensure that all science teachers could teach this course effectively.

53. Schools using different contextual strands as contexts for the NOS assessments raised the question of consistency of assessment across schools. Due to the broadness of possible interpretations of the NOS standards, there were concerns about inconsistency and inequity for students depending on how the standards were delivered.

Comparison to international standards

54. A number of respondents drew comparisons to the teaching of Science overseas, noting that Option A would not keep up with international standards of Science teaching. There was also concern that Option A would impact NCEA's credibility as a qualification internationally. Comparisons were drawn to other countries' structuring and assessment of contextual strands within Science, such as the GCSE qualification undertaken in England, with the ability to assess contextual strands separately being upheld as best practice.

Skills

55. There was criticism from those who disliked Option A that this option focuses too much on the skill of literacy. However, there was some appreciation for how Option A would increase critical thinking, despite the perceived lack of grounding in contextual strand specific skills and knowledge.

56. Rote learning within Science would be limited under Option A. Some saw this as being a negative, as they perceived rote learning to be a valuable and important skill within sciences. Others saw this as positive, as they considered understanding NOS to be of greater importance.

Difficulty

57. There was feedback that Option A would reduce how challenging Science is for students. This was stated to have the potential to prevent students becoming interested in science and therefore reduce achievement rates.

School timetabling

58. Reducing the range of different Science classes offered by a school by providing only 1 Science matrix would free up timetable slots to allow students to take more Subjects outside of Science. This is a positive for small schools, as they would not require as many specialist teachers to cover the range of Level 1 Science Subjects.

Foundational, broad and integrating

59. For those who supported Option A, it was hailed as being foundational, broad and would incorporate all contextual strands of Science at Level 1. It would encourage the educational sector to think beyond what is currently offered and adapt to teach all the contextual strands of Science.

Option B

Level of Support

60. Support for Option B as a first choice was lower than that for Option C, but it was often the second preference for those who chose Option C. Option B did not attract as many comments, and these comments were less passionate in nature compared to those of A and C. Option B was seen as a compromise between what the Ministry initially suggested in the Provisional Subject List engagement,

and what many in the teaching profession preferred; something similar to the status quo. The level of acceptance of this as a favourable compromise varied.

Quantity of feedback

61. 185 responses selected Option B as their preferred option. 343 responses indicated that option B was their second preferred option.

Themes

Strands of Science

62. Option B was seen to more effectively weave the contextual strands of science together than Option C while also enabling an element of specialisation. This could mitigate the 'siloing' of the strands of science some respondents recognised as the case at Level 1 currently.

63. Significant feedback was received about the possible combination of subjects in Option B. A common suggestion was Physics/ESS and Chemistry/Biology. Some of this feedback was related to how academic each subject is currently perceived and this new split was thought to be more balanced.

64. Some respondents rationalised this as Biology/ESS could be perceived as the easier subject to achieve over Physics/Chemistry. This discrepancy in perceived difficulty could then be used to stream students within a school.

65. Some feedback suggested Option B was artificially combining subjects as a compromise. Some felt that ESS was not required, and was not as important as Physics, Biology and Chemistry. These respondents proposed a further option with 4 separate subjects comprising the general Science standards and these 3 subjects. This feedback almost entirely came from those who selected Option C as their first preference.

66. Some respondents sought the ability to combine the different strands of Science to better suit their school's needs for providing different combinations of contextual science strands to their students. This could be seen as the ability to 'mix and match' standards to create courses such as biochemistry, or astrophysics that some respondents' schools currently offer.

67. This preference was linked to the desire to have each standard developed under this option relate to one contextual strand only, so that they can be taught alongside standards from a different Science matrix without reference to multiple contextual strands.

School timetabling

68. As with the feedback for Option A, reducing the number of subject courses offered at a school by having fewer assessment matrices means students are able to take more subject courses outside of Science, while also being able to contextualise this learning. This again is especially important for small schools, as they would not require as many specialist teachers to cover a wide range of Level 1 Science Subjects that larger schools are able to offer.

Option C

Level of Support

69. There was the most support for Option C, which came across strongly in feedback. The perception of option C was positive compared to Option A and B. Option C was seen as most similar to the current status quo of subjects offered at Level 1 currently, which was seen as being comprehensive and adequate for assessing Science more broadly as well as the separate contextual strands.

Quantity of feedback

70. 691 responses selected Option C as their preferred option. 41 responses indicated that Option C was their second preferred option.

Themes

Status quo

71. There was a strong level of support for this option as it resembles the status quo of Level 1 Science subjects. This was most comfortable for Science teachers, by minimising required alterations to current teaching and course offerings, this creates the least stress for schools in terms of changes to their offerings of Science at Level 1.

72. Some respondents were critical of how this option continues with the current framework of science subjects, which was perceived to have many issues with how it is implemented. This was seen as contrary to the new vision for NCEA.

73. Although some responses criticised the current state of subjects at Level 1 Science, Option C remained their preferred option due to maintaining the breadth of contextual strands while reducing the number of Achievement Standards for each subject.

Broad

74. Increasing the range of subjects available at Level 1 was interpreted as being broad by some who preferred Option C.

75. This interpretation of broad as many varied assessments was seen as an important part of designing Science courses within schools. It would allow flexibility in the mode of assessment (internal/external), gave students more choice in pursuing their specific passions within the Science learning area, and allowed the greatest ability to 'mix and match' standards to create specialised courses for students.

76. For those who did not prefer Option C, there was a perception that although it broadens the availability of content material, it narrows the focus to specific contextual strand knowledge too soon.

Streaming

77. Option C was seen as allowing schools to stream students by ability within Science, and this was seen as positive by some respondents and negative by others.

78. Streaming was seen positively by some as it allowed students to be challenged appropriately to their level and undertake assessment that they best performed under.

79. There was concern that Option C would enable and encourage streaming at schools. It was noted that streaming disproportionately affects Māori and Pacific students, frequently reducing their opportunities in science.

80. Conversely, some teachers valued the chance to stream students by Science ability and to run courses that focus on internal-only assessment, which Option C (and to a lesser extent Option B) would continue to allow.

ESS

81. As with some feedback on Option B, ESS was seen by some as not being required at Level 1, despite being one of the 4 contextual stands.

Student passion

82. Option C was seen as being flexible enough for course design to cater to diverse student needs and there was a strong emphasis on the importance of students focusing on what they enjoyed.

Comparison to international standards

83. Comparisons were drawn to how Science is taught overseas, in particular that Option C would better reflect international standards of Science teaching. There was concern that specialist knowledge needed to be taught from Level 1 to enable tertiary study and to maintain NCEA as a reputable qualification.

Next steps

84. All feedback has been analysed, and will be used to inform the technical report on Science Options.

We **shape** an **education** system that delivers **equitable** and **excellent outcomes**

He mea **tārai** e mātou te **mātauranga** kia **rangatira** ai, kia **mana taurite** ai ōna **huanga**

MINISTRY OF EDUCATION
TE TĀHUHU O TE MĀTAURANGA