



**Consultation Report**

**Draft Senior Secondary Australian  
Curriculum: Mathematics**



November 2012

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## Executive summary

### Background

The Australian Curriculum, Assessment and Reporting Authority (ACARA) is responsible for a national curriculum from Foundation to Year 12 in specified learning areas.

In December 2010, ACARA published the Foundation to Year 10 Australian Curriculum for English, History, Mathematics and Science. During 2010, draft curriculum content was also developed for 14 senior secondary subjects (four in each of English, Mathematics and Science, and two in History) and released for public consultation. From mid-2010 to December 2012, an iterative process of curriculum writing, consultation, feedback analysis, revision and refinement was conducted. The process included selected curriculum writers and advisors, and ongoing engagement with key stakeholder groups including state and territory education authorities, ACACA (Australasian Curriculum, Assessment and Certification Authorities), professional associations and academics.

Chapter 1 of this report provides more detail on the context for development of the senior secondary Australian Curriculum, and explains the development process over the two-year period.

The draft Senior Secondary Australian Curriculum: Mathematics was released as four subjects:

- General Mathematics
- Essential Mathematics
- Mathematical Methods
- Specialist Mathematics

### Methodology

The draft senior secondary Australian Curriculum was made available for nationwide consultation from 10 May to 20 July 2012.

There were two main avenues for formal consultation feedback: an online questionnaire on the consultation portal of the Australian Curriculum website, and written submissions sent directly to ACARA.

Feedback was directly sought on rationales and aims, structural coherence, coverage and clarity of content, clarity and coherence of achievement standards, and representation of general capabilities and cross-curriculum priorities.

Chapter 2 of this report provides more detail about the consultation methodology.

### Consultation demographics

Across all 14 senior secondary subjects (English, History, Mathematics, Science), 373 responses were received to the online questionnaire, including 114 for Mathematics. In addition to the questionnaire responses, 162 written submissions were received. Numerous written submissions addressed each of the four learning areas and the subjects therein.

Note that single responses often incorporated the views of many respondents.

The breakdown of online questionnaires for each subject is presented in Appendix 1.

All states and territories provided feedback on the draft curriculum either through the online questionnaire or via detailed written submissions.

Feedback was submitted by key stakeholders throughout Australia including:

- state and territory curriculum and school authorities
- peak bodies (such as teacher professional associations, government agencies and non-government organisations)
- schools
- individuals (teachers, academics, parents, members of the community).

Organisations that made written submissions are listed in Appendix 2.

## Key findings

The consultation feedback identified strengths common to all four Mathematics subjects:

- The draft consultation versions of the senior Mathematics subjects are much improved on previous versions
- The writers have taken on board feedback and suggestions from previous consultation
- There is coherence in the structure of the subjects
- The inclusion of the comprehensive glossaries is useful for both teachers and students
- The Mathematics subjects are rigorous and provide a sound basis for further study

Specific areas for improvement across all four mathematics subjects were also identified:

- The content descriptions of 10A that would be desirable for the senior mathematics subjects have not been made clear
- The amount of content in each subject will make it difficult to teach the content in depth in the available time
- There is too much statistics included in all of the Mathematics subjects
- The degree of specificity of the content descriptions should be consistent both within and across subjects
- There is lack of clarity about the use of ICT in mathematics subjects
- The descriptions of general capabilities and cross-curriculum priorities were not clear and explicit in the Organisation sections of the curriculum

These broad concerns became the focus of review and refinement, along with concerns identified specific to each of the four mathematics subjects.

Strengths and areas for improvement identified in the consultation feedback as being specific to General Mathematics, Essential Mathematics, Mathematical Methods and Specialist Mathematics are described in Chapters 4 to 7 respectively of this report.

# 1. Background information

## 1.1 Context for senior secondary curriculum development

The draft curriculum was developed according to a set of design specifications that were approved by the ACARA Board following consultation with state and territory curriculum, assessment and certification authorities. These are published in ACARA's *Curriculum Design Paper (v3.0)* (2012) (see [www.acara.edu.au/curriculum/development\\_of\\_the\\_australian\\_curriculum.html](http://www.acara.edu.au/curriculum/development_of_the_australian_curriculum.html))

The design specifications build on:

- a) the *Senior Secondary Years Position Paper* that was subject to national consultation in 2009
- b) discussion of senior secondary curriculum in the *Shape of the Australian Curriculum (v3.0)*, which included reference to overall characteristics of the senior secondary Australian Curriculum.

The senior secondary Australian Curriculum specifies content and achievement standards for 14 senior secondary subjects across English, History, Mathematics and Science. Content refers to the knowledge, understanding and skills to be taught and learned in each subject. Achievement standards refer to descriptions of the quality of learning (the depth of understanding, extent of knowledge and sophistication of skill) expected of students who have studied the content for the subject.

The senior secondary Australian Curriculum for each subject has been organised into four units. In each subject, Units 3 and 4 are designed to be developmentally more challenging than Units 1 and 2. Each unit is designed to be taught in approximately half a school year (approximately 50–60 hours' duration including assessment and examinations). This design enables flexibility in the delivery of the four senior secondary units so that they may be studied singly in half a year, as two units over one year, or as four units over two years.

Each subject is clearly organised with a rationale, aims and learning outcomes to which the content and achievement standards are written.

The rationale for each subject:

- describes the nature of the subject in general terms and outlines how learning in the subject relates to the contemporary world and current practice
- explains the place and purpose of the subject, how learning in the subject is valuable, and how it contributes to meeting the national goals of schooling
- is consistent with the Foundation – Year 10 learning area rationale.

The aims for each subject present high-level statements of the major purpose of the subject and the intended developments in student learning.

The learning outcomes for each subject broadly describe what a student is expected to have learned as a result of studying the specified content. They describe the major dimensions of content, namely the knowledge, understanding and skills required by the subject.

Together with the content and achievement standards, the learning outcomes for each subject provide sufficient detail for:

- a) teachers and students to know what is expected to be taught and learned
- b) state and territory authorities to set assessment and certification requirements.

## 1.2 Key stages in the development process

The key stages, development criteria and roles/responsibilities are outlined in ACARA's *Curriculum Development Process (v6.0)* which has been published on the authority's website. The process is summarised in the following timeline.

February–March 2011

- Review of final report from the 2010 consultation on senior years' curriculum content along with key stakeholder (authorities, professional associations and universities) submissions to identify the major issues in relation to the curriculum content
- Preparation of conceptual models for senior secondary achievement standards and an options paper for consideration by an achievement standards reference group

#### April 2011

- Consideration of senior secondary curriculum design and structural elements
- Discussion of a preferred option for development of senior secondary achievement standards
- Analysis of relevant state and territory documents regarding achievement standards, subject-specific 'grade' or equivalent-level descriptors, and related policy expectations

#### May 2011

- Drafting of senior secondary Australian Curriculum (particularly rationale, aims, units, content descriptions) by writers and advisory groups
- Advice from ACACA regarding plans to develop achievement standards and proposals for redrafting the curriculum and the draft senior secondary curriculum design paper

#### June–July 2011

- Draft curriculum materials presented to national panels for feedback

#### August–October 2011

- Analysis of national panel feedback
- Revision of the draft curriculum in response to feedback and in light of concurrent work to develop the achievement standards
- Circulation of the draft curriculum to state and territory authorities for reviewing prior to the next round of national panels

#### November–December 2011

- Further round of national panel meetings to inform ongoing review of the curriculum

#### August–December 2011

- Research into current standards in equivalent subjects in states and territories
- Development of possible model/s for achievement standards and subsequent drafting of achievement standards for each subject
- Advice from Achievement Standards Reference Group, ACARA's F–12 Curriculum Reference Group, and ACACAs

#### January–February 2012

- Continuing review of the curriculum with assistance of critical reviewers, content experts and advisory groups

#### March–April 2012

- Preparation of the next draft of the curriculum for a further round of national panel review
- Bilateral meetings with each state and territory curriculum authority
- Subsequent revision in consultation with advisers and writers to prepare consultation draft for approval for national consultation

#### May–July 2012

- Release of draft curriculum for national consultation on the Australian Curriculum consultation website from 10 May to 20 July
- Continuing engagement with expert groups, advisory groups and national panels



- Review of national and international information on achievement standards

#### July–August 2012

- Comparisons of the draft curriculum with comparable curriculum offerings in selected international jurisdictions

#### August–October 2012

- Finalisation of senior secondary consultation feedback reports
- Concurrent analysis of significant concerns and suggested areas for improvement drawn from the initial feedback analysis, with particular attention given to state/territory authority submissions
- Reviews by international experts and a desktop mapping analysis of similarities and differences between the Australian Curriculum and international curricula
- A further round of national panel meetings (6 to 11 September 2012) to assist advisory groups and writers to further revise and refine the curriculum
- Consultation data analysed and appropriate revisions made to the curriculum
- Senior secondary Australian Curriculum forwarded to the ACARA Board for approval

#### November–December 2012

- Curriculum submitted to AEEYSOC (Australian Education, Early Childhood Development and Youth Affairs Senior Officials Committee) for consideration in November
- Endorsement at SCSEEC (Standing Council on School Education and Early Childhood) meeting of 7 December for publication

## 2. Methodology

### 2.1 Consultation processes

The draft senior secondary Australian Curriculum was made available for nationwide consultation from 10 May to 20 July.

There were two main avenues for formal consultation feedback:

- an online survey on the consultation portal of the Australian Curriculum website, where respondents completed a rating scale for each question and were able to write a comment
- written submissions sent directly to ACARA.

The online survey comprised a mixture of rating-scale questions (four-point Likert scale) and space for comments that focus on suggestions for improvement. Feedback was sought on the:

- rationale, aims and coherence of the unit structure for each subject
- coverage and clarity of curriculum content
- clarity and coherence of the achievement standards
- representation of general capabilities and cross-curriculum priorities.

All online survey questions are included in Appendix 1.

Written submissions were received from state/territory education authorities, professional associations and other stakeholders. These typically offered more detailed feedback than was possible via the online survey. Respondents were requested to complete a cover sheet that contained space to record basic demographic information to assist in the collation and analysis of responses.

Opportunities to provide feedback either via the online survey or by written submission were promoted on the ACARA website and through education authorities, professional associations, and academics in the field of education. Reminders were regularly provided to subscribers through the online newsletter *ACARA Update*.

### 2.2 Feedback: gathering, analysis and reporting

**Quantitative data**, from the online survey, are presented in charts and tables throughout this report and in the appendices. All quantitative data were collated and analysed in spread sheets, from which charts and tables were produced. The methodology for the collection and analysis of the data is outlined below.

For rating-scale questions, the frequency of responses for each rating (strongly agree, agree, disagree and strongly disagree) was assigned a numeric value (for example, strongly agree – 4, agree – 3). Values were totalled, and a percentage was calculated for each category and displayed as a column graph.

Data analysis included breakdowns by state and territory for each question.

**Qualitative data** were outsourced to experts in research and data analysis. The data were gathered both from the comments in the online survey and from the written submissions, and were analysed using NVivo software. From responses to each question in the online survey, comments were categorised as ‘concerns’, ‘strengths’ and ‘suggestions’, with specific topic nodes developed within these three categories. Comments were analysed for recurring themes and general trends.

An identical coding procedure was used for the written submissions.

ACARA senior project officers also read and reviewed all the consultation feedback (quantitative and qualitative). They supplemented the qualitative analysis with reference to emphases and trends evident in the data, from their own critical analysis of the feedback.

For reporting purposes, the analysed data were organised according to the broad organisers for the survey- Rationale and Aims, Organisation, Content and Achievement Standards. Findings are reported against these headings in terms of strengths, areas of contention, and areas for improvement.

Analysis of specific elements of consultation feedback highlighted the usefulness of grouping issues raised in the feedback into several categories for response by ACARA, namely:

Category	Response
1. Broad and strong agreement and consistent with design brief and subject rationale	Addressed through revision of the documents
2. Identifies errors in content	Addressed through revision of the documents
3. Conflicting views about the issue and/or how to resolve it	Decision to be made by ACARA with advisors about how to address
4. Inconsistent with design brief and would require a change in design specifications	Noted, not addressed
5. Related to nature of integration and implementation	Best resolved by the state/territory during the process of integration

## 2.3 Quality assurance

Qualitative data were analysed externally by data analysis consultants to ensure greater objectivity. ACARA officers met with the researchers to discuss the results of the data and ways to make its presentation clear to the reader.

Findings from the data analysis were checked against submissions of major stakeholders such as curriculum, assessment and certification authorities, whose input typically represented the views of a number of respondents. This was to ensure no significant concerns were left unrecognised in the findings.

All consultation feedback, including written responses and online surveys, was archived to TRIM, ACARA's information management system. Data integrity checks were carried out to ensure that data were both accurate and relevant. All online data from the surveys were checked and duplicates were removed.

### 3. Consultation findings: across the Mathematics learning area

This section summarises the key strengths, some areas of contention or conflicting views, and areas for improvement that were identified in the consultation. There was also much commentary around implementation issues, which were not the prime focus of consultation.

#### 3.1 Consultation demographics: Mathematics

##### 3.1.1 Online questionnaires

Table 1: National representation of respondents by state across the Learning Area – online questionnaire

State/Territory	Number of questionnaires	Respondent group size
Australian Capital Territory	nil	
International	4	4
New South Wales	30	96
Northern Territory	nil	
Queensland	19	228
South Australia	2	2
Tasmania	nil	
Victoria	34	144
Western Australia	25	256
<b>TOTAL</b>	<b>114</b>	<b>730</b>

A breakdown of the quantitative data generated by the online questionnaire is available in Appendix 1.

### 3.1.2 Written submissions

A total of 150 written submissions were also received, again representing a number of respondents. As many of the submissions did not reference the number of participants, the respondent group size is unclear.

Table 2: National representation of written submissions across the Learning Area

State/Territory	Number of written submissions
Australian Capital Territory	9
New South Wales	21
Northern Territory	4
Queensland	22
South Australia	11
Tasmania	6
Victoria	31
Western Australia	16
National	30
<b>TOTAL</b>	<b>150</b>

The list of contributing groups, organisations and individuals can be found in Appendix 2.

### 3.2 Strengths

Respondents indicated that the draft consultation versions of the senior mathematics subjects were much improved on previous versions. It was noted that the writers had taken on board feedback and suggestions from the previous consultation. Respondents supported the intent of consistency in the format, rationales, aims and organisation sections for each subject. Comments were made by some respondents that there is coherence in the structure of the subjects.

Respondents indicated that the inclusion of the comprehensive glossaries would be useful for both teachers and students.

Many respondents commented on the potential of the mathematics subjects to be rigorous and a sound basis for further study.

A curriculum authority made the comment that:

*The combination of four courses caters for a diversity of needs and ability levels ...  
The topics that are to be taught are clear ... The topics and content of the courses  
are comprehensive ... (QSA)*

### 3.3 Areas for improvement

While some respondents were happy with the intent of the content, others stated that there is too much content in each of the subjects, which would make it difficult for the content to be taught in depth.

A number of respondents indicated that there was disproportionate weight given to statistics. Concerns were also raised as to the ability of teachers to teach the statistical content when this content was very new to most teachers. There was support for the inclusion of statistics in the content of the mathematics subjects, but a significant number of respondents were concerned about the amount of statistics in each subject. In a number of submissions it was argued that by including too much statistical content, the subjects have become overcrowded resulting in too much content to be taught in the time available.

While some respondents described the content descriptions as clear, others indicated that more detail was required in the content descriptions to clarify the depth of learning. Respondents indicated that there needed to be further clarity for each content description by the inclusion of examples and contexts.

### 3.4 Areas of conflicting views

Some submissions included statements about the role of 10A. One view was that the role of 10A as a prerequisite for the subjects should be stated at the beginning of the topics. Some respondents believed that the F–10 content alone should be sufficient to equip students for any of the senior mathematics subjects.

Many respondents stated that the focus of the achievement standards for the mathematics subjects should be on the quality of understanding and skills relating to the relevant content, while other respondents wanted more reference made to content. Some respondents indicated the need for greater differentiation between levels, and others were concerned that the 'A' and 'B' achievement standards were pitched too high.

## 4. Consultation findings: Essential Mathematics

### 4.1 Consultation demographics

This section summarises the consultation findings on the draft rationale, aims, organisation, content and achievement standards of the Essential Mathematics curriculum. Feedback from respondents largely endorsed the content and skills included in the subject.

#### 4.1.1 Online questionnaire

Table 3: National representation of respondents by state – Essential Mathematics online questionnaire

State/Territory	Number of questionnaires	Respondent group size
Australian Capital Territory	nil	
International	4	4
New South Wales	30	96
Northern Territory	nil	
Queensland	19	228
South Australia	2	2
Tasmania	nil	
Victoria	34	144
Western Australia	25	256
<b>TOTAL</b>	<b>114</b>	<b>730</b>

A summary of the quantitative data generated by the online questionnaire is available in Appendix 1.



### 4.1.2 Written submissions

A total of 33 written submissions were received, representing a number of respondents. As many of the submissions did not reference the number of participants, the respondent group size is unclear.

Table 4: National representation of respondents by state – Essential Mathematics written submissions

State/Territory	Number of written submissions
Australian Capital Territory	2
New South Wales	5
Northern Territory	1
Queensland	4
South Australia	2
Tasmania	1
Victoria	5
Western Australia	5
National	8
<b>TOTAL</b>	<b>33</b>

The list of contributing groups, organisations and individuals can be found in Appendix 2.

## 4.2 Strengths

There was strong support for the content of Essential Mathematics. Many respondents stated that the inclusion of content examples were generally appropriate and clarified what is to be taught. Some respondents made reference to the fact that it still gave them the opportunity to teach the content in a context suitable for their student cohort. A significant number of questionnaires and submissions indicated that Essential Mathematics is pitched at an appropriate level of difficulty.

## 4.3 Areas for improvement

A number of comments suggested that there is too much content in each unit to be taught in the allocated time. Other respondents indicated that the pitch is too high for some of the intended cohort and that some jurisdictions may need to provide a subject below the level of difficulty of Essential Mathematics.

Some respondents believed there is repetition and duplication of both the content and the contexts, whereas others indicated that this was desirable and allowed students the opportunity to have content reinforced via a spiral curriculum.

### 4.3.1 Rationale, aims, organisation

Many respondents stated their support for the clarity of the rationale. There was less support for the clarity of the aims of each subject.

*The rationale for the course is good...(MANSW)*

Figure 1: Responses to Question 9. The rationale provides clarity about the subject’s broad scope, distinctive nature and importance – Essential Mathematics (n=17)

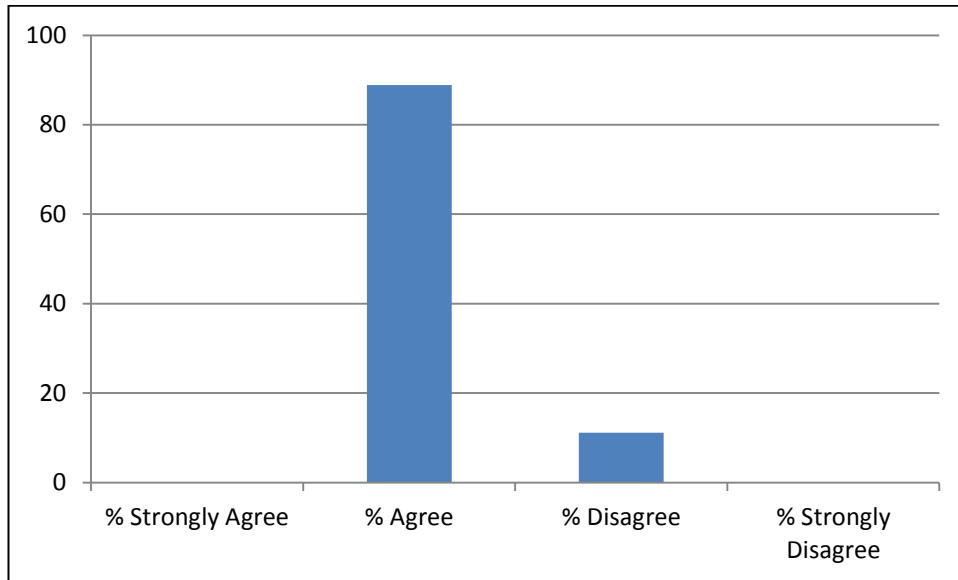
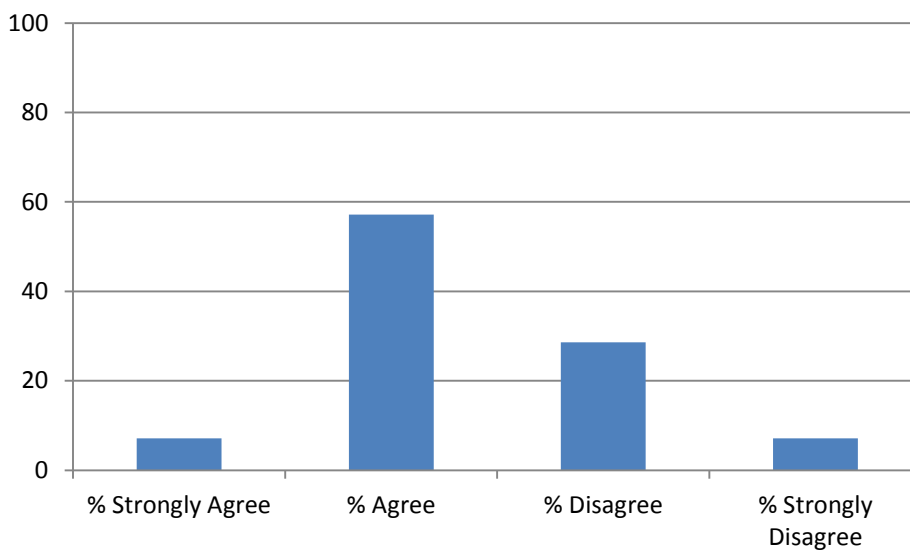


Figure 2: Responses to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject – Essential Mathematics (n=13)



Respondents indicated that there was logic and coherence in the structure of the units and that Units 3 and 4 were more cognitively demanding than Units 1 and 2. Some respondents could see the link with the F-10 curriculum.

Figure 3: Responses to Question 11. The four-unit structure has internal logic and coherence – Essential Mathematics (n=22)

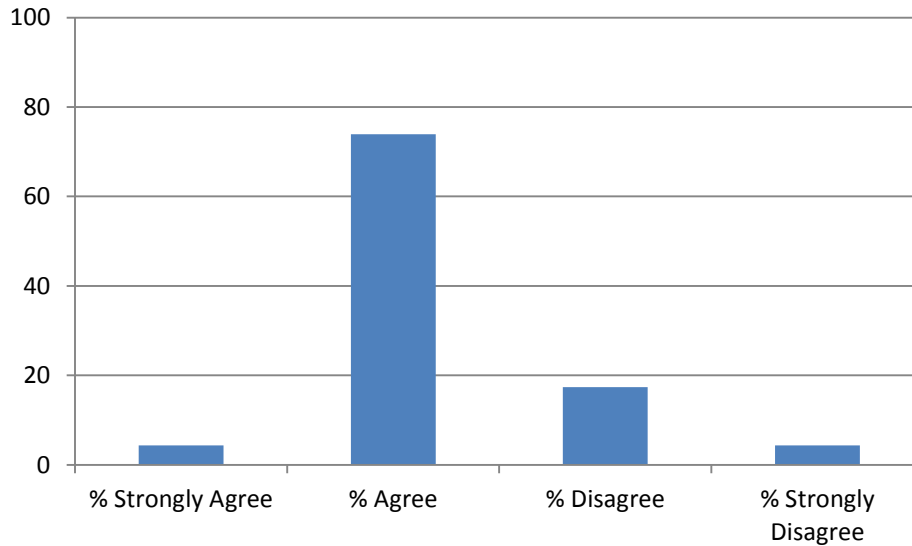


Figure 4: Responses to Question 12. Units 3 and 4 are more cognitively demanding than Units 1 and 2 – Essential Mathematics (n=21)

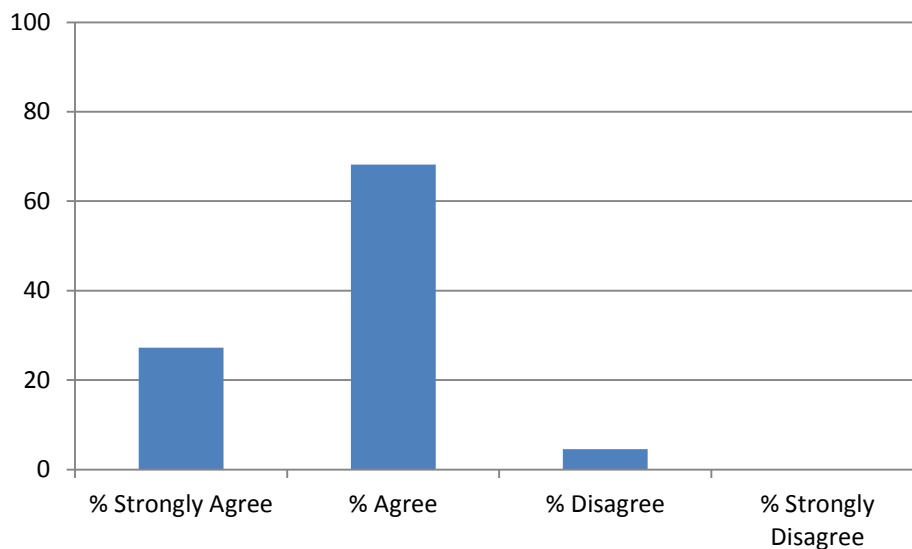
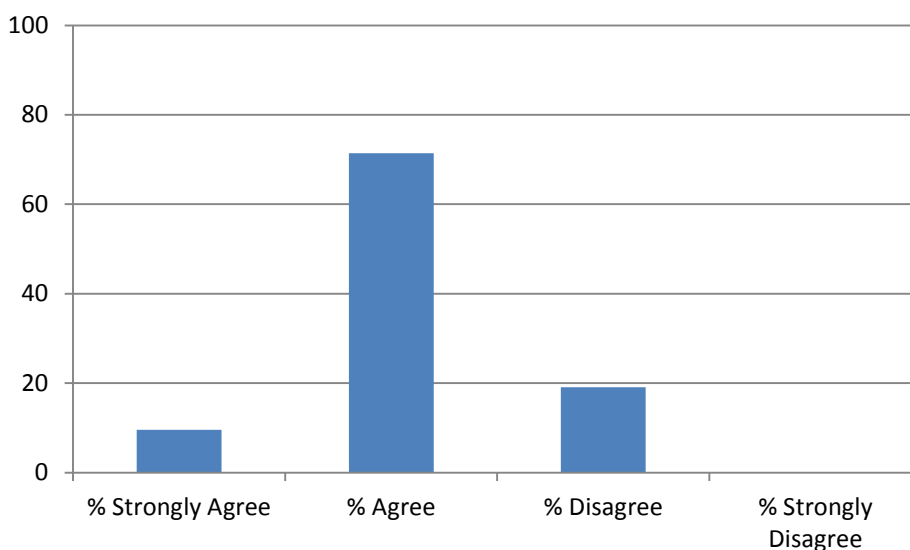


Figure 5: Responses to Question 13. There is a clear link between this senior secondary curriculum and the relevant F–10 Australian Curriculum – Essential Mathematics (n=20)



### 4.3.2 Content

Respondents indicated that the content was appropriate and relevant for the intended cohort. Most respondents endorsed the inclusion of the contextual examples to clarify the content. However, some respondents would have preferred more clarity in the specificity of the content to be taught.

*The content descriptions and examples provided are generally good and clarify what is to be taught... (AISWA)*

*In Essential Mathematics it was good to see the stated intention that content be taught in contexts relevant to students' needs and interests, and the relative emphasis on giving the students valuable life skills... (MERGA)*

*Positive features of Essential Mathematics include the focus on using mathematics to make sense of the world, the practical real life applications ... (MANSW)*

*There has been a significant improvement in this subject since previous drafts. In particular the rewriting of content descriptions which now do not specify the context in which the units are to be taught. The core content should be prescribed, but teachers should exercise their professional judgment in choosing contexts which suit their students' interests... (QSA)*

There were mixed responses about the amount of content. Most respondents felt that the amount of content could be taught within the allocated time because knowledge and skills were repeated in different content descriptions. Others, however, felt that there was too much content for the intended cohort.

Figure 6: Responses to Question 17. Unit 1 contains relevant and appropriate content (knowledge, understanding and skills) – Essential Mathematics (n=19)

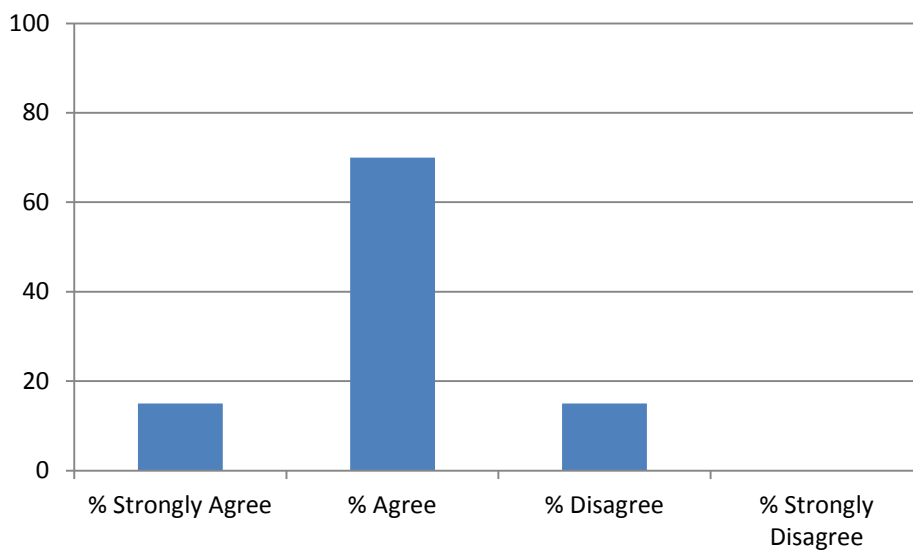


Figure 7: Responses to Question 22. Unit 2 contains relevant and appropriate content (knowledge, understanding and skills) – Essential Mathematics (n=20)

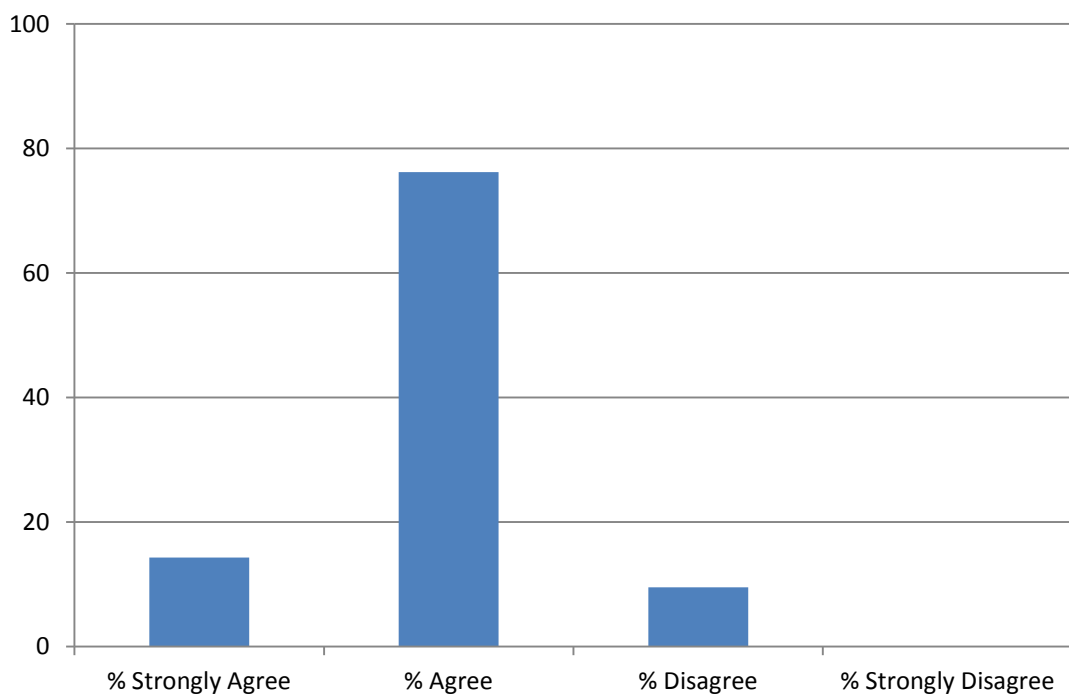


Figure 8: Responses to Question 31. Unit 3 contains relevant and appropriate content (knowledge, understanding and skills) – Essential Mathematics (n=18)

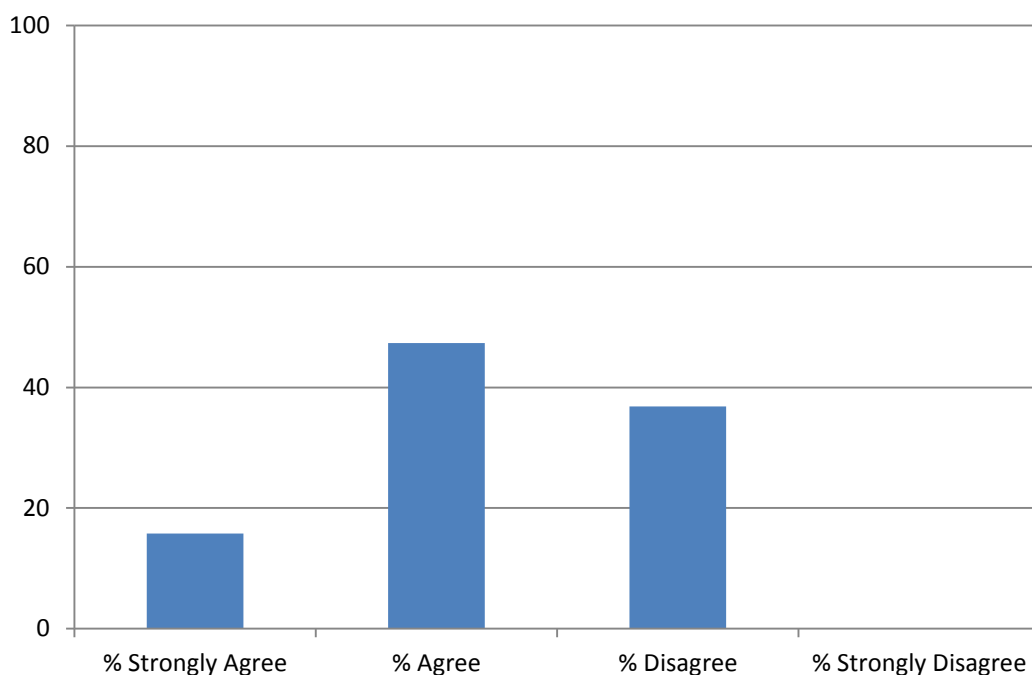
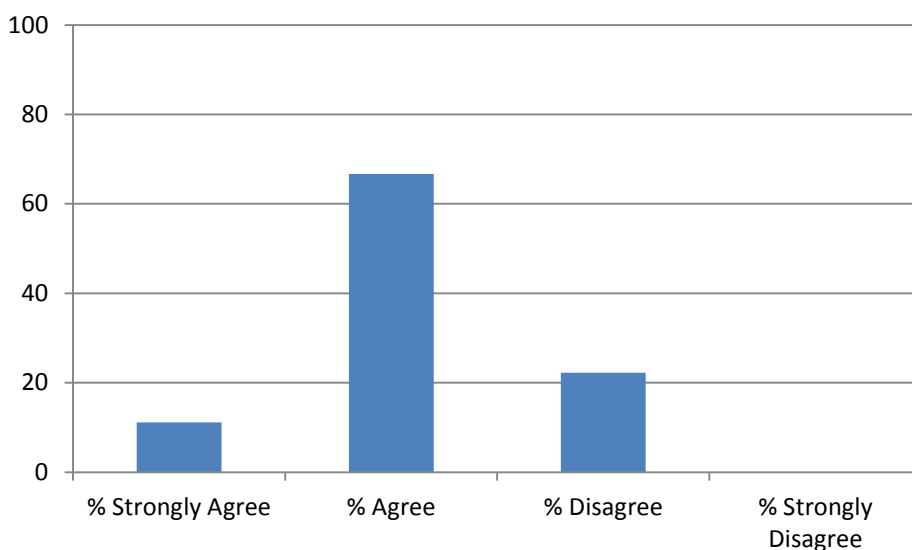


Figure 9: Responses to Question 36. Unit 4 contains relevant and appropriate content (knowledge, understanding and skills) – Essential Mathematics (n=18)



*There is repetition and duplication of both the content and the contexts ... (MAV)*

*The volume of content in the two years is far above what can reasonably be expected to be covered with deep understanding, especially in Units 2 and 3. Less content and more appropriate content is preferred... (QSA)*

### 4.3.3 Achievement standards

Respondents indicated their recognition of the alignment between the aims, learning outcomes, content and the achievement standards, but they were not in agreement with the progression of skill development.

Figure 10: Responses to Question 25. Achievement standards for Units 1 and 2: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions – Essential Mathematics (n=17)

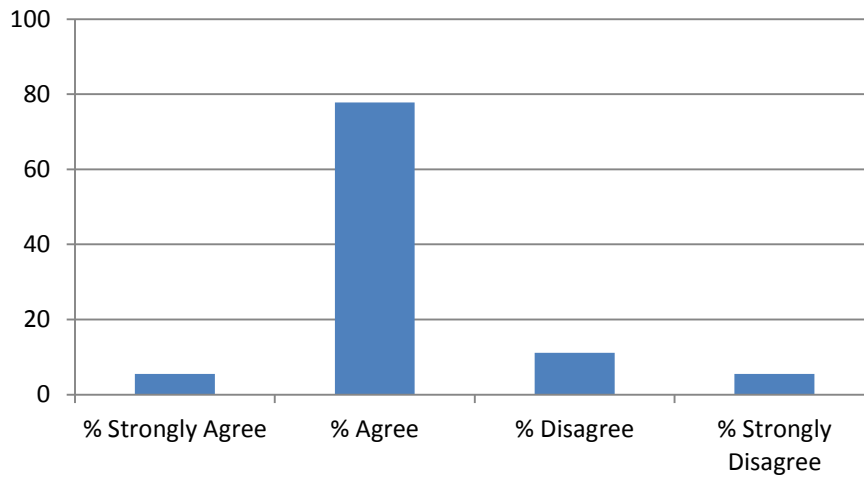
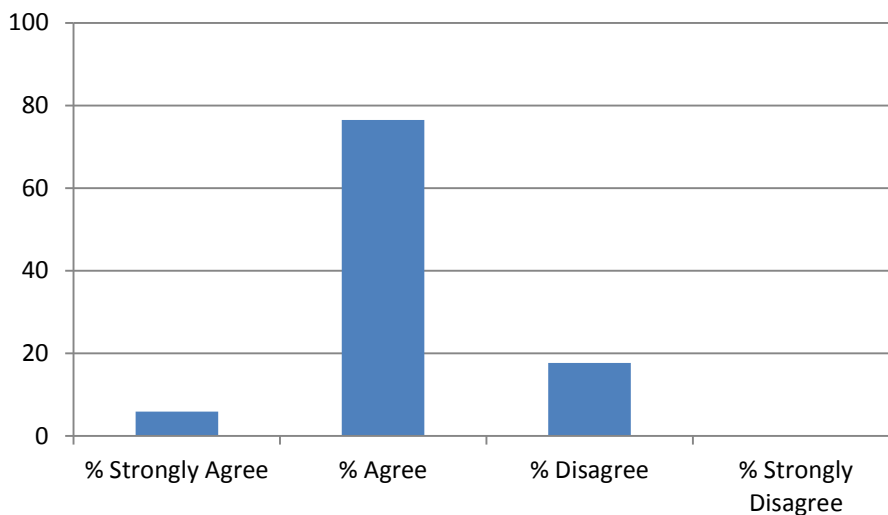


Figure 11: Responses to Question 39. Achievement standards for Units 3 and 4: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions – Essential Mathematics (n=16)



*There was general agreement that the achievement standards were useful but concerns were raised over how these would be interpreted by teachers ... (MERGA)*

*Some students will not meet the E standard ... (ACT)*

*It is a difficult task to write achievement standards and the standards including reasoning and communicating has improved these standards from previous drafts ... (MANSW)*

## 5. Consultation findings: General Mathematics

### 5.1 Consultation demographics

This section summarises the consultation findings on the draft rationale, aims, organisation, content and achievement standards of the General Mathematics curriculum. Feedback from respondents largely endorsed the content and skills included in the subject.

#### 5.1.1 Online questionnaire

Table 5: National representation of respondents by state – General Mathematics online questionnaire

State/Territory	Number of questionnaires	Respondent group size
Australian Capital Territory	nil	
New South Wales	7	24
Northern Territory	nil	
Queensland	6	68
South Australia	nil	
Tasmania	nil	
Victoria	11	46
Western Australia	5	65
International	1	1
<b>TOTAL</b>	<b>30</b>	<b>204</b>



### 5.1.2 Written submissions

A total of 32 written submissions were received; representing a number of respondents. As many of the submissions did not reference the number of participants, the respondent group size is unclear.

Table 6: National representation of respondents by state – General Mathematics written submissions

State/Territory	Number of written submissions
Australian Capital Territory	2
New South Wales	5
Northern Territory	1
Queensland	4
South Australia	2
Tasmania	1
Victoria	5
Western Australia	4
National	8
<b>TOTAL</b>	<b>32</b>

The list of contributing groups, organisations and individuals can be found in Appendix 2.

### 5.2 Strengths

Respondents indicated that General Mathematics was a well-designed and appropriate subject for the intended cohort. Many commented that the choice of content was well balanced and provided a variety of mathematics that would encourage students to take a mathematics subject in the senior years.

*Well designed and appropriate subject for the right cohort ... (AISWA)*

*Good choice of topics for this cohort of students ... (School Mathematics Faculty)*

### 5.3 Areas for improvement

Some respondents expressed concern that the subject contained no study of probability or of shares. They stated that these topics were relevant for students' knowledge at this level of study.

*Many of the business topics from the SACE Maths Apps course are included but not Shares, which is surprising considering they feature in the financial planning of many ordinary Australians ... (MASA)*

Some respondents stated that the subject was pitched too high for the intended cohort and that this may push students into studying Essential Mathematics, which could be too easy for them.

*ACARA's General Mathematics Course appears to be too demanding for the typical student currently studying the NSW HSC General Mathematics Course. We fear that many of these students will eventually end up taking Essential Mathematics which will not provide sufficient challenge ... (MANSW)*

*Overall I believe that this course is designed with the expectation that students have successfully completed Year 10 ACARA. Based on the current cohorts taking SMA over the past number of years, this will be a huge challenge for our students, particularly when we consider the new (and more complex) formulae that they will have to learn ... (Qld Mathematics faculty)*

Some respondents were concerned that there is a lack of contexts through which statistics is to be taught and that the format of the Essential Mathematics subject should be replicated in General Mathematics.

*There is a lack of contexts through which the Statistics is taught ... (ABS)*

Most respondents stated that overall there was too much content to be covered in the allocated time. Most respondents stated their desire for students to have the time to study content in depth.

*There is some worthwhile and appropriate content in this course, but like the previous two courses described above, it has far too much content to cover ... (Head Teacher SA)*

*Only concern is completing this course. Is there too much content for the time available? ... (School Mathematics Faculty)*

### 5.3.1 Rationale, aims, organisation

There was general agreement that the aims and rationale were appropriate for this subject, but there were some respondents who would have preferred the content descriptions to better reflect the stated aims. There was a mixed response to the structure of the subject with some respondents agreeing with the sequencing, and others questioning the logic of the progression of the topics.

Figure 11: Responses to Question 9. The rationale provides clarity about the subject's broad scope, distinctive nature and importance – General Mathematics (n=16)

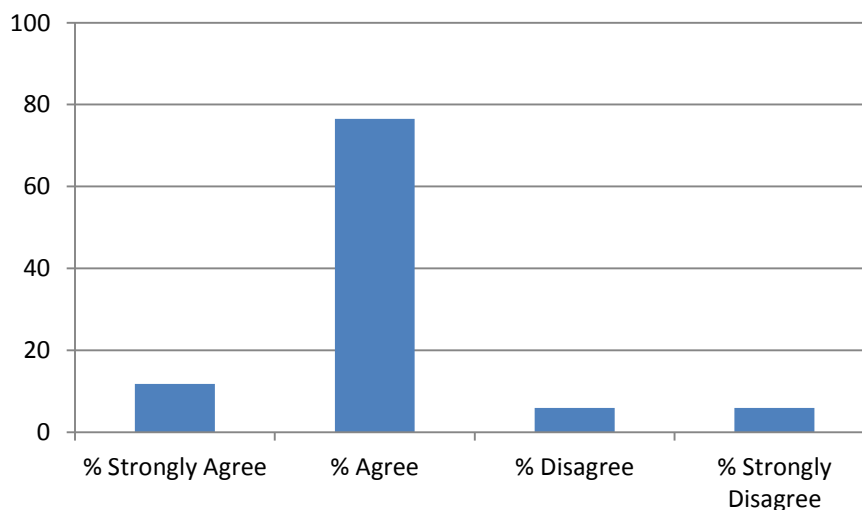


Figure 12: Responses to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject – General Mathematics (n=20)

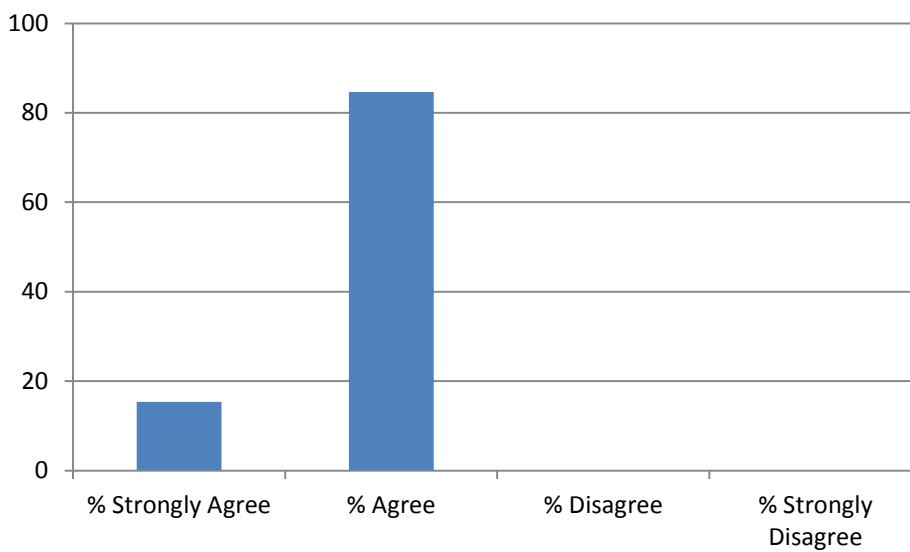


Figure 13: Responses to Question 11. The four-unit structure has internal logic and coherence – General Mathematics (n=22)

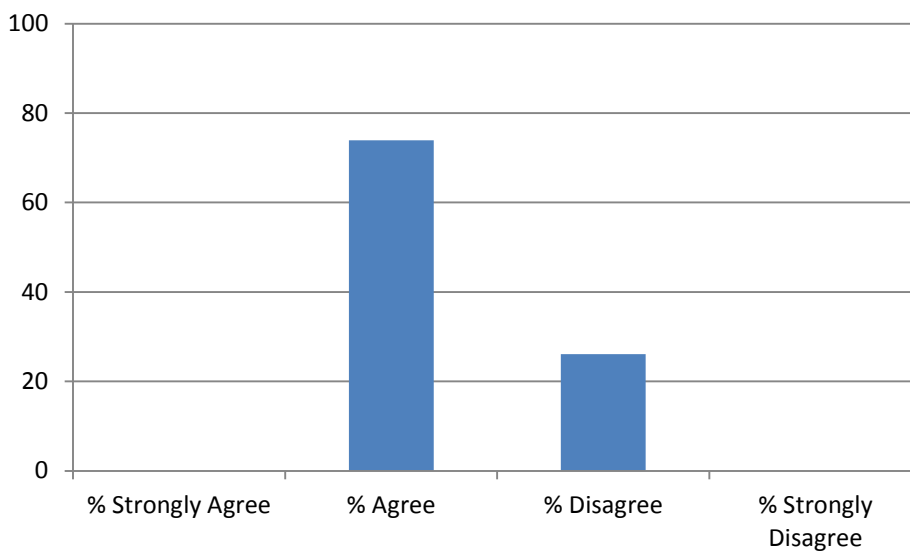
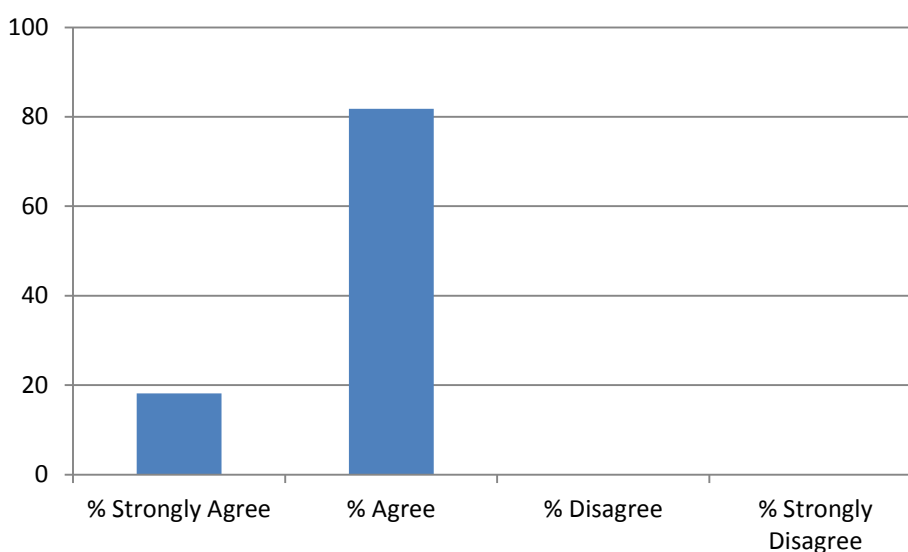


Figure 14: Responses to Question 12. Units 3 and 4 are more cognitively demanding than Units 1 and 2 – General Mathematics (n=21)



*Rationale provides clarity about scope, nature and importance of subject but the nominated audience is too high ... (ISQ)*

*The rationale refers to investigations of real world phenomena but this is not evident in the unit descriptions which for all courses tend to refer only to content ... (MASA)*

### 5.3.2 Content

Most respondents agreed that the content descriptions clearly described the focus and scope of the unit, but there was concern from some respondents about the amount of content to be taught in the allocated time.

*There seems to be an appropriate amount of content ... (AISWA)*

*The GM course is very full and it is unlikely that each unit could be covered in 50 – 60 hours with the type of students who will take it; something needs to be omitted ... (Vic Heads of Faculty group)*

*General Mathematics contains 3 topics in each unit. Most of these contain an appropriate amount of content for the time allocated ... (MANSW)*

Respondents commented on the inclusion of some topics. Suggestions were made to move or delete topics to assist in the coherence of the subject.

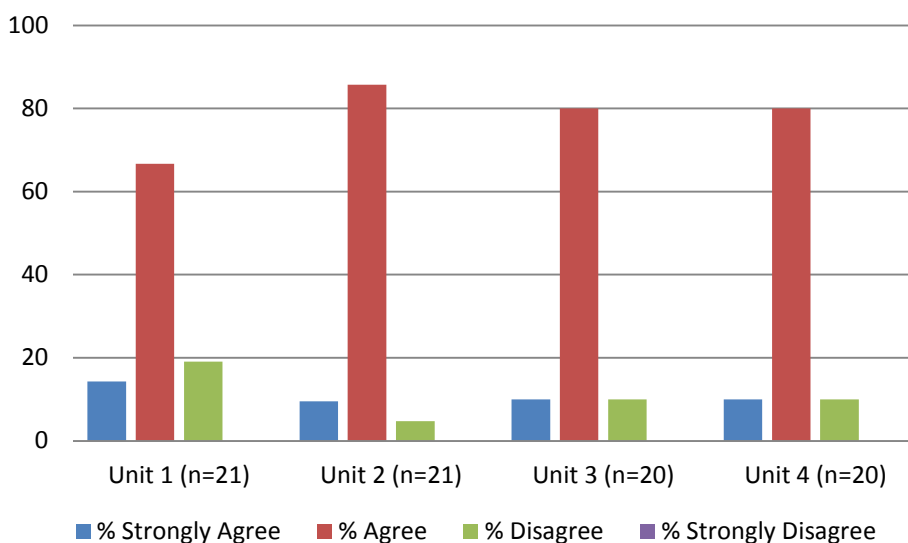
*The inclusion of matrices in general mathematics is not necessary as the topic goes nowhere ... (AAMT)*

*There is a lack of contexts through which the Statistics is taught ... (ABS)*

*Graphs and networks is too hard for cohort ... (ISQ)*

*Lovely material, (Graphs and networks) but this all seems way beyond the level of student who will be taking this course. In England this would all be a topic in our Further Mathematics, taken only by the very top ability students ... (Douglas Butler UK)*

Figure 15: Responses to Questions 15, 20, 29 and 34. The unit description clearly describes the focus and scope for this unit – General Mathematics (Units 1–4)



### 5.3.3 Achievement standards

Most respondents indicated there was clear alignment between the subject’s aims, learning outcomes and content. There were various responses to the pitch and progression between the levels of the achievement standards. It is evident from some of the submissions that the purpose of achievement standards varies between states and territories.

*Achievement Standards are too content heavy ... Standards are task- dependent rather than student response dependent ... (ISQ)*

*The pitch of the achievement standards is generally too high. In particular the C, D and E descriptors are of concern and require further refinement ... (QSA)*

*The MAV generally agrees that the achievement standards across Units 1, 2, 3 and 4 are organised in an order consistent with our experience ... (MAV)*

*Some students will not meet the E standard ... (ACT)*

## 6. Consultation findings: Mathematical Methods

### 6.1 Consultation demographics

This section summarises the consultation findings on the draft rationale, aims, organisation, content and achievement standards of the Mathematical Methods curriculum. Feedback from respondents largely endorsed the content and skills included in the subject.

#### 6.1.1 Online questionnaire

Table 7: National representation of respondents by state – Mathematical Methods online questionnaire

State/Territory	Number of questionnaires	Respondent group size
Australian Capital Territory	nil	
New South Wales	8	25
Northern Territory	nil	
Queensland	5	44
South Australia	1	1
Tasmania	nil	
Victoria	9	32
Western Australia	8	73
International	1	1
<b>TOTAL</b>	<b>32</b>	<b>176</b>

### 6.1.2 Written submissions

A total of 34 written submissions were received, representing a number of respondents. As many of the submissions did not reference the number of participants, the respondent group size is unclear.

Table 8: National representation of respondents by state – Mathematical Methods written submissions

State/Territory	Number of written submissions
Australian Capital Territory	2
New South Wales	5
Northern Territory	1
Queensland	6
South Australia	2
Tasmania	1
Victoria	7
Western Australia	4
National	6
<b>TOTAL</b>	<b>34</b>

The list of contributing groups, organisations and individuals can be found in Appendix 2.

## 6.2 Strengths

Many respondents stated that Mathematical Methods was a coherent and well-composed subject for the intended cohort. Some respondents stated that the intent of the subject was balanced and that the emphasis on calculus was appropriate for the intended cohort; however, other respondents were not as positive about the focus on statistics and would have preferred alternative topics to be included.

*Overall the intent of this Course seems balanced with an emphasis on Calculus ... (Qld Mathematics Faculty)*

*The general development and makeup of Mathematical Methods was viewed very favourably, if overly devoted to statistics. It seems to provide a good preparation for students moving into various university courses that use Mathematics ... (QSA)*

*Matrices would be better in this course than in SM and Calculus 5 should be in SM not MM.... (Vic Mathematics Heads of Faculty Group)*

*The inclusion of too much statistics in Mathematical Methods could lead to black-box teaching as opposed to teaching for depth rather than breadth ... (AAMT)*

*Too difficult for NSW 2 unit candidates ... (Dr Bill Pender)*

*The proposed course focuses almost exclusively on calculus and statistics. For example, arithmetic and geometric sequences, which are important topics in terms of day to day applications (e.g interest rates, annuities), are missing from the*

*Mathematical Methods curriculum but are included, to some extent, in General Mathematics and Specialist Mathematics ... (Sydney University)*

*... way too much statistics in the current draft: it is not sufficiently fundamental, and I'd suggest that the topics chosen are not going to be sufficiently engaging, interesting or appealing, to warrant such attention ... (Associate Professor Jo Grotowski)*

Some respondents commented on the links to the F–10 Curriculum. Others believed that the links were not as evident and that statements about prerequisites should be included in the content descriptions.

*There is a clear link between this senior curriculum and the relevant F-10 Australian curriculum ... (MAV)*

*Mathematical Methods has high algebra demands not adequately covered in preparation through 10A in the draft Australian Curriculum: Mathematics K-10. Many of the topics in Mathematical Methods require knowledge gained in 10A and this may exclude students from studying Mathematical Methods who may otherwise have been successful at this level of study ... (MANSW)*

*The 10A course contains 6 extra topics. While not compulsory pre-requisites, the correlation to senior study is so significant, any student without the background will be disadvantaged. 3 of the 6 are highly recommended for Methods and all 6 for Specialist ... (MASA)*

*An attempt has been made to link the senior subjects with the F-10 curriculum in terms of content (usually convincingly) and proficiencies, although a clearer explanation of how the proficiencies are meant to be enacted in the senior subjects would be valuable ... (MERGA)*

### 6.3 Areas for improvement

There was general agreement from respondents that there was too much content in Mathematical Methods to be covered in the allocated time. Some respondents suggested ways to improve the nature and intent of topics and reduce the content. Specific suggestions have been noted. Some respondents suggested that sampling and confidence intervals should be omitted, as there has been evidence in some states that they have not been taught well.

*The course as it stands would be difficult to complete in 50 – 60 hours per unit ... (Vic Mathematics Heads of Faculty group)*

Many respondents stated that the inclusion of too much statistics in Mathematical Methods could lead to black-box teaching as opposed to teaching for depth rather than breadth. Concerns were raised that teachers would need significant professional development to be able to teach the content effectively.

*Statistics is far too sophisticated for school students ... (Dr Bill Pender)*

*There is far too much emphasis on the study of statistics which should not factor so largely in the study of pure mathematics ... (School Mathematics Faculty)*

*Most of the topics in Mathematical Methods are familiar to teachers of the current calculus-based courses in NSW. Many of our members welcome the presence of statistics in this course but feel that the quantity of statistics needs to be reduced ... (MANSW)*



There were respondents who commented on the lack of examples of application of the content to relevant contexts. Many respondents stated that examples and contexts would clarify the content descriptions and give an indication of depth.

*Overall, this is a bland course lacking in the applications of mathematics to the real world and to science, finance and commerce that are usually employed to give students a purpose for the study of calculus, functions and trigonometry at this level ... (MANSW)*

### 6.3.1 Rationale, aims, organisation

Many respondents indicated that the rationale was clear and succinct and that the aims were also clear, succinct and comprehensive. Others stated that the structure of the content had clear links to the F–10 curriculum. Some respondents commented that the units were well sequenced and demonstrated a progressive increase in cognitive demand.

*Coherent and well composed course for intended cohort ... (AISWA)*

*There is obvious consistency in the format, Rationales, Aims and Organisation for each subject ... (MERGA)*

*It was generally agreed that the four unit structure has internal logic and coherence ... (MERGA)*

Figure 16: Responses to Question 9. The rationale provides clarity about the subject’s broad scope, distinctive nature and importance – Mathematical Methods (n=16)

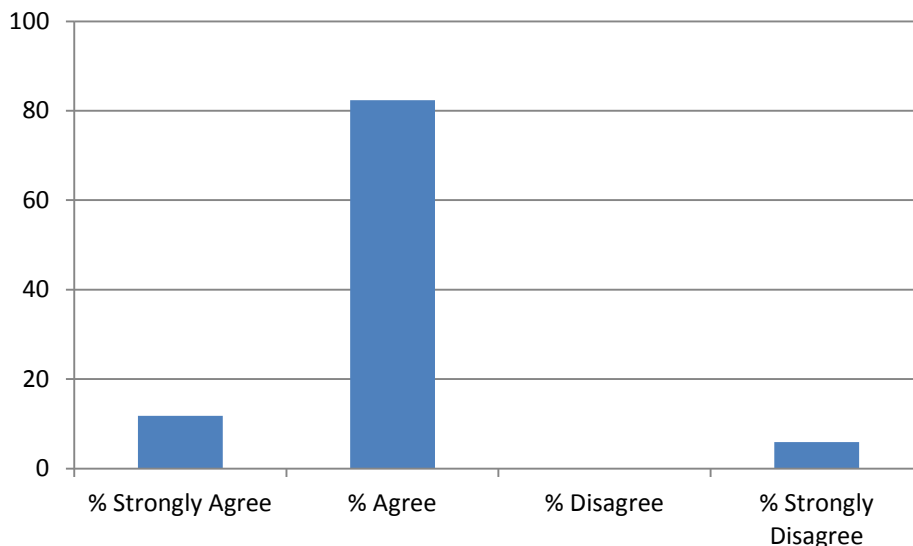


Figure 17: Responses to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject – Mathematical Methods (n=16)

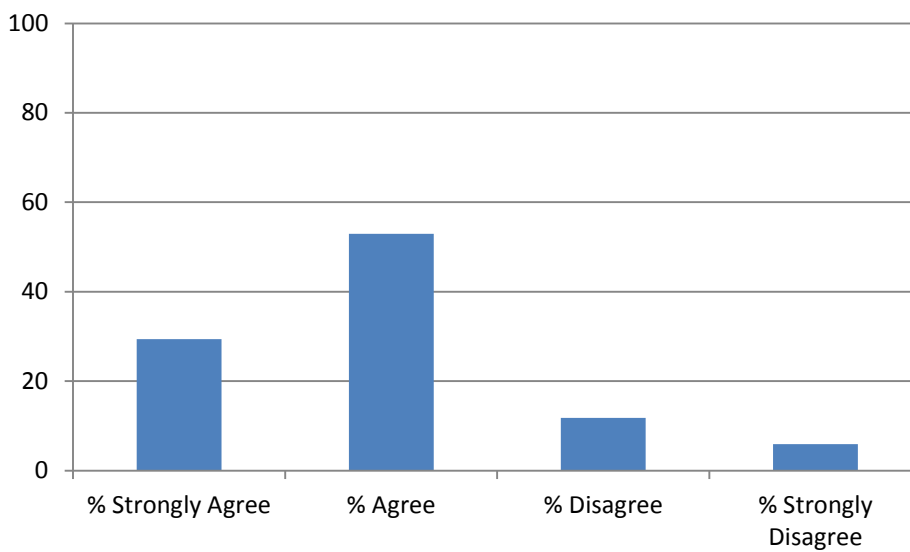


Figure 18: Responses to Question 11. The four-unit structure has internal logic and coherence – Mathematical Methods (n=27)

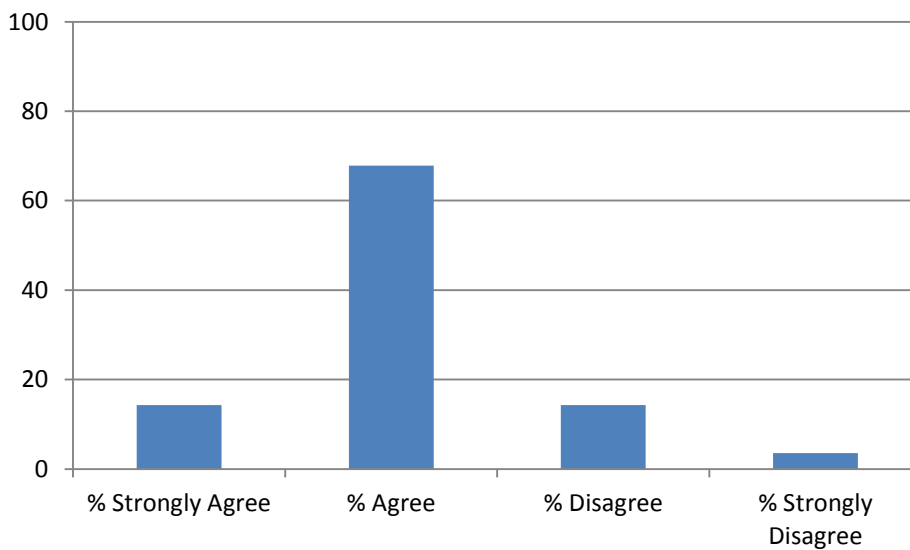


Figure 19: Responses to Question 12. Units 3 and 4 are more cognitively demanding than Units 1 and 2 – Mathematical Methods (n=29)

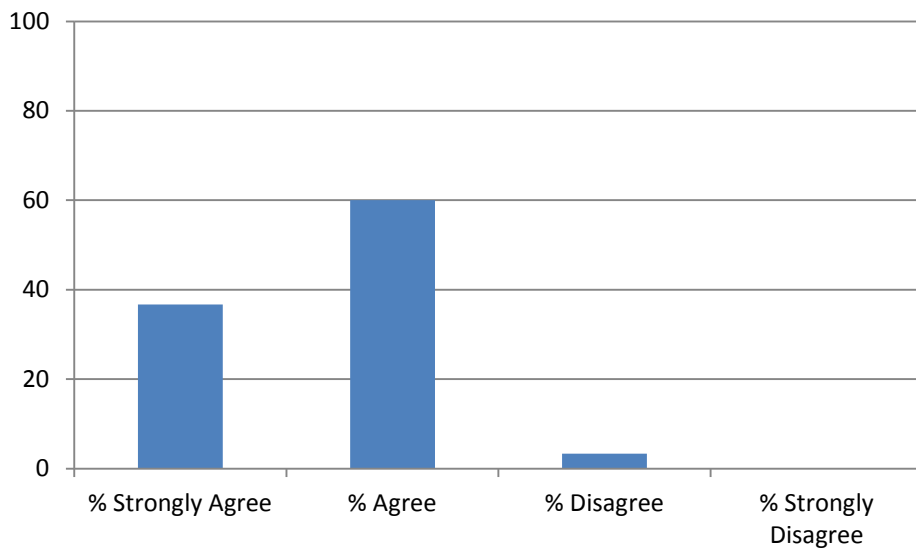
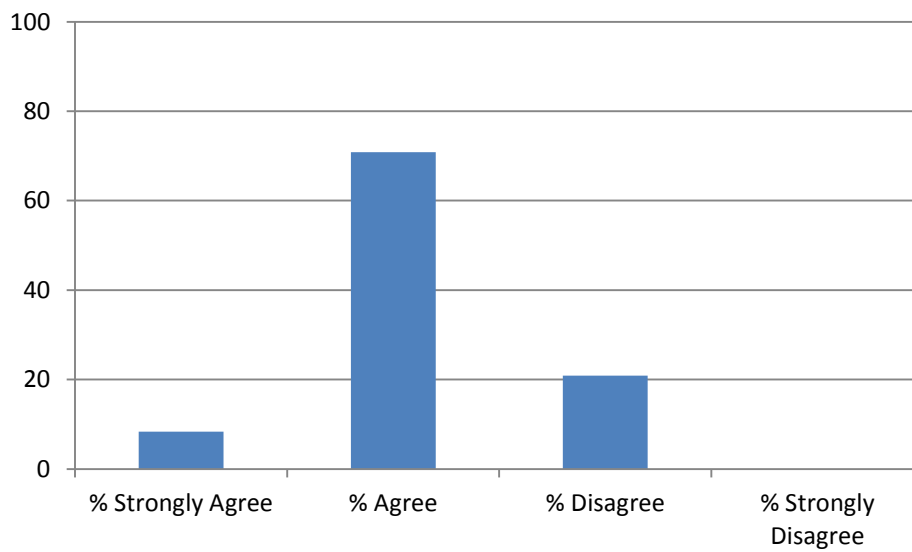


Figure 20: Responses to Question 13. There is a clear link between this senior secondary curriculum and the relevant F-10 Australian Curriculum – Mathematical Methods (n=23)



### 6.3.2 Content

Many respondents stated that the pitch of the content is too high for the intended cohort. Others indicated there is too much content for the indicated time. Most respondents were supportive of the unit descriptions' capacity to describe the focus and scope of the unit. There was also concern that the appropriateness of the content needed to be reconsidered.

Figure 21: Unit 1 content – Mathematical Methods

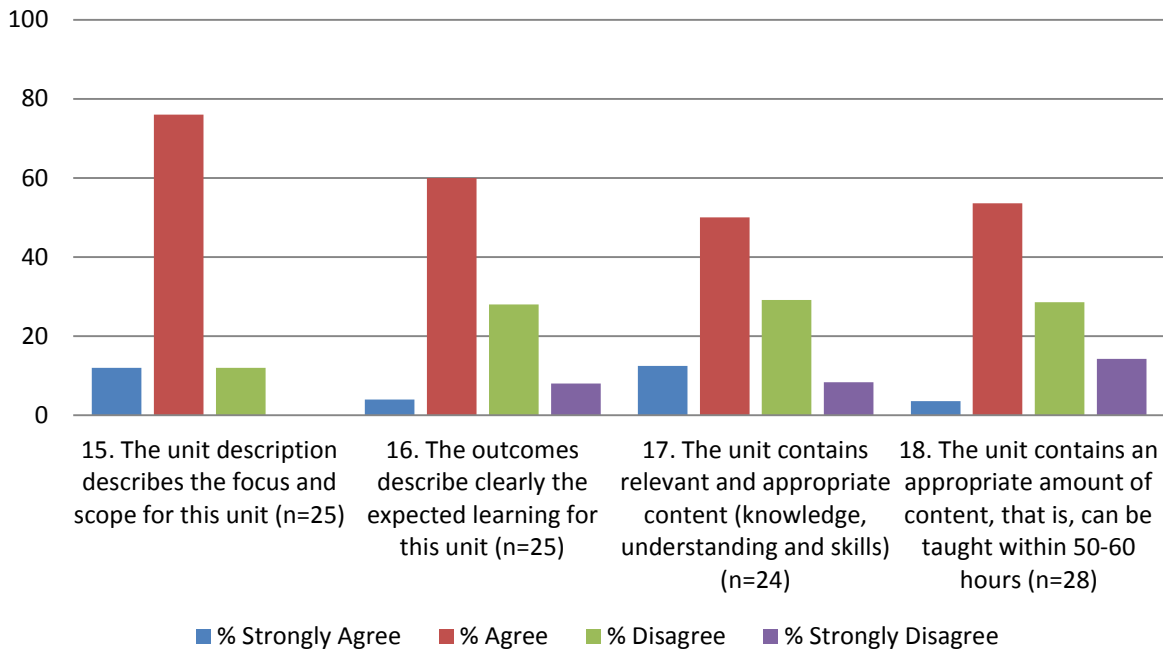


Figure 21: Unit 2 content – Mathematical Methods

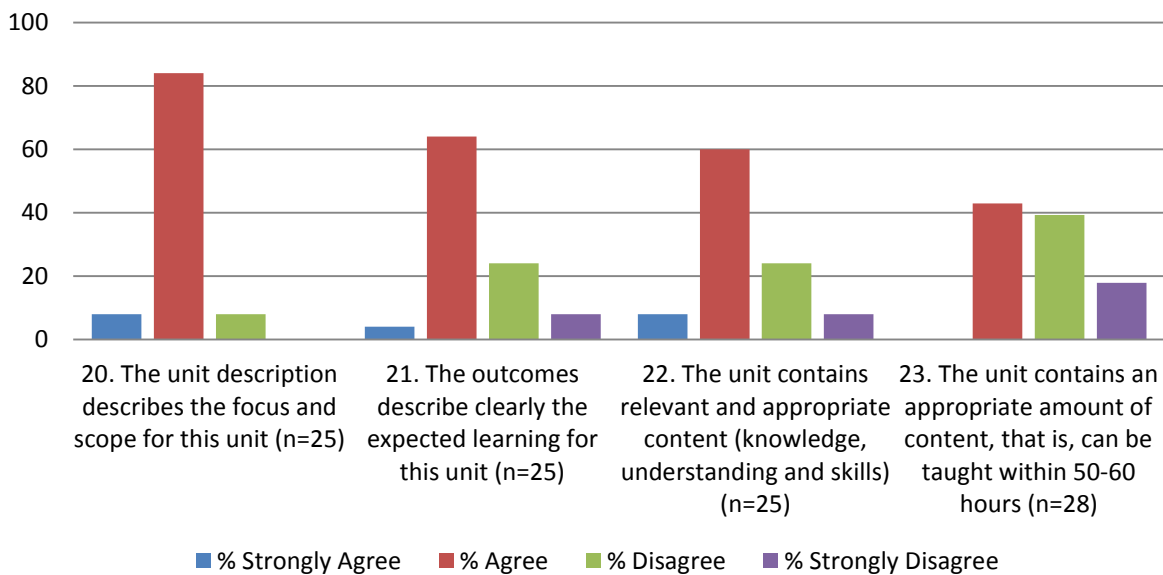


Figure 22: Unit 3 content – Mathematical Methods

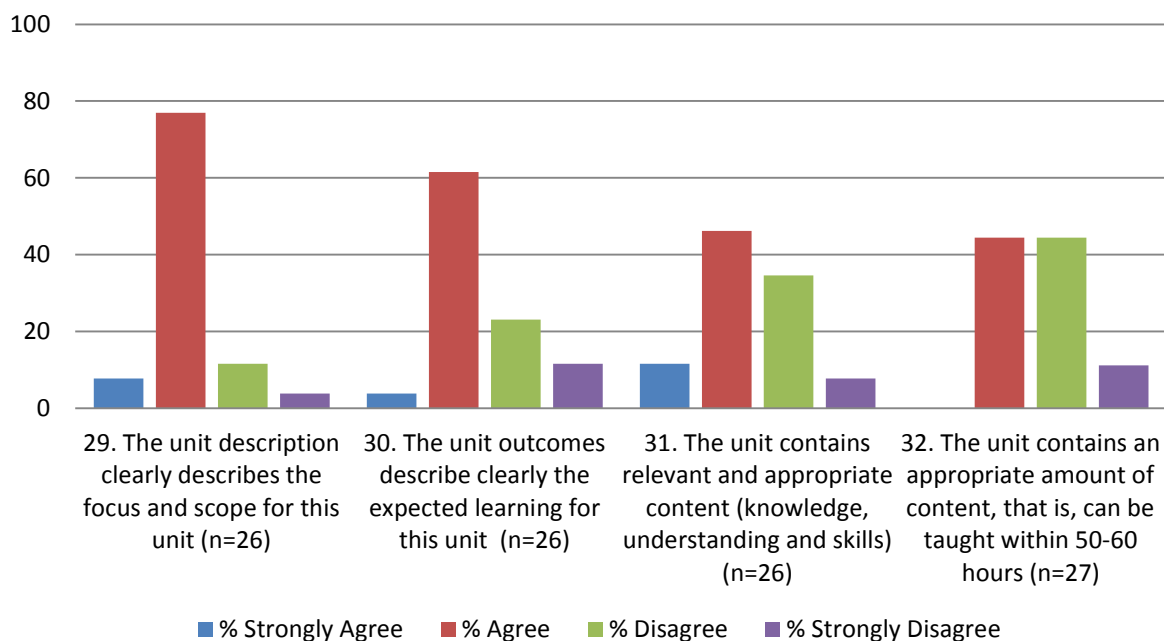
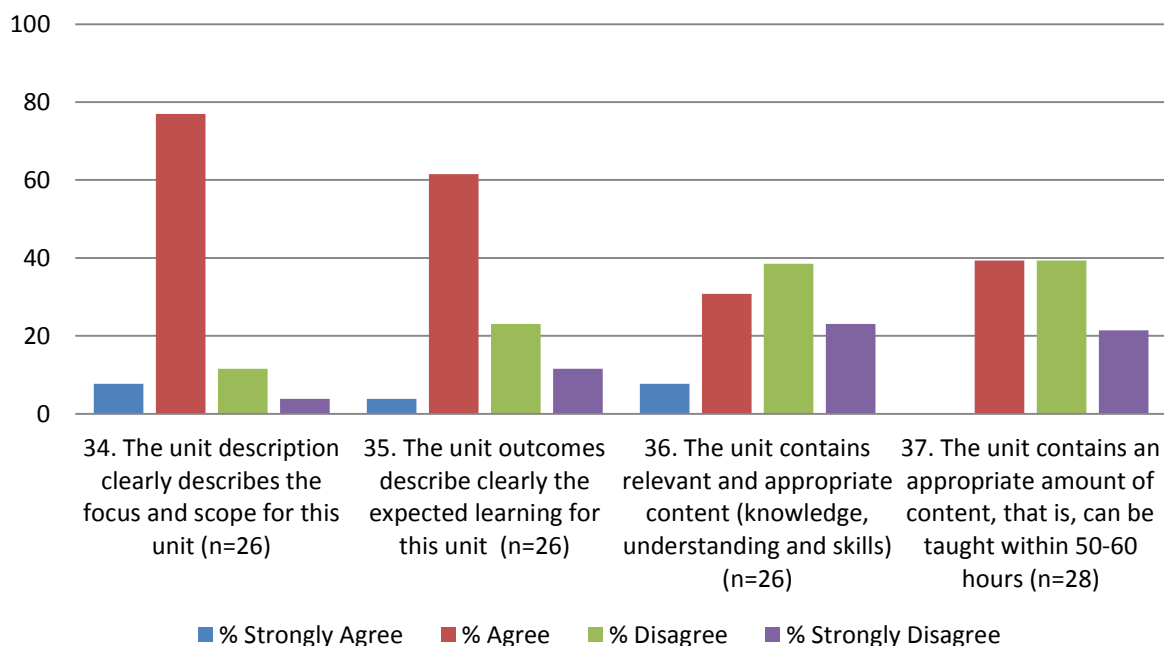


Figure 23: Unit 4 content – Mathematical Methods



Suggestions were made to delete certain content descriptions and topics or move them to Specialist Mathematics.

*The discrete and continuous probability topics will be better if they are both covered in MM3/4 rather than splitting across two year levels, in Unit 2 and Unit 3. Matrices would be better in this course than in SM and Calculus 5 should be in SM not MM ... (Vic Mathematics Heads of Faculty Network Group)*

*Inverse functions and composite should be studied appropriately in Methods rather than skimming around them ... (Head of Department Vic)*

*The study of discrete random variables and continuous random variables works really well when studied together in the same unit. It will lose its impact when studied separately in two separate years ... (Mathematics Faculty)*

*Topic 3 (Unit 3) and Topic 1 (Unit 4) in the Methods course are completely inappropriate for study at school level ... (Dr Peter Coutis, Vic Director of Curriculum)*

*The topics Discrete Random Variables, binomial theorem and Bernoulli distribution are too difficult for these students in Year 11 ... (MANSW)*

### 6.3.3 Achievement standards

Many respondents indicated that there was clear alignment between the aims, learning outcomes, content descriptions and achievement standards. However, many respondents indicated that there was insufficient clarity in the pitch and progression of the levels of the achievement standards.

Figure 24: Responses to Question 25. Achievement standards for Units 1 and 2: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions – Mathematical Methods (n=23)

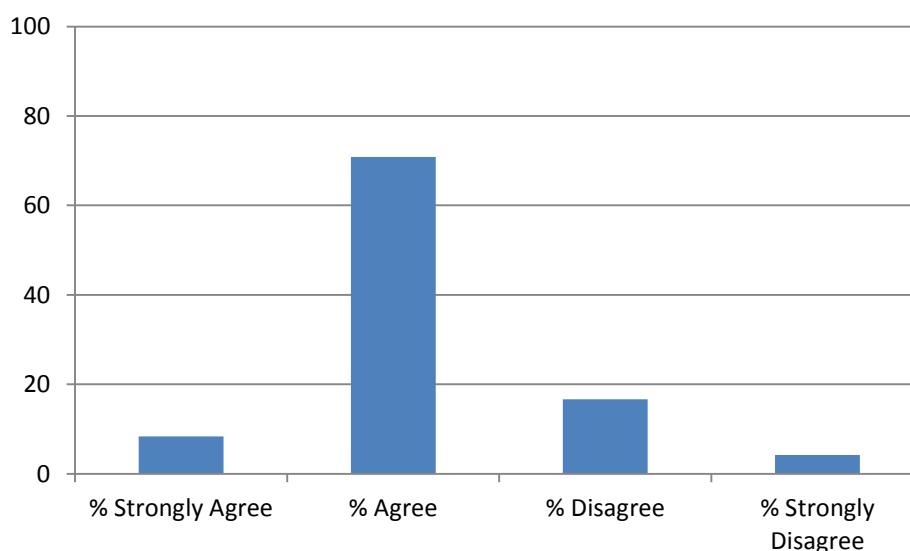


Figure 25: Responses to Question 26. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills – Mathematical Methods (n=22)

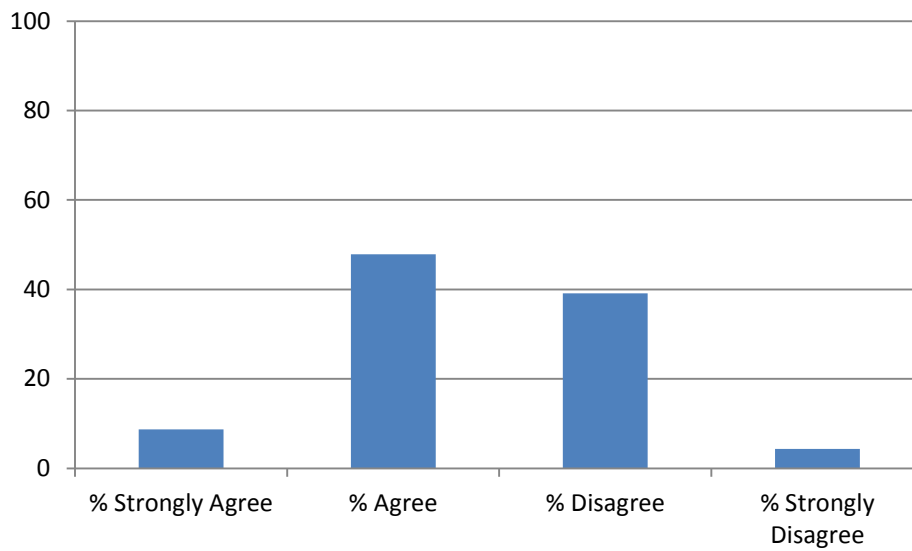


Figure 26: Responses to Question 27. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units – Mathematical Methods (n=23)

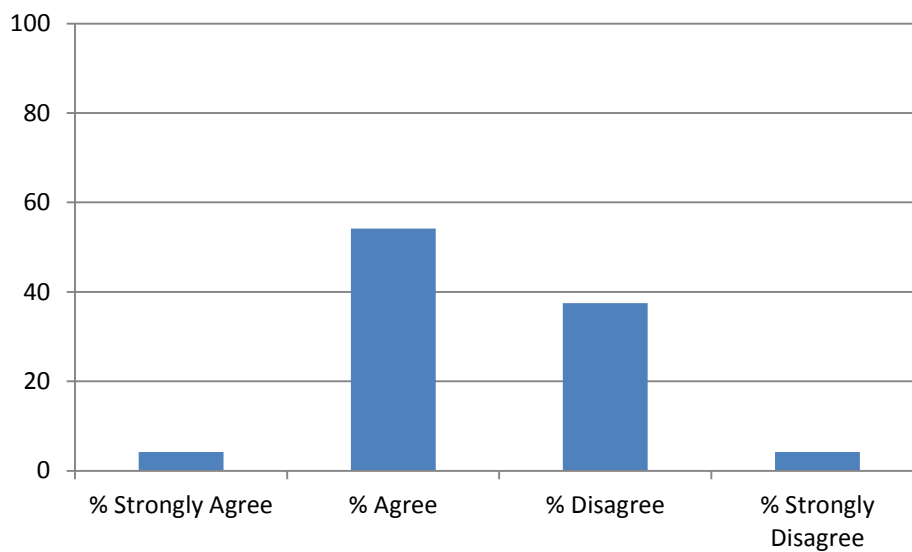


Figure 27: Responses to Question 28. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level – Mathematical Methods (n=23)

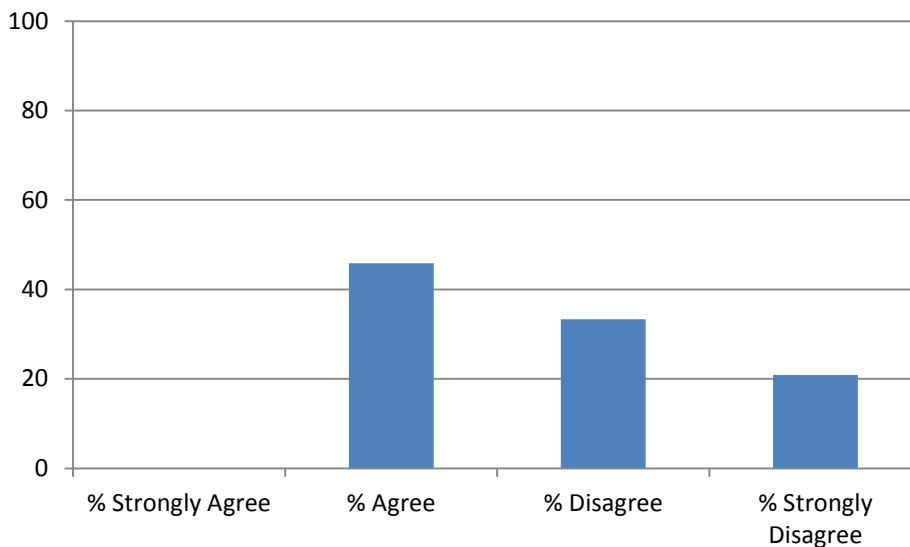


Figure 28: Responses to Question 39. Achievement standards for Units 3 and 4: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions – Mathematical Methods (n=23)

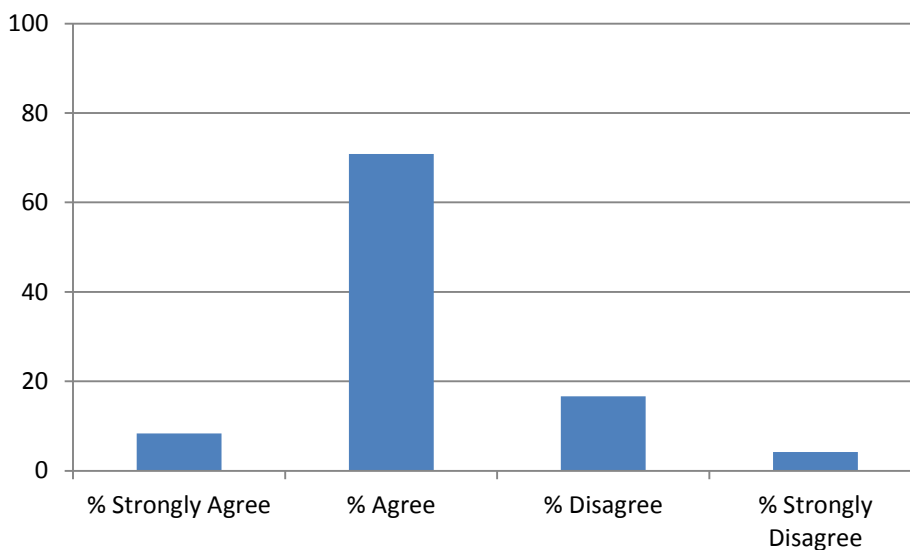




Figure 29: Responses to Question 40. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills – Mathematical Methods (n=22)

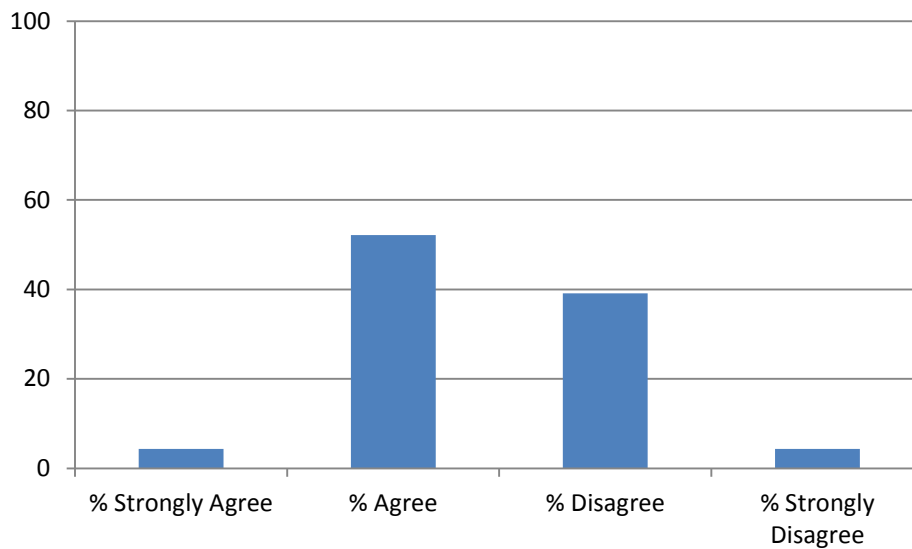


Figure 30: Responses to Question 41. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units – Mathematical Methods (n=23)

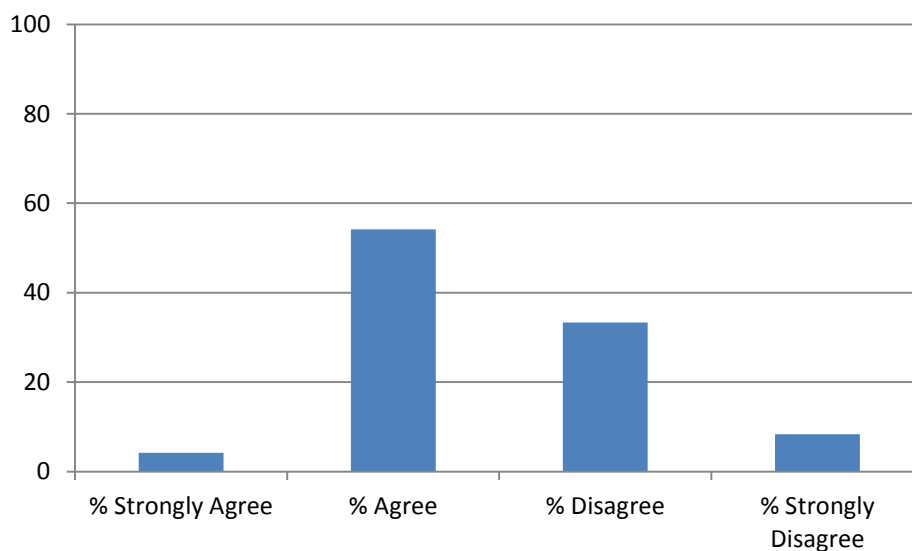
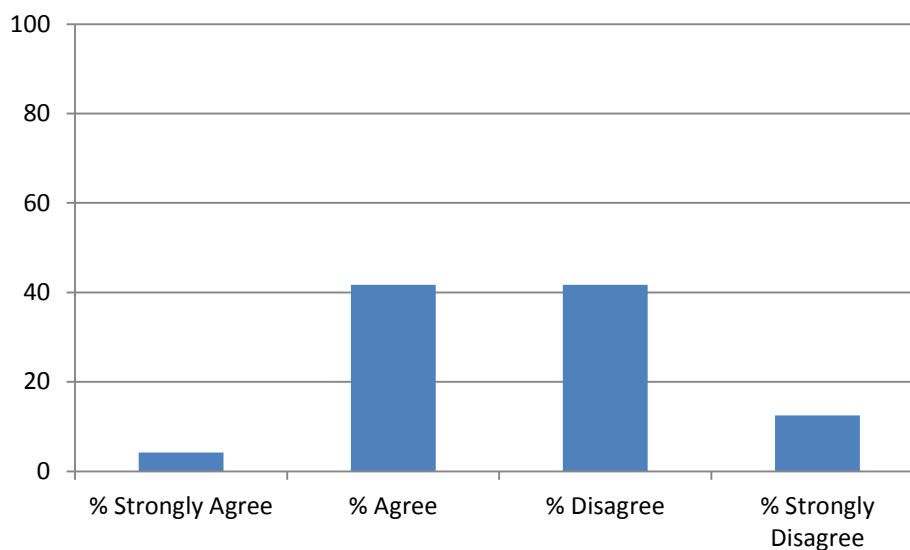


Figure 31: Responses to Question 42. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level – Mathematical Methods (n=23)



*Achievement standards are organised hierarchically and relate well to aims ... (ISQ)*

*Achievement Standards are pitched too high for C, D and E ... (ISQ)*

*Achievement Standards are pitched too high ... (AISWA)*

## 7 Consultation findings: Specialist Mathematics

### 7.1 Consultation demographics

This section summarises the consultation findings on the draft rationale, aims, organisation, content and achievement standards of the Specialist Mathematics curriculum. Of the subjects offered within the senior secondary Mathematics curriculum, Specialist Mathematics was the most strongly supported. Feedback from respondents largely endorsed the content and skills included in the subject.

#### 7.1.2 Online questionnaire

Table 9: National representation of respondents by state – Specialist Mathematics online questionnaire

State/Territory	Number of questionnaires	Respondent group size
Australian Capital Territory	nil	
New South Wales	8	25
Northern Territory	nil	
Queensland	5	67
South Australia	nil	
Tasmania	nil	
Victoria	8	25
Western Australia	5	54
International	1	1
<b>TOTAL</b>	<b>27</b>	<b>172</b>

### 7.1.3 Written submissions

A total of 33 written submissions were received, representing a number of respondents. As many of the submissions did not reference the number of participants, the respondent group size is unclear.

Table 10: National representation of respondents by state – Specialist Mathematics written submissions

State/Territory	Number of written submissions
Australian Capital Territory	2
New South Wales	6
Northern Territory	1
Queensland	6
South Australia	2
Tasmania	1
Victoria	6
Western Australia	3
National	6
<b>TOTAL</b>	<b>33</b>

The list of contributing groups, organisations and individuals can be found in Appendix 2.

## 7.2 Strengths

Many respondents indicated that Specialist Mathematics was a suitable subject for the more capable students.

*Provides well for the high ability mathematics student ... (AISWA)*

*The course is appropriate except for Graph Theory and Statistics ... (MAV)*

## 7.3 Areas for improvement

For NSW, the combination of Mathematical Methods and Specialist Mathematics did not meet their current structure of Extension 1 and Extension 2 Mathematics.

*Some members liked this course but members were not unanimous in deciding whether this course offered adequate challenge for students who would currently take Mathematics Extension 2 in NSW ... (MANSW)*

*Pitch is too hard for Extn 1 students but not hard enough for extn 2 ... (Dr Bill Pender)*

Most respondents did not support the inclusion of statistical inference. Many respondents commented that students were exposed to enough statistics in the Mathematical Methods subject and there was no need for them to study even more statistics in Specialist Mathematics.

*Get rid of the statistics. Students are exposed to enough in Methods. Replace statistics with second derivatives and implicit differentiation which have moved to Methods ... (MAV)*

*Statistics in Unit 4 Methods is too difficult ... (ACT)*

*Statistical inference and modelling motion should be omitted ... (AISWA)*

*Many respondents felt that the statistical inference in Unit 4 was dry and boring and that this would impede student and teacher enthusiasm for the subject. There is a page of dot points but it was suggested that these would only take two weeks to teach. It was noted that few teachers would have the knowledge needed to teach this material at present ... (Vic Mathematics Heads of Faculty Network Group)*

### 7.3.1 Rationale, aims, organisation

Many respondents stated that the rationale and aims are clear and describe the learning in the subject. Respondents were less supportive of the logical coherence of the structure. Many respondents could not see evidence of the links between Specialist Mathematics and the F–10 curriculum.

Figure 32: Responses to Question 9. The rationale provides clarity about the subject's broad scope, distinctive nature and importance – Specialist Mathematics (n=14)

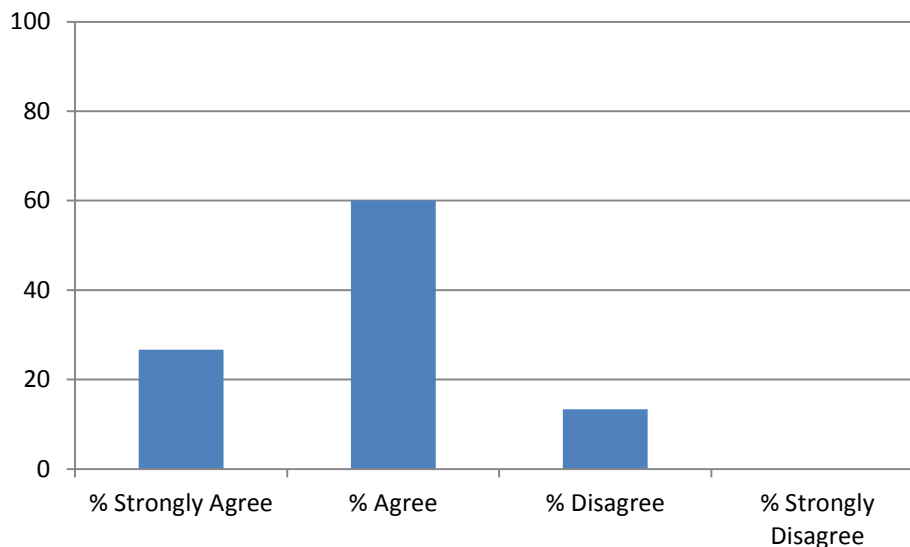


Figure 33: Responses to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject – Specialist Mathematics (n=14)

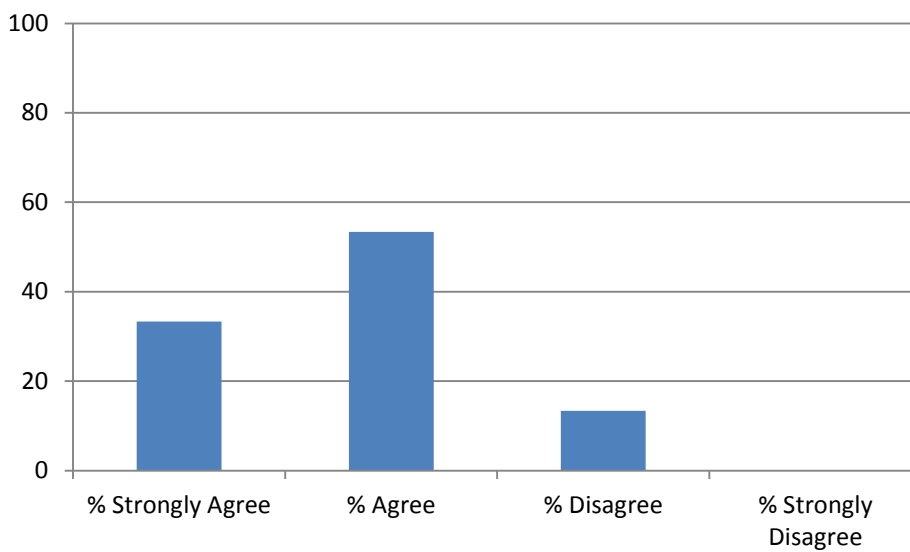


Figure 34: Responses to Question 11. The four-unit structure has internal logic and coherence – Specialist Mathematics (n=22)

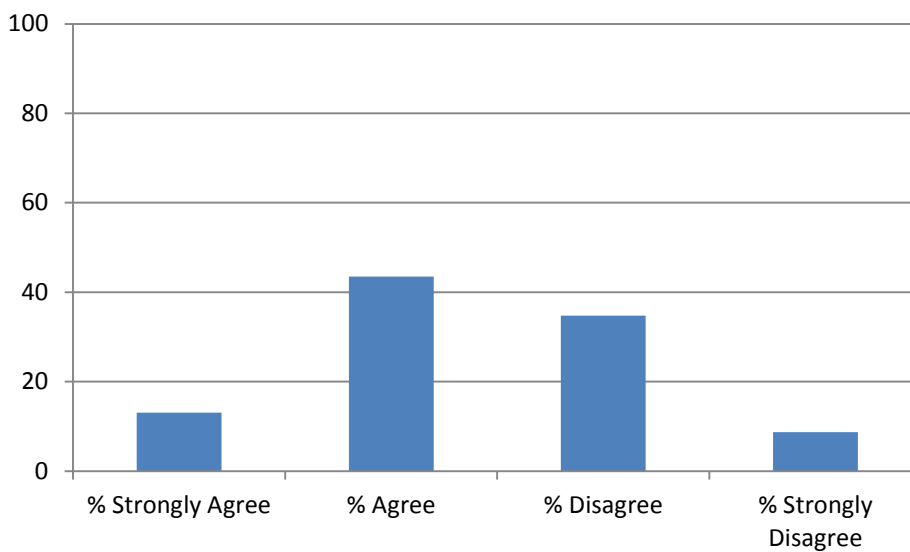
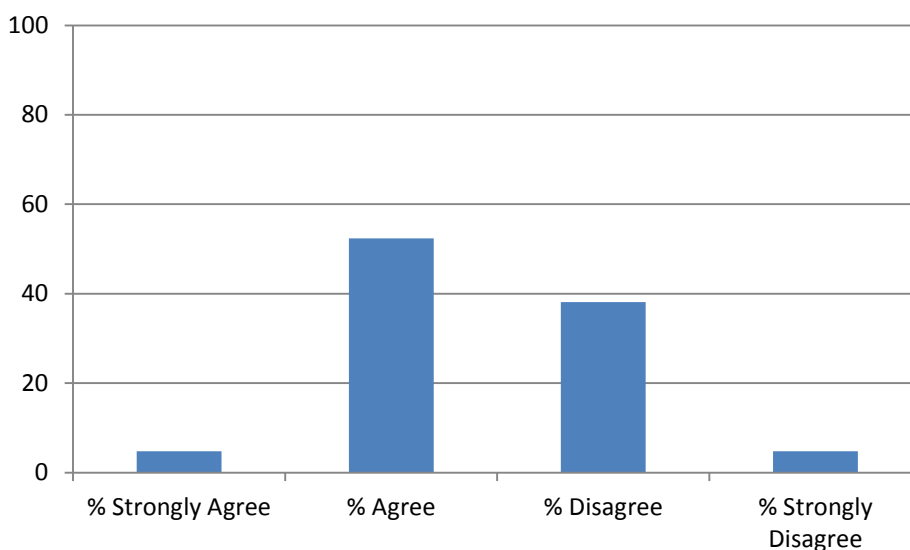


Figure 35: Responses to Question 13. There is a clear link between this senior secondary curriculum and the relevant F–10 Australian Curriculum – Specialist Mathematics (n=20)



*No clear purpose for why students are doing the topics... (ISQ)*

### 7.3.2 Content

Most respondents supported the relevance of the unit descriptions and unit outcomes at the beginning of each unit. However, there was concern at the number and nature of topics to be taught in the allocated time. Many respondents suggested deleting graph theory and statistical inference to allow students more time to study mathematics in depth. There were varying and disparate comments on the level of rigour of the topics. Some respondents commented that the content was too challenging, others that the content was not challenging enough.

Figure 36: Unit 1 content – Specialist Mathematics

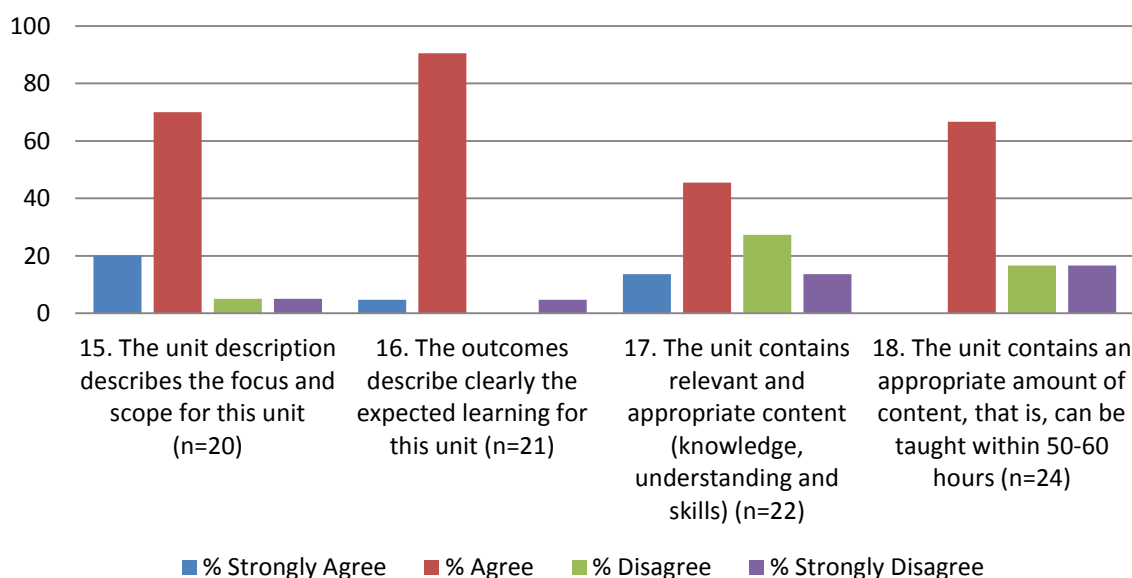


Figure 37: Unit 2 content – Specialist Mathematics

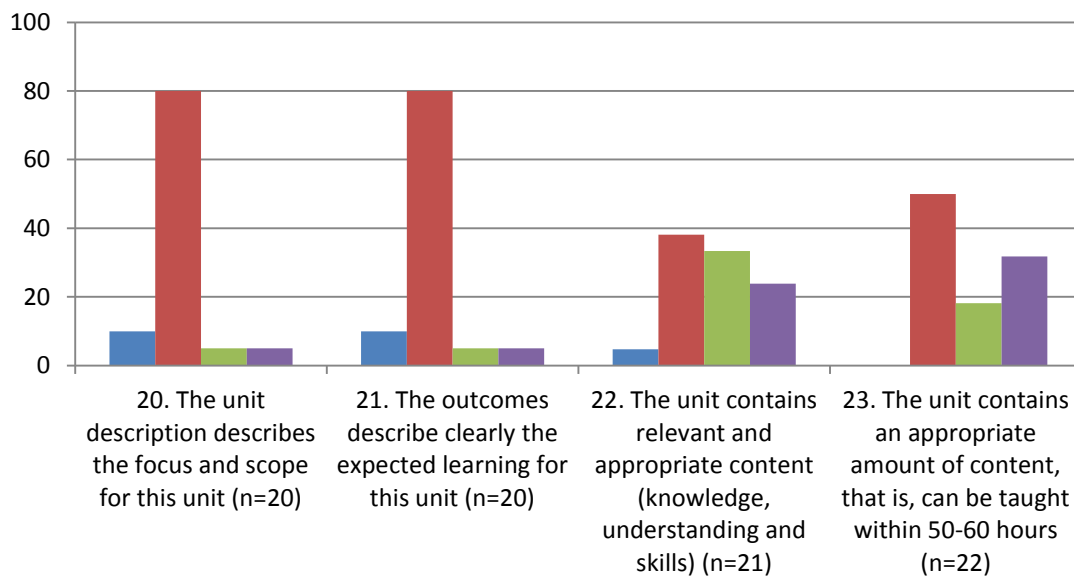


Figure 38: Unit 3 content – Specialist Mathematics

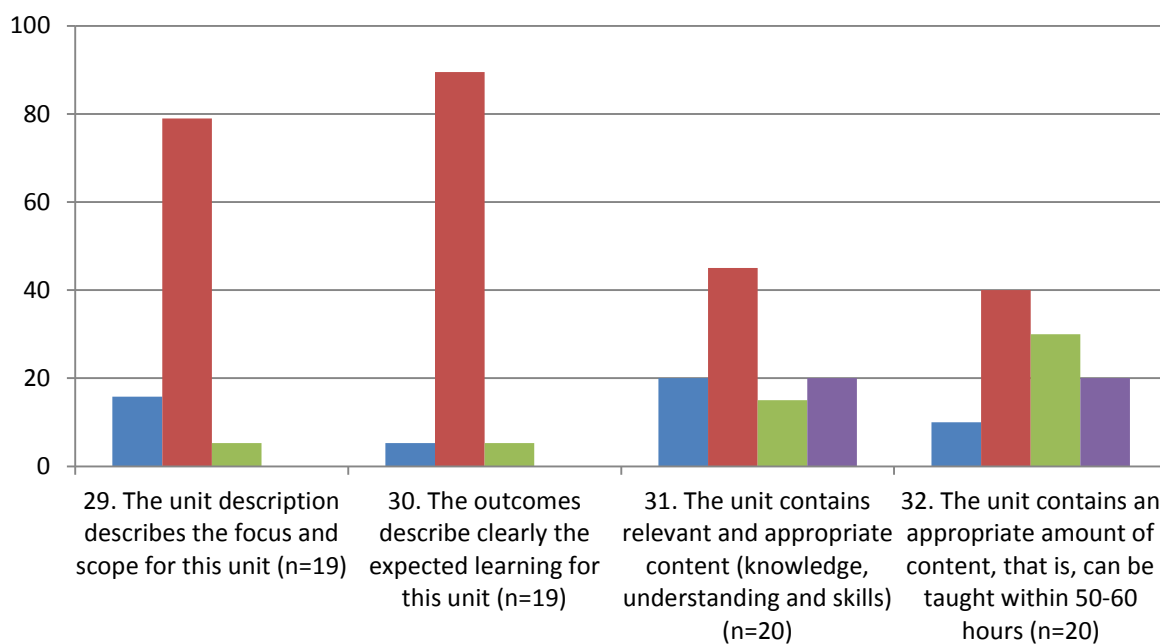
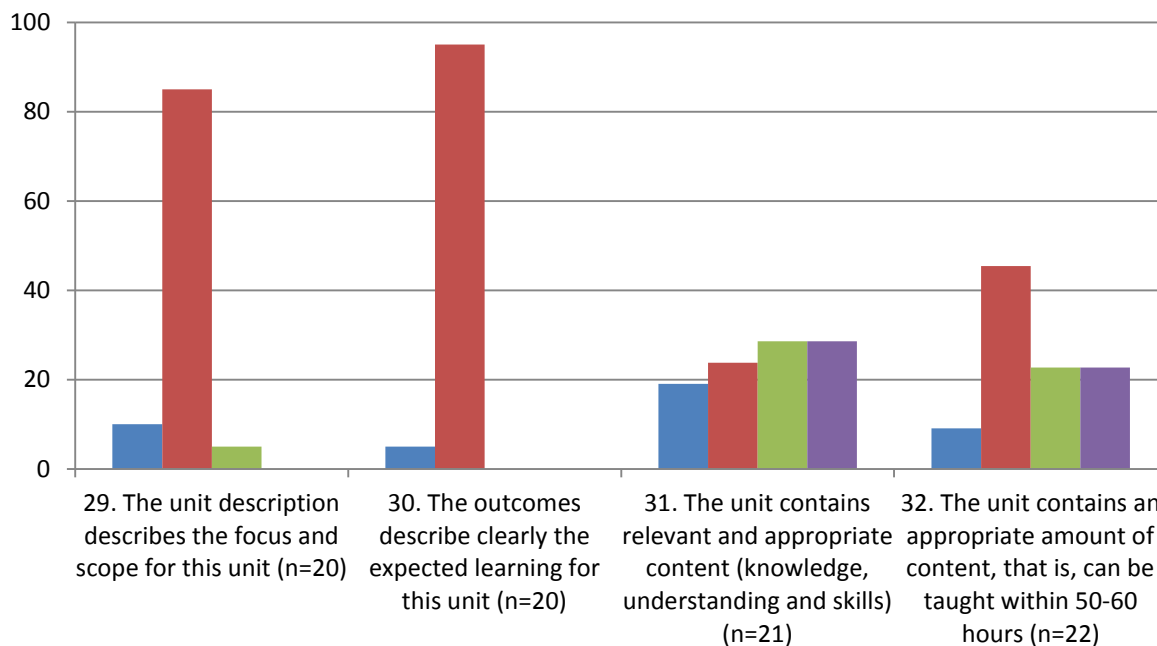




Figure 39: Unit 4 content – Specialist Mathematics



*There is too much content in the subject overall ... (QSA)*

*The number of topics to be covered will make this a difficult course ... (MANSW)*

*Specialist Mathematics is content heavy. It is suggested that content (which would be better in methods) means possible loss of in depth (e.g. probability / stats, logic) ... (ACT)*

*Statistics in Unit 4 Methods is too difficult ... (ACT)*

*The bite-sized topics are problematic ... (MERGA)*

*The material on Matrices and systems of equations in Unit 3 was seen as a topic that could be removed from the Specialist curriculum to allow time to develop some of the other areas in more depth ... (Syd Uni)*

### 7.3.3 Achievement standards

Many respondents indicated there was clear alignment between the aims, learning outcomes, content descriptions and achievement standards. However, many responded that there was no clear progression in the complexity and sophistication of the learning as students progress from Year 11 to Year 12.

Figure 40: Responses to Question 25. Achievement standards for Units 1 and 2: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions – Specialist Mathematics (n=19)

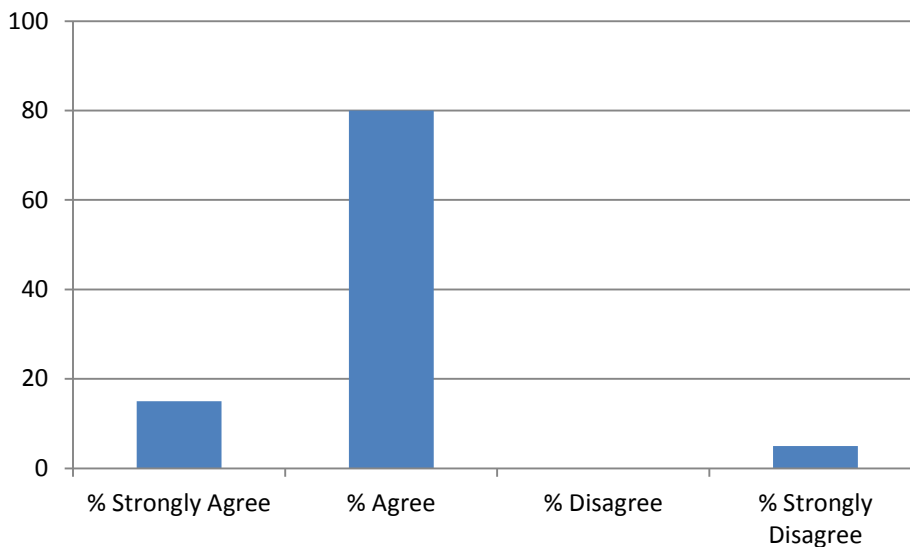
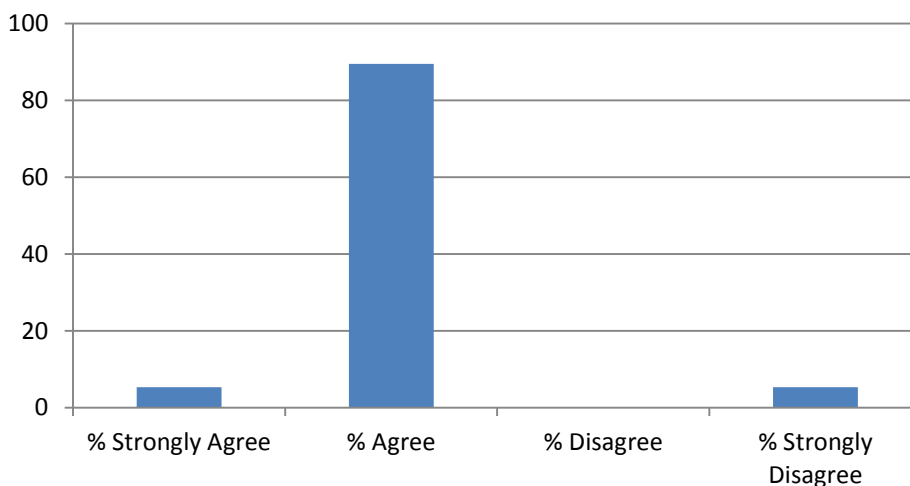


Figure 41: Responses to Question 39. Achievement standards for Units 3 and 4: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions – Specialist Mathematics (n=18)



Many respondents commented that the achievement standards were pitched too high for the intended cohort but clearly differentiate the expected performance.

*Achievement Standards are pitched too high ... (ISQ)*

*The pitch of the achievement standards is generally too high. In particular the C, D and E descriptors are of concern and require further refinement ... (QSA)*

## 8. Key findings and actions taken

### 8.1 Across the Mathematics learning area

#### 8.1.1 Strengths

- The draft consultation versions of the senior Mathematics subjects are much improved on previous versions
- The writers have taken on board feedback and suggestions from previous consultation
- There is coherence in the structure of the subjects
- The inclusion of the comprehensive glossaries are useful for both teachers and students
- The Mathematics subjects are rigorous and provide a sound basis for further study

#### 8.1.2 Areas for improvement and actions taken

Areas for improvement		
Broad area	Specific issue	Action taken (revisions made)
The role of 10A	The content descriptions of 10A that would be desirable for the senior mathematics subjects have not been made clear.	Those content descriptions in 10A that would be desirable knowledge for topics in the senior subjects have been exemplified in the rationales.  Particular 10A content descriptions that need to be reviewed have been made explicit in the unit descriptions.
The amount of content	The amount of content in each subject will make it difficult to teach the content in depth in the available time.	The amount of content in several units has been reduced by removing topics to leave room for deep understanding and the ability to complete the subject in the allocated time. (See subject sections for specific topics removed.)  The amount of content in each subject has been reduced by removing some content descriptions from each topic. Decisions about what to remove have been made on the basis of the following criteria: <ul style="list-style-type: none"> <li>• advice from submissions</li> <li>• having the right balance of mathematical and statistical content</li> <li>• maintaining the flow of the content and the cohesion of the topics.</li> </ul>
The amount of statistics	There is too much statistics in all of the Mathematics subjects.	The amount of statistics in General Mathematics, Mathematical Methods and Specialist Mathematics has been reduced.  Statistical content has been deleted from Specialist Mathematics. Statistical content in Mathematical Methods has been moved into Specialist Mathematics. (See subject sections for specific topics removed.)

Clarity of content descriptions	The degree of specificity of the content descriptions should be consistent both within and across subjects.	Content descriptions have been reviewed to ensure consistency in their specificity: <ul style="list-style-type: none"> <li>• concepts included in a content description have been separated to ensure the clarity of the requirement of what is to be learnt and taught</li> <li>• examples have been included to add to the clarity of the content description.</li> </ul>
The role of ICT	There is lack of clarity about the use of ICT in Mathematics subjects.	The general statement on technology in the Organisation of Learning section has been reviewed.  In the unit descriptions for each subject a statement has also been included to assist in clarifying the use of technology across all mathematics subjects.  Content descriptions have been reviewed and, where appropriate and necessary, specific reference to the application of technology has been included.
General capabilities and cross-curriculum priorities	The representation of general capabilities and cross-curriculum priorities were not clear and explicit in the Organisation section of the curriculum.	Parts of the Organisation of Learning section have been rewritten to include statements about the scope and the opportunity for the representation of the general capabilities and cross-curriculum priorities in the Mathematics subjects.

## 8.2 Essential Mathematics

### 8.2.1 Strengths

- The inclusion of content examples clarified what is to be taught
- Most of the content is pitched at an appropriate level of difficulty
- The rationale and outcomes were clear and appropriate

### 8.2.2 Areas for improvement and actions taken

Areas for improvement		Action taken (revisions made)
Broad area	Specific issue	
Amount of content	The amount of content in each subject will make it difficult to teach the content in depth in the available time.	<p>Content has been selectively reduced to allow more time for teachers and students to focus on the concepts and skills included in the subject. This reduction has been achieved in the following ways:</p> <ul style="list-style-type: none"> <li>• deleted some content descriptions</li> <li>• clarified some content descriptions by rewording the description to ensure the intent of what is to be learnt and taught is clear</li> <li>• reorganised the examples in context to enhance the clarity of the intent of the content descriptions.</li> </ul>
Pitch of content	The pitch of the content in some identified topics is too high.	The pitch of the Straight Line Graphs and rates and ratios has been changed. The algebra topic has been refined to focus on the substitution into and the application of formulas.
Repetition of content	There is some repetition and duplication of content throughout the subject.	The overlap has been reduced and minimised where possible. However, there is retention of some perceived overlap where the content provides opportunities to reinforce learning of particular concepts.

## 8.3 General Mathematics

### 8.3.1 Strengths

- It is a well-designed and appropriate subject for the intended cohort
- The choice of content is well balanced
- It provides a variety of mathematics content to encourage students to take a mathematics subject in the senior years
- The aims and rationale are appropriate for this subject
- The content descriptions clearly describe the focus and scope of the unit
- There is clear alignment between the aims, learning outcomes and content

### 8.3.2 Areas for improvement and action taken

Areas for improvement		Action taken (revisions made)
Broad area	Specific issue	
Amount of content	There is too much content to be taught in the required number of hours.	<p>Content has been selectively reduced to allow more time for teachers and students to focus on the concepts and skills included in the subject.</p> <p>This reduction has been achieved in the following ways:</p> <ul style="list-style-type: none"> <li>• the measurement and geometry content has been consolidated into two topics</li> <li>• simple and compound interest has been removed from the topic Financial Mathematics and has been combined with other like concepts and applications in Unit 3</li> <li>• matrix sequences has been deleted from discrete growth and decay.</li> </ul>
Pitch of content	The pitch of some content is too high for the intended cohort. This is particularly the case with graphs and networks and some of statistics.	<p>The content descriptions have been reviewed for pitch and clarity.</p> <p>In particular the following revisions have taken place:</p> <ul style="list-style-type: none"> <li>• diminished the amount of content in graphs and networks; graphs and networks have been moved to Units 3 and 4</li> <li>• reorganised and clarified the statistics content in Unit 2; this topic emphasises univariate data which revises and unifies study in statistics from F–10; this section is in preparation for new topics which occur in Units 3 and 4.</li> </ul>
Matrices	The study of matrices was seen as isolated in relation to the other content topics in the subject.	<p>The content included in matrices has been rewritten to clarify the relevance of the topic. Examples of applications have been provided.</p> <p>The study of matrices in Unit 1 is continued in Unit 3 of graphs and networks to provide an application and relevance of the matrices topic.</p>

## 8.4 Mathematical Methods

### 8.4.1 Strengths

- It is a coherent and well composed subject for the intended cohort
- The intent of the subject is balanced
- The emphasis on calculus is appropriate for the intended cohort
- The rationale and aims are clear and succinct
- The structure of the content has clear links to the F–10 curriculum
- There is clear alignment between the aims, learning outcomes, content descriptions and achievement standards

### 8.4.2 Areas for improvement and action taken

Areas for improvement		Action taken (revisions made)
Broad area	Specific issue	
Amount of Content	The amount of content would be difficult to complete in 50–60 hours per unit.	<p>Content has been selectively reduced to allow more time for teachers and students to focus on the concepts and skills included in the subject.</p> <p>This reduction has been achieved in the following ways:</p> <ul style="list-style-type: none"> <li>• Statistical Inference has been diminished by 60%. The topic in its revised form has been retained to unify the topics studied in F–10</li> <li>• Related rates of change moved to Specialist Mathematics</li> <li>• Implicit differentiation moved to Specialist Mathematics</li> <li>• Exponential Distribution has been deleted</li> <li>• Confidence Intervals for Means has been deleted.</li> </ul>
The amount of statistics	There is too much emphasis on statistics, in particular the inclusion of statistical inference.	<p>Statistical inference has been diminished by 60%. The topic in its revised form has been retained to unify the topics studied in F–10.</p> <p>Exponential Distribution Confidence Intervals for Means has been deleted.</p>
Clarity of content descriptions	The content descriptions are not always clear about the scope and depth of study expected.	<p>The intent of the depth of the content descriptions has been clarified by:-</p> <ul style="list-style-type: none"> <li>• additional use of verbs, which have been introduced at the beginning of each description and are appropriate for the content</li> <li>• Inclusion of examples for some content descriptions to assist in the illustration of expectations.</li> </ul>

## 8.5 Specialist Mathematics

### 8.5.1 Strengths

- It is a suitable subject for the more able students
- The rationale and aims are clear and describe the learning of the subject
- The relevance of the unit descriptions and unit outcomes at the beginning of each unit is clear and appropriate
- There is clear alignment between the aims, learning outcomes, content descriptions and achievement standards

### 8.5.2 Areas for improvement and action taken

Areas for improvement		Action taken (revisions made)
Broad area	Specific issue	
Amount of content	The amount of content would be difficult to complete in 50–60 hours per unit.	<p>Content has been selectively reduced to allow more time for teachers and students to focus on the concepts and skills included in the subject.</p> <p>This reduction has been achieved in the following ways:</p> <ul style="list-style-type: none"> <li>• recurrence relations moved into Mathematical Methods in an appropriate form for Methods students</li> <li>• calculus divided into two topics to clarify the content descriptions</li> <li>• Unit 3 Matrices including Gaussian Elimination has been deleted</li> <li>• Statistical Inference has been substantially reduced</li> <li>• Graph Theory has been deleted.</li> </ul>
Statistical inference	The inclusion of the statistical inference topic is inappropriate for the cohort.	The Statistical Inference topic has been rewritten to include the deleted content from Mathematical Methods. The topic has been made clearer and more accessible for students.



## **Appendix 1 - Online questionnaire responses**

This appendix presents graphs of the responses to the online questionnaires for General Mathematics, Essential Mathematics, Mathematical Methods and Specialist Mathematics.

## Essential Mathematics

Figure 1: Response to Question 9. The rationale provides clarity about the subject's broad scope, distinctive nature and importance (n=18)

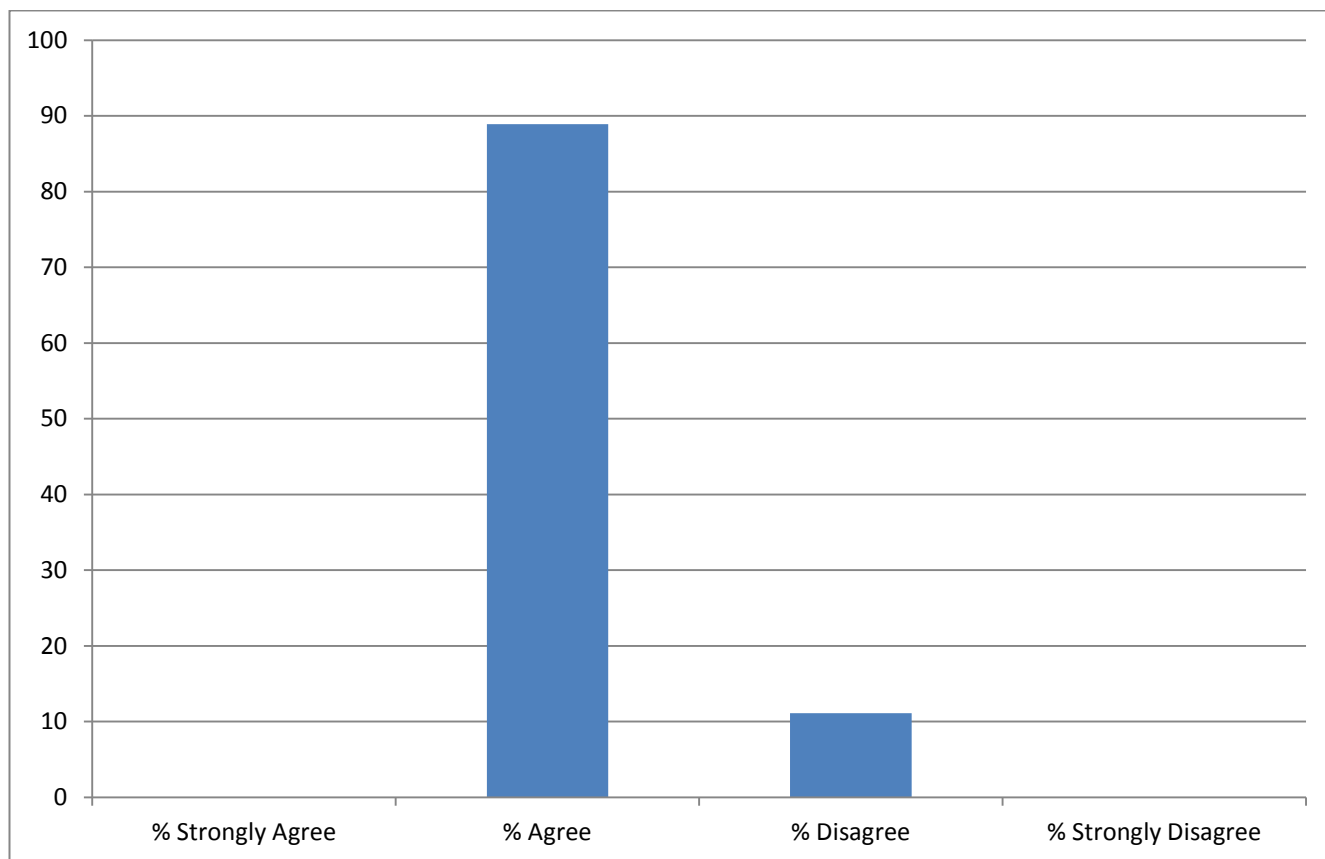


Figure 2: Response to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject (n=14)

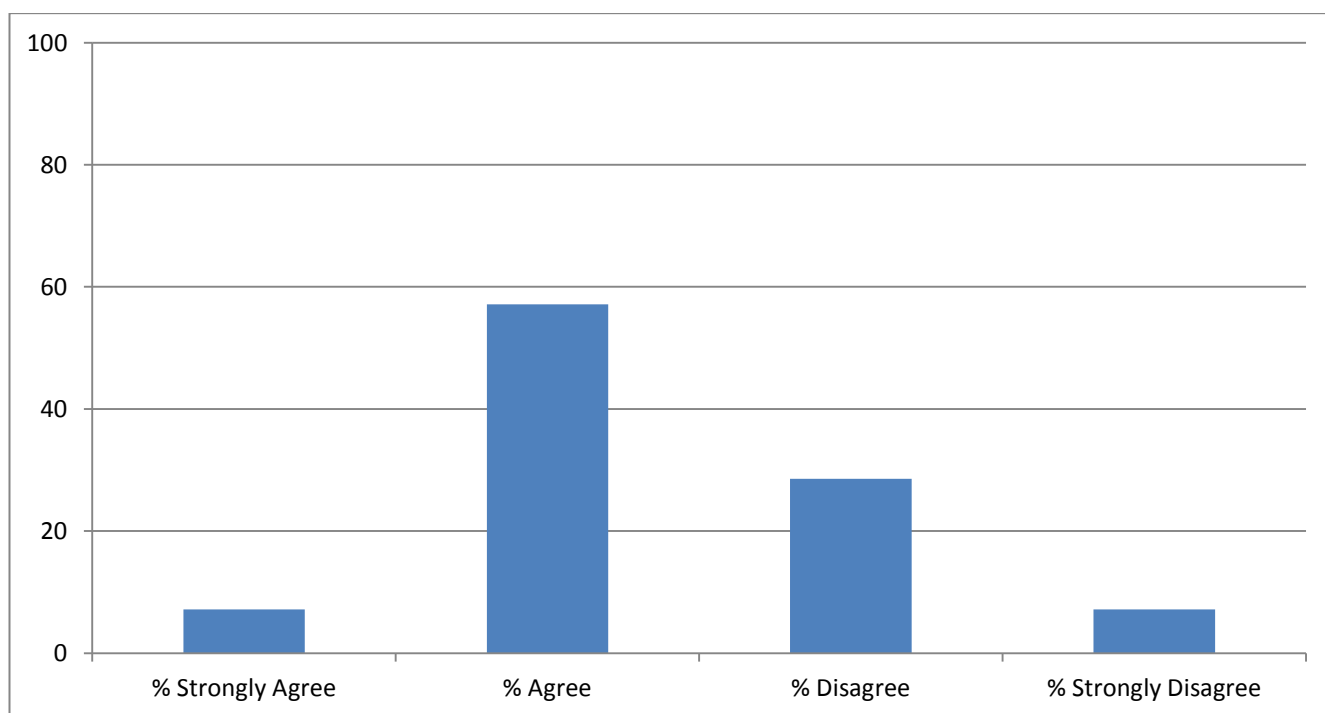


Figure 3: Response to Question 11. The four-unit structure has internal logic and coherence (n=23)

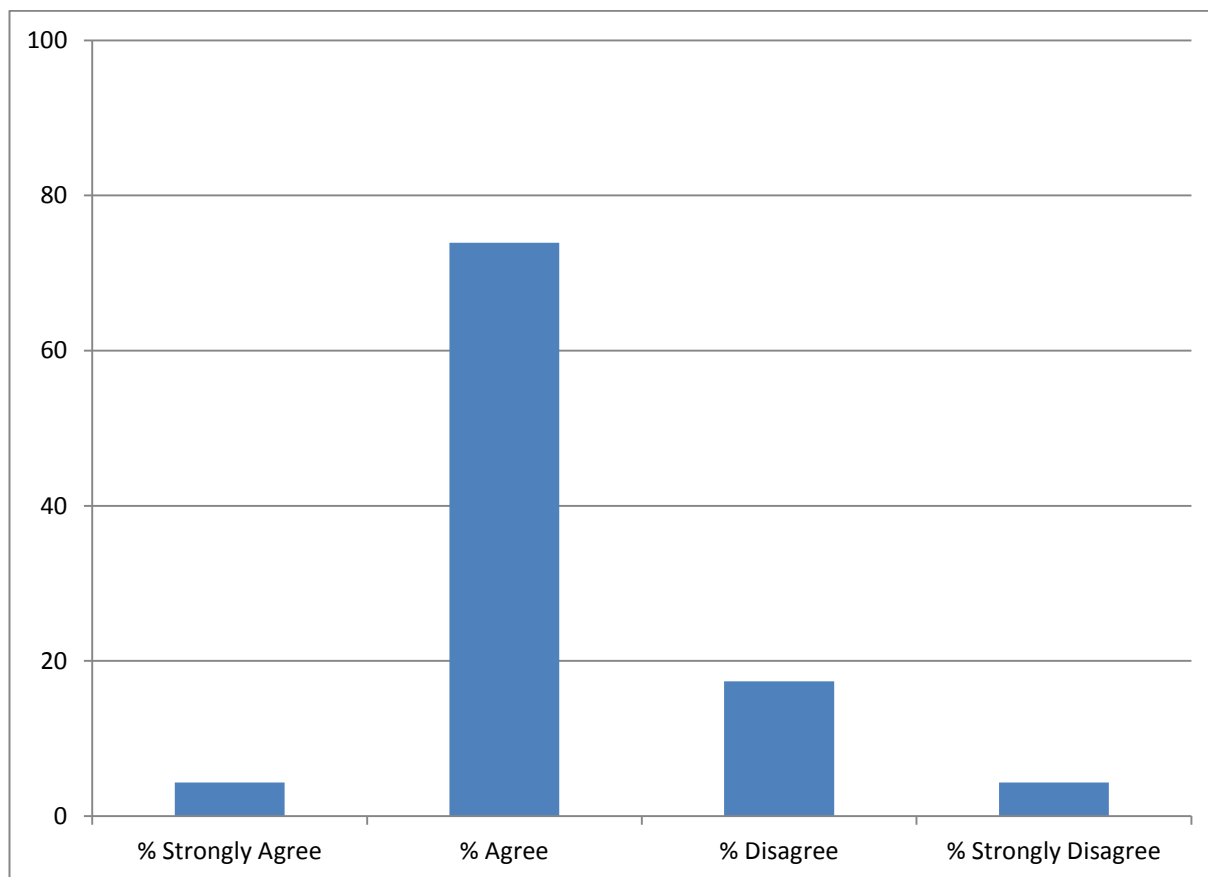


Figure 4: Response to Question 12. Units 3 and 4 are more cognitively demanding than Units 1 and 2 (n=22)

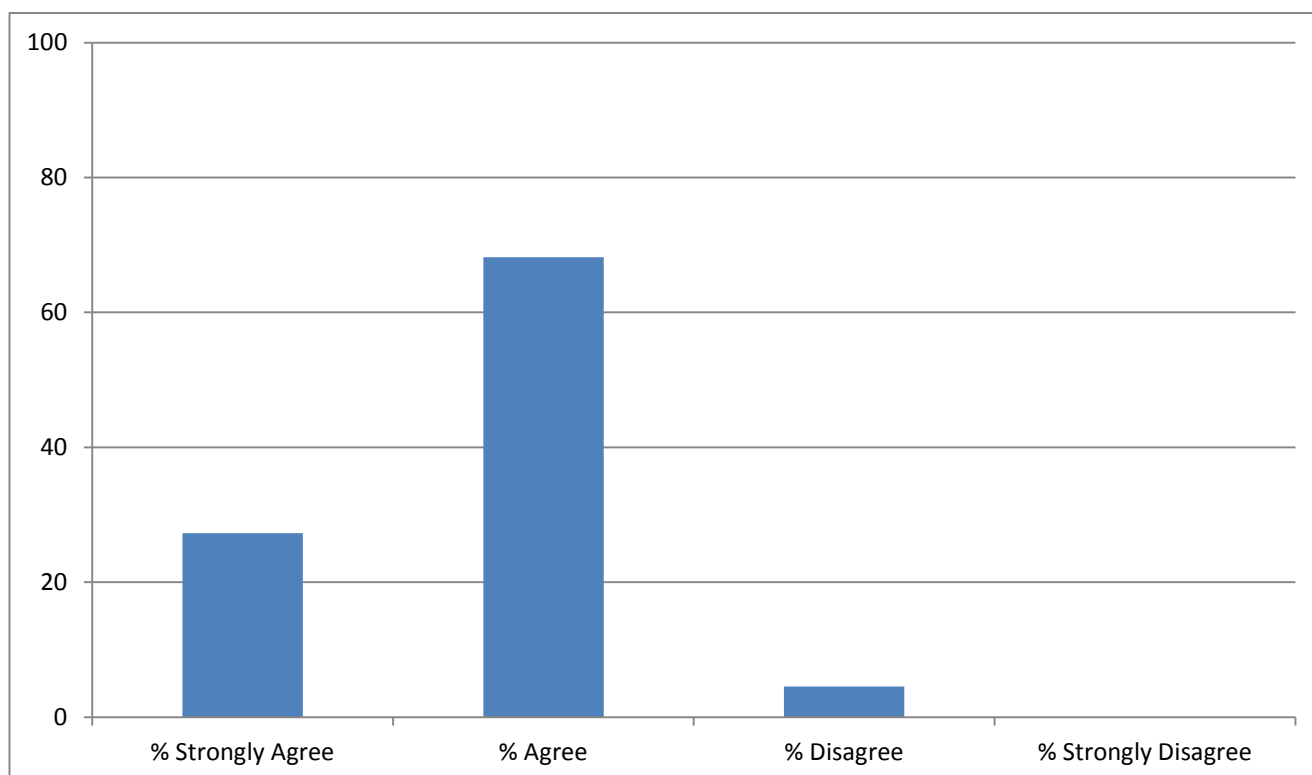


Figure 5: Response to Question 13. There is a clear link between this senior secondary curriculum and the relevant F-10 Australian Curriculum (n=21)

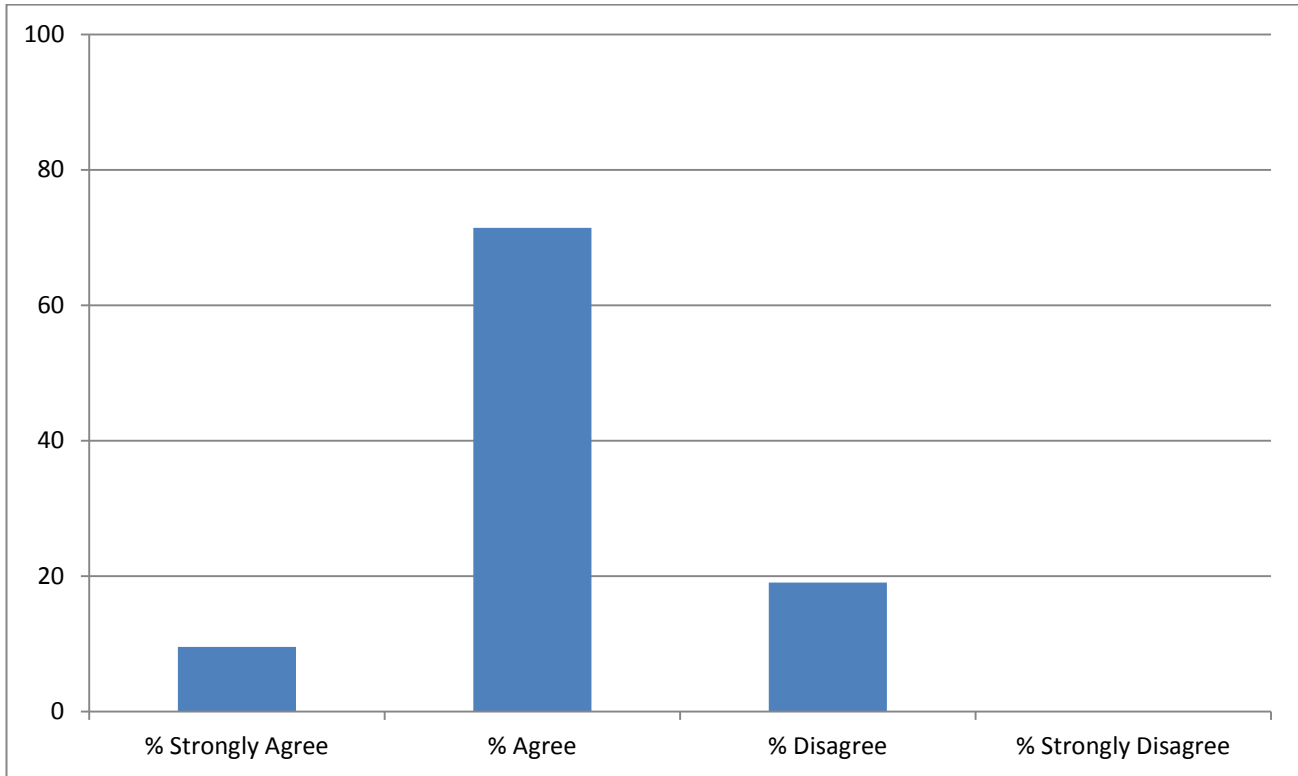


Figure 6: Response to Question 14. The achievement standards across Units 1 and 2 and Units 3 and 4 are organised in an order consistent with your experience (n=21)

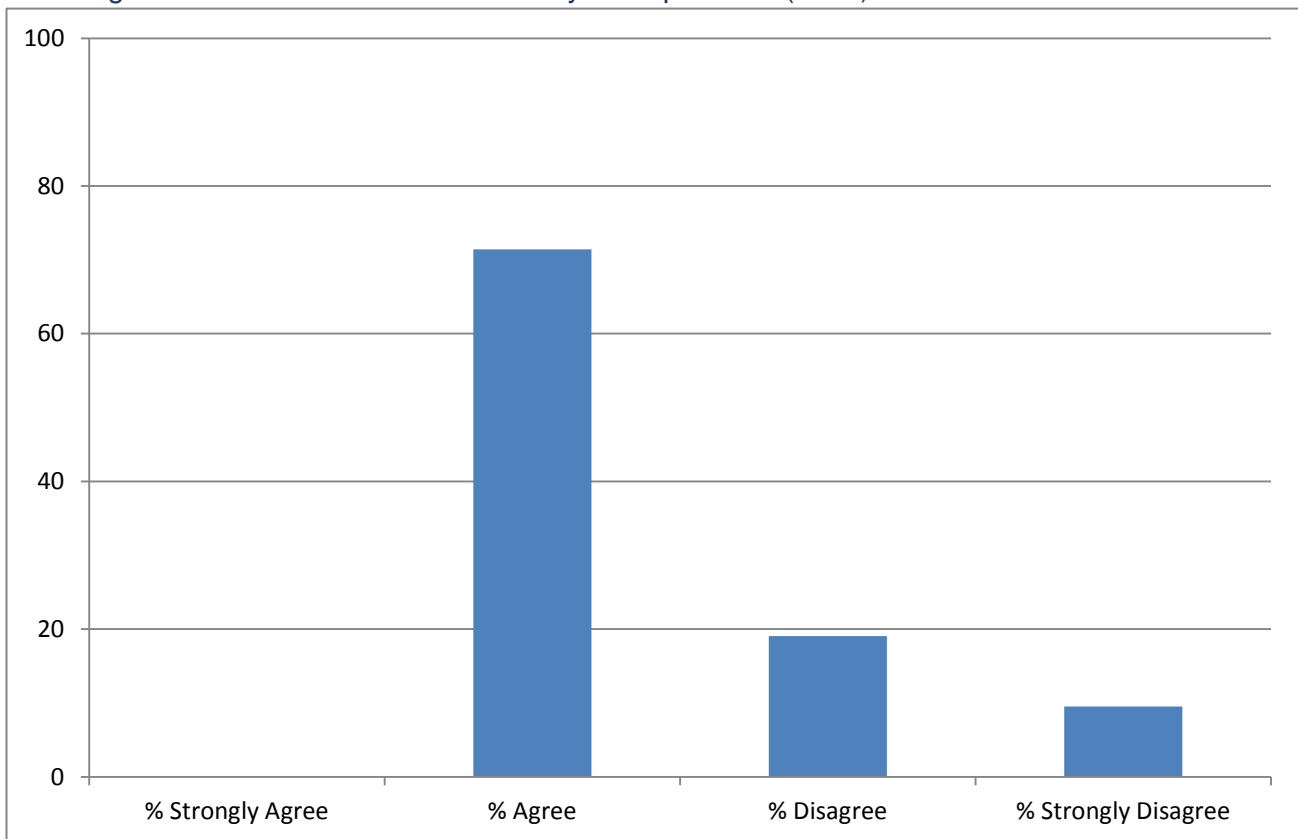


Figure 7: Response to Question 15. Unit 1: The unit description describes the focus and scope for this unit (n=20)

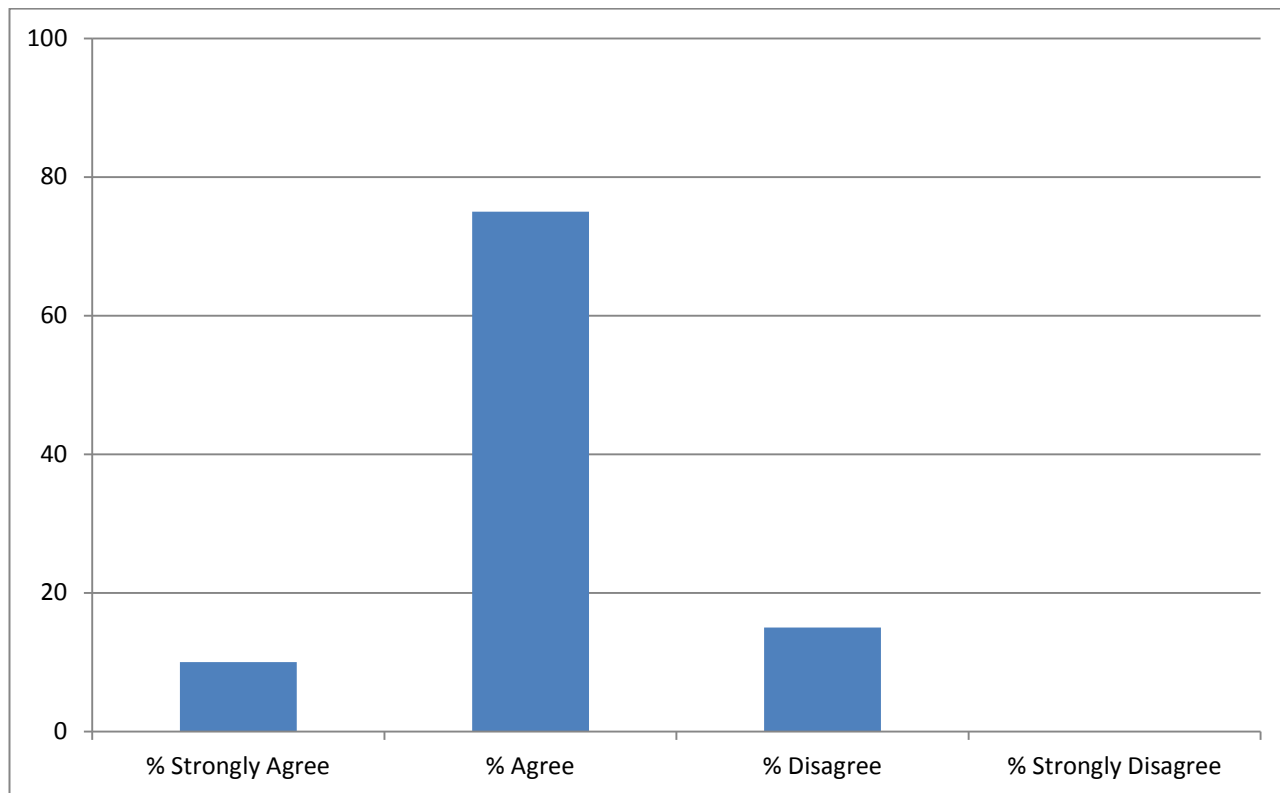


Figure 8: Response to Question 16. The outcomes describe clearly the expected learning for this unit (n=20)

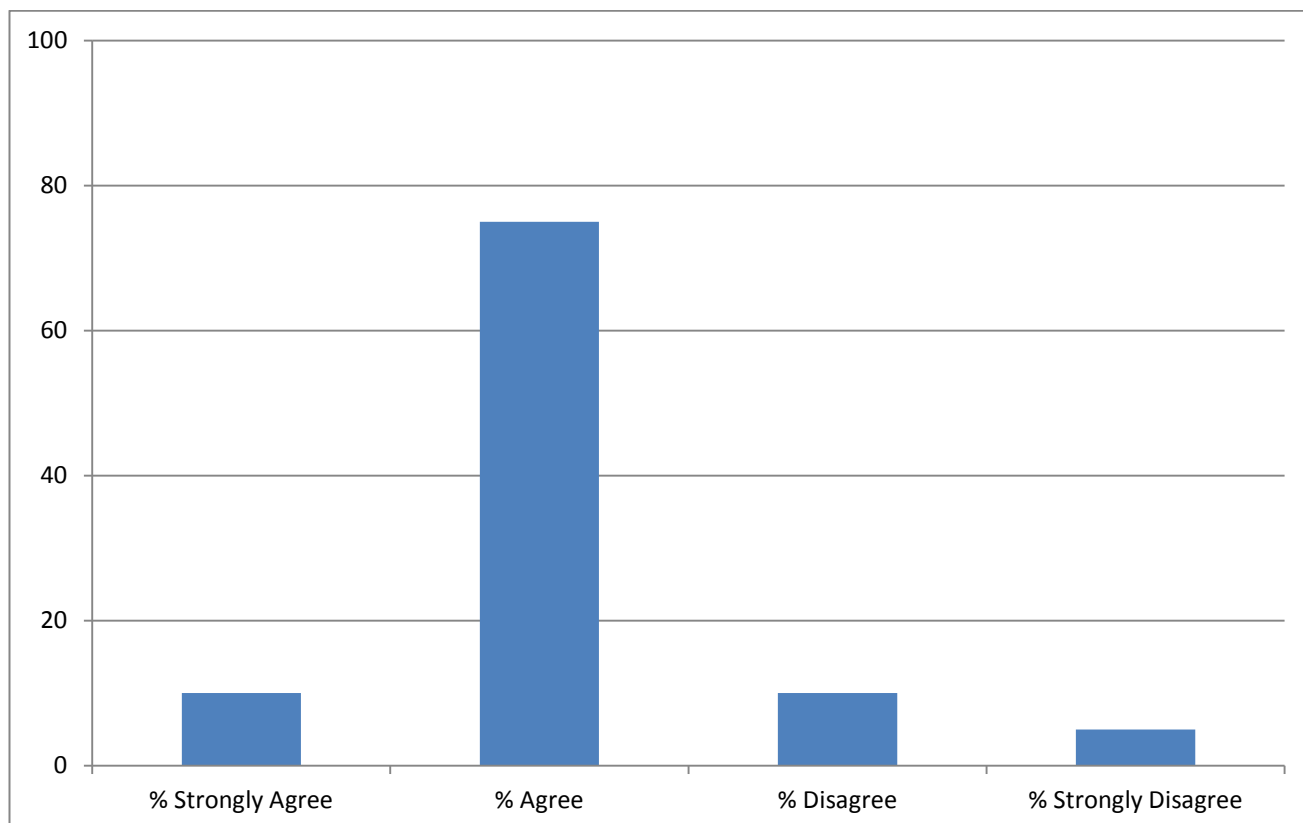


Figure 9: Response to Question 17. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=20)

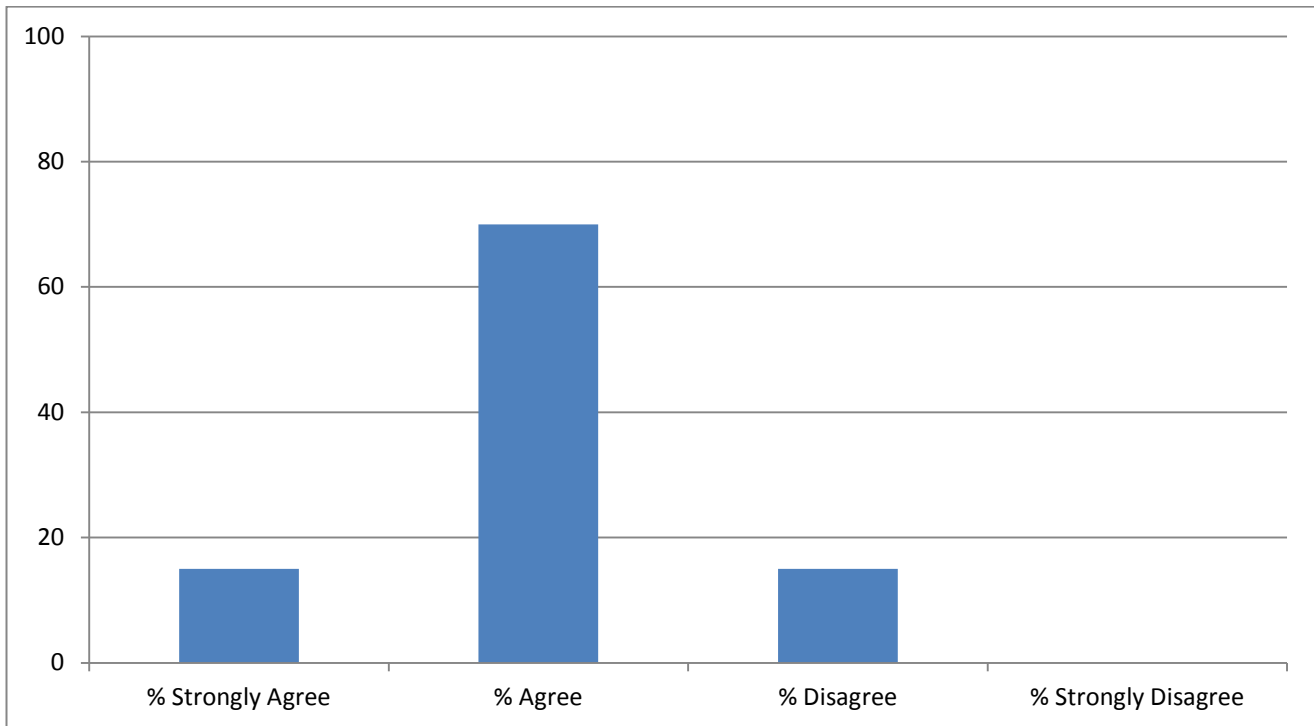


Figure 10: Response to Question 18. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=19)

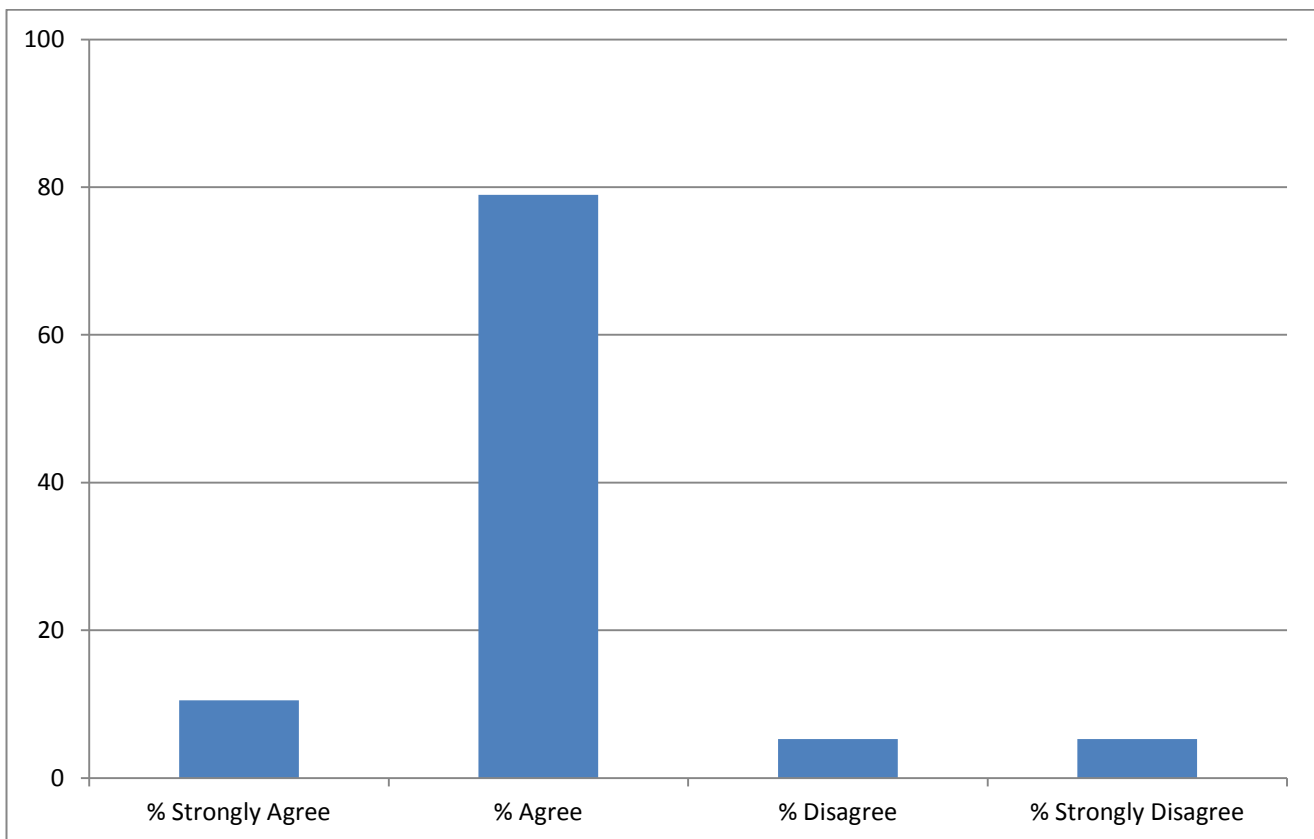


Figure 11: Response to Question 19. The content descriptions are specific about what is to be taught (n=20)

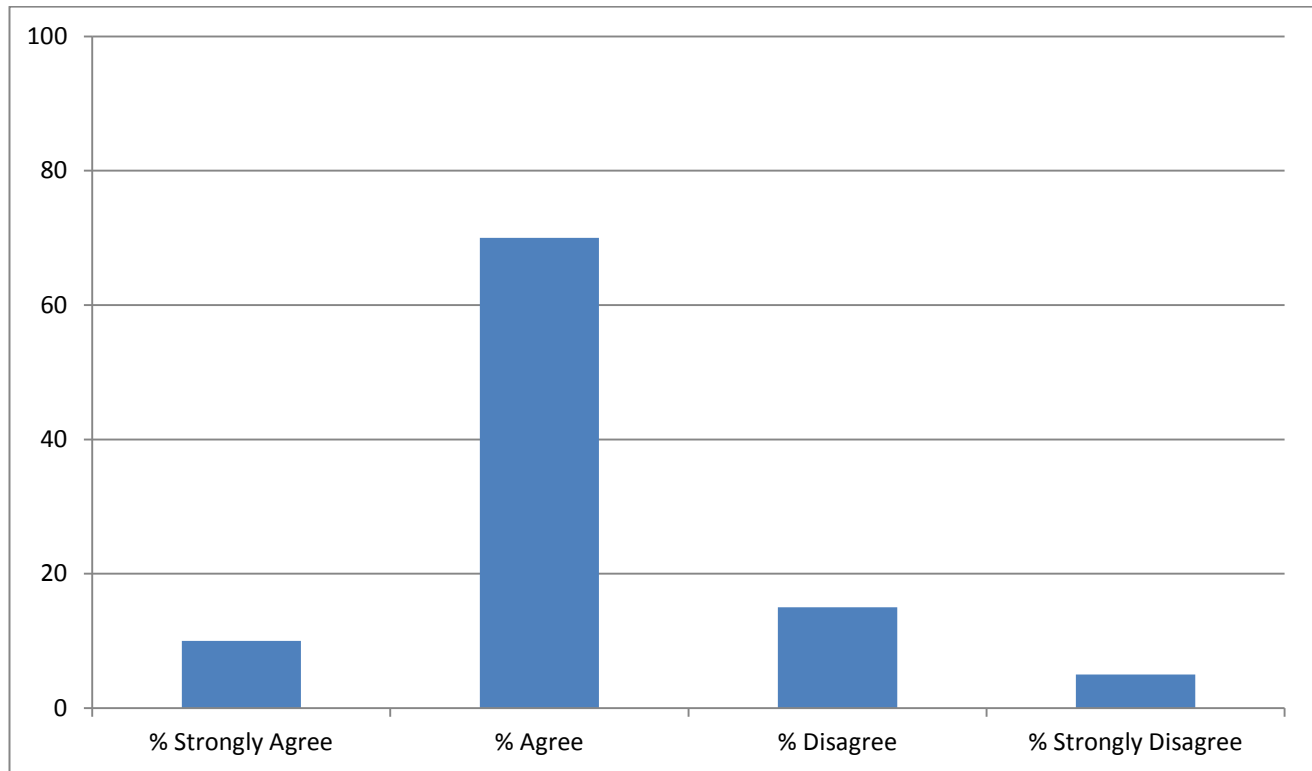


Figure 12: Response to Question 20. Unit 2: The unit description clearly describes the focus and scope for this unit (n=21)

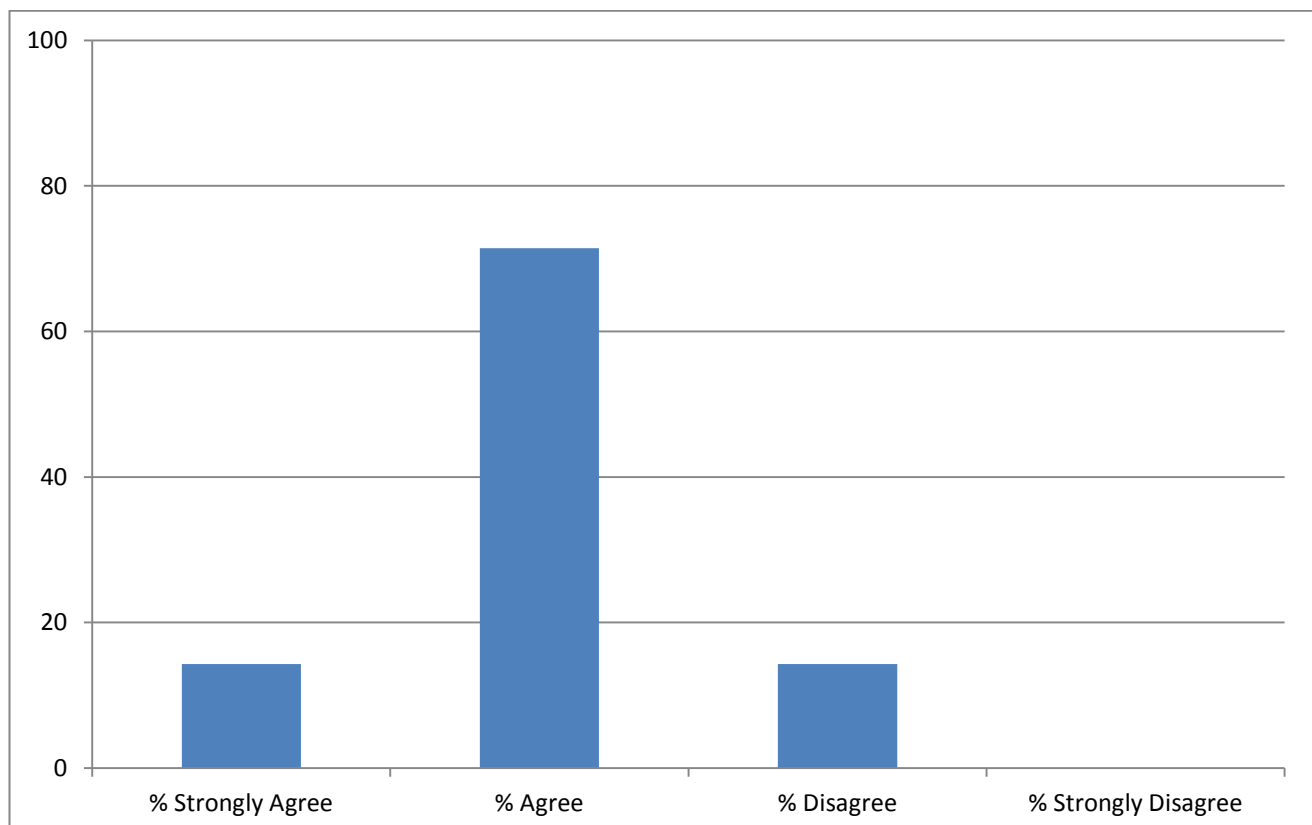


Figure 13: Response to Question 21. The unit outcomes describe clearly the expected learning for this unit (n=21)

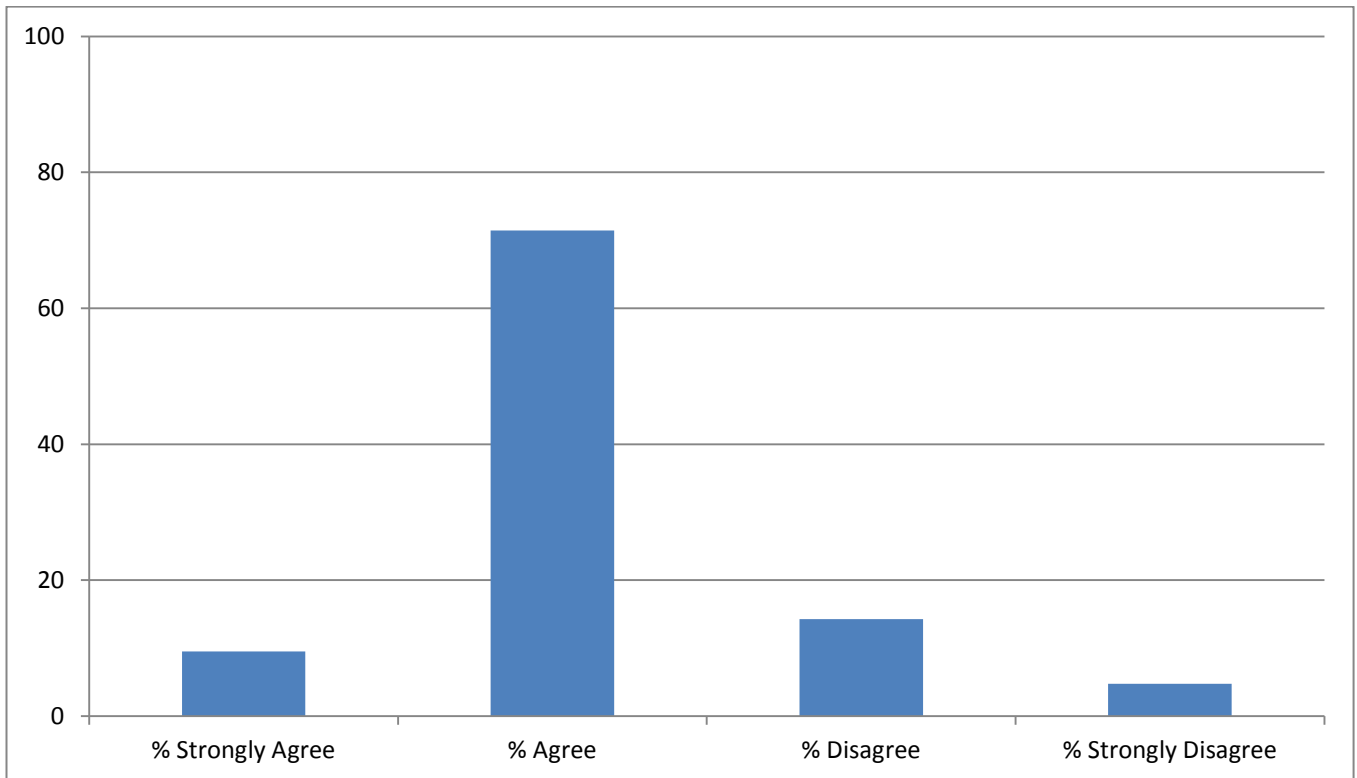


Figure 14: Response to Question 22. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=21)

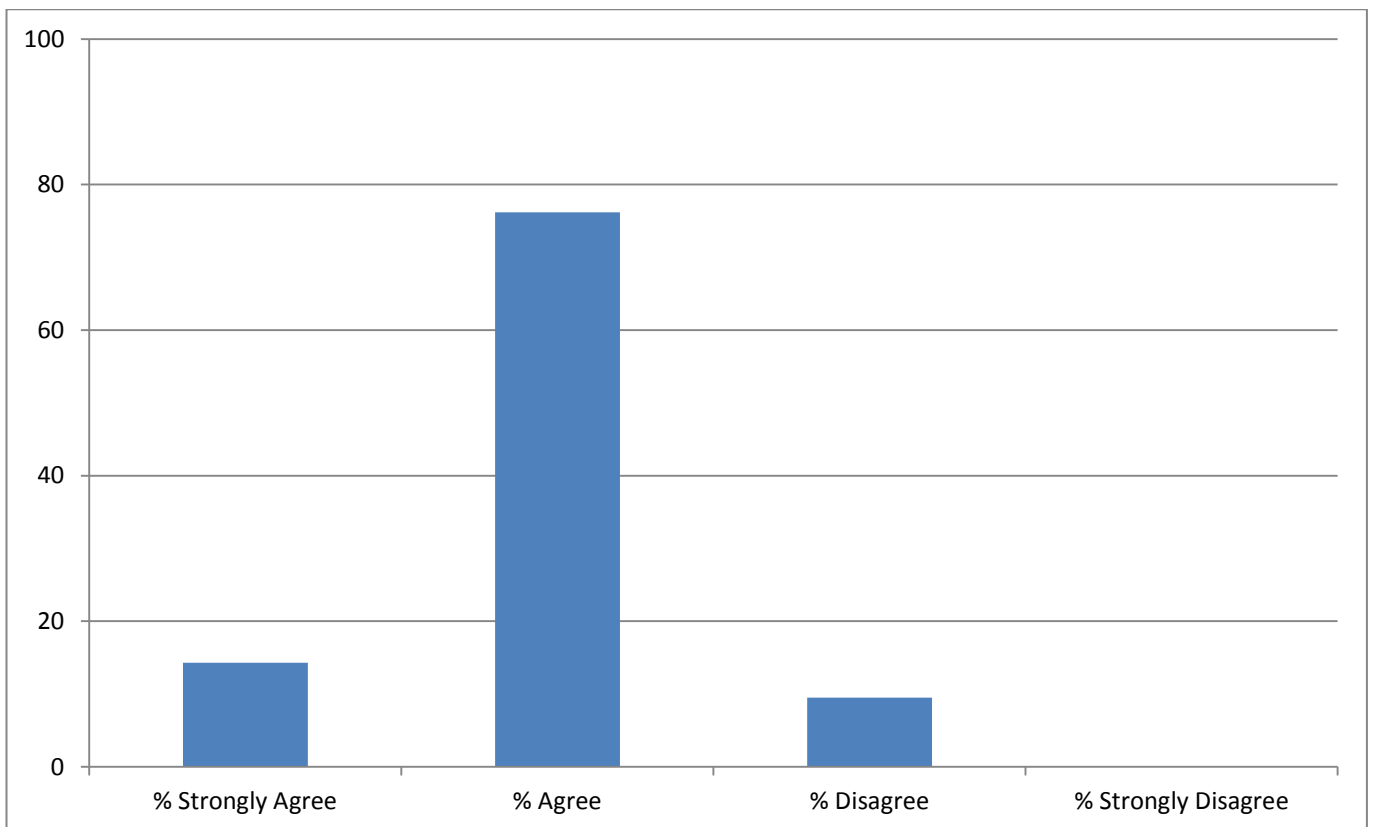




Figure 15: Response to Question 23. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=24)

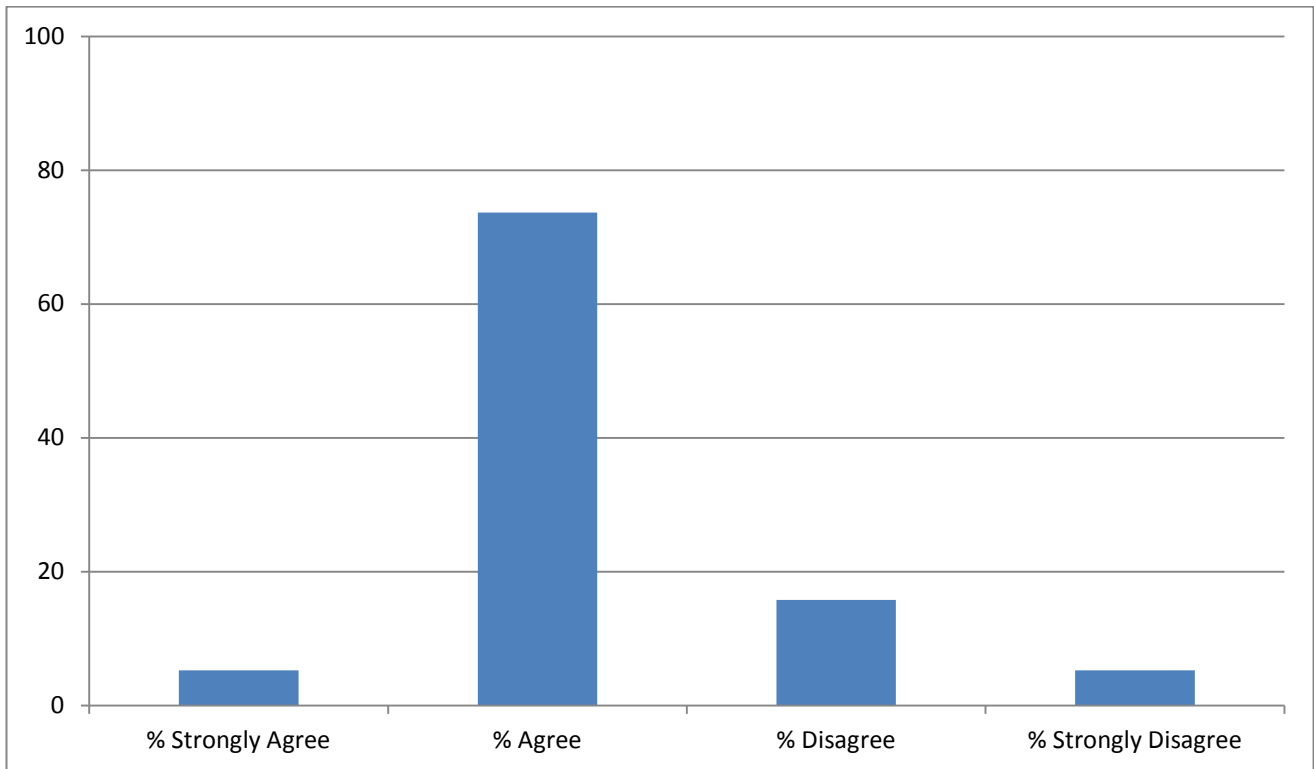


Figure 16: Response to Question 24. The content descriptions are specific about what is to be taught (n=20)

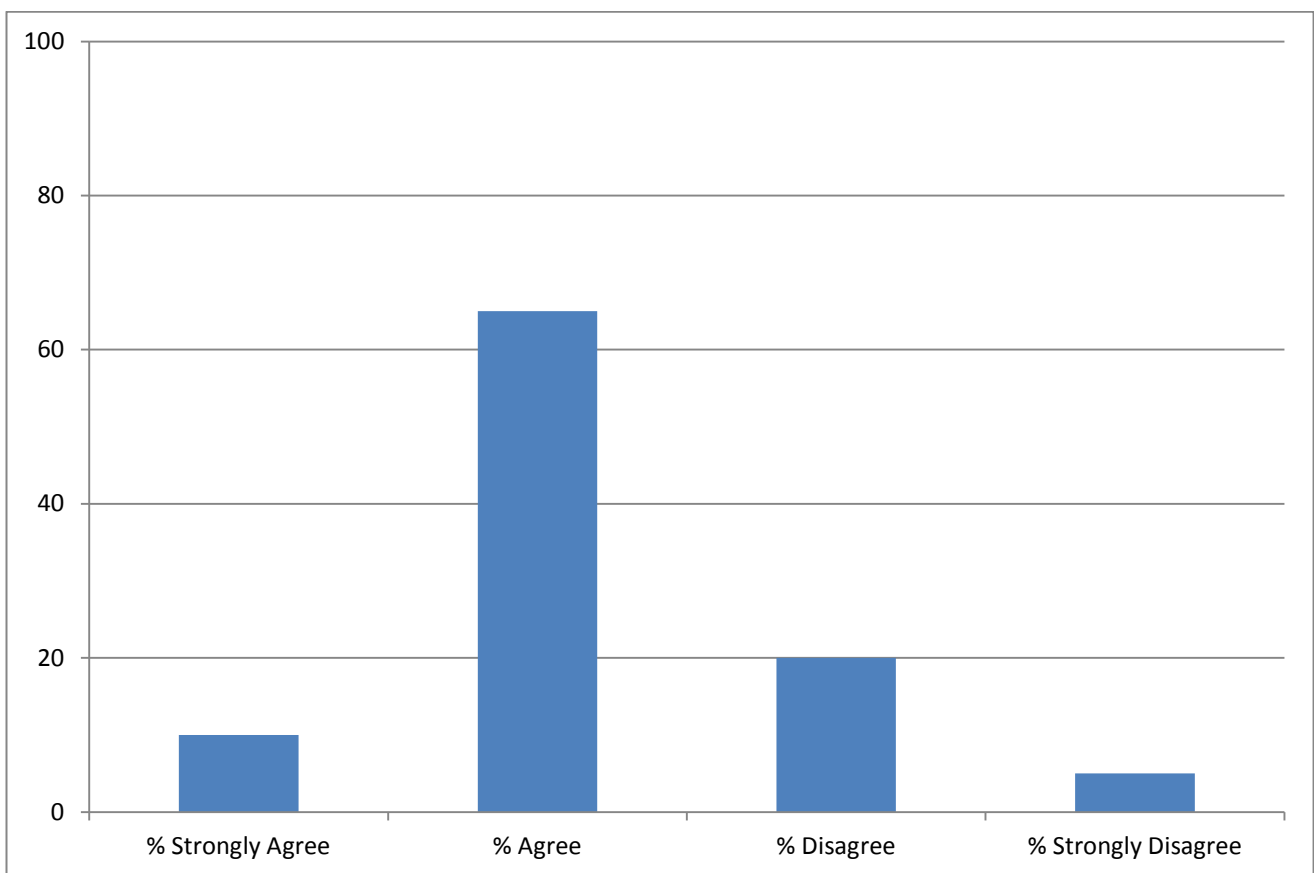


Figure 17: Response to Question 25. Achievement standards for Units 1 and 2: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=18)

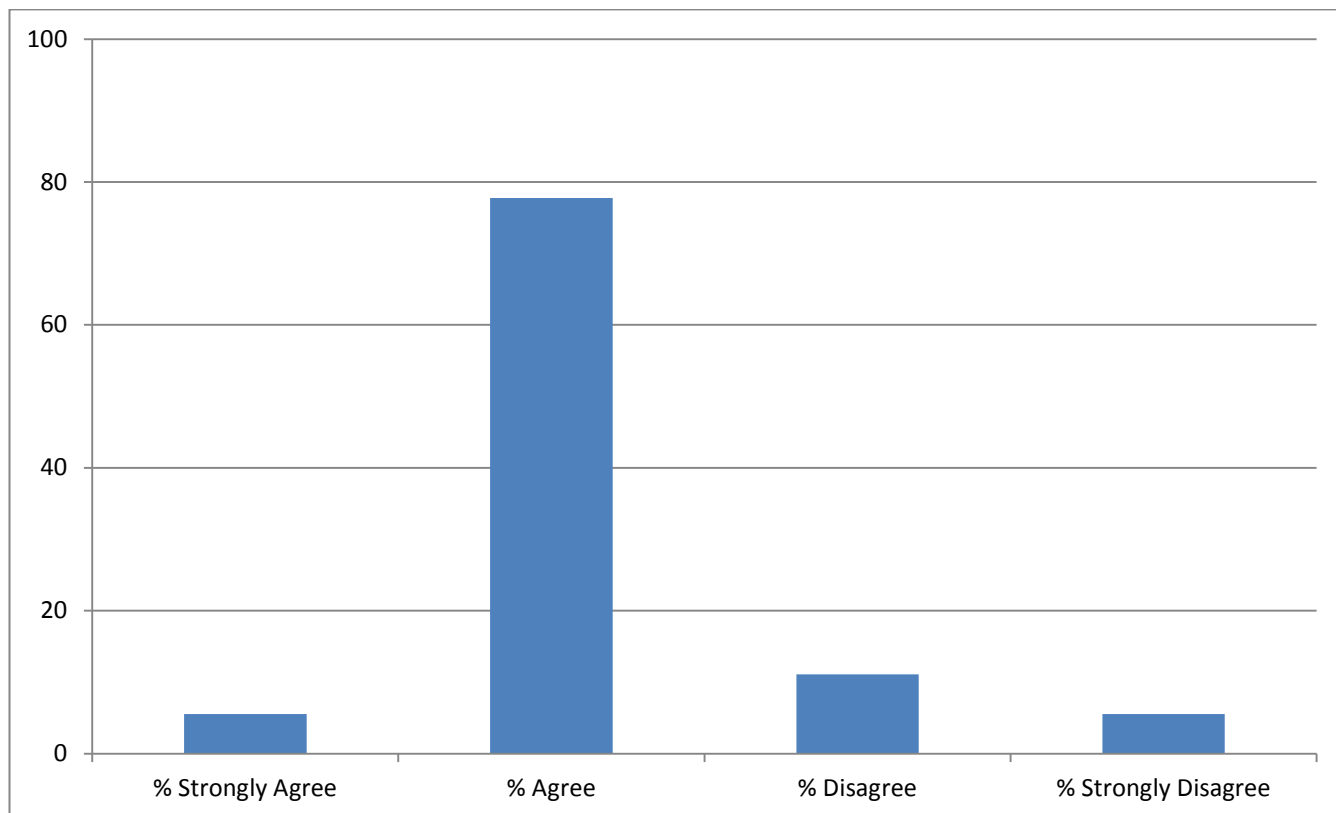


Figure 18: Response to Question 26. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=18)

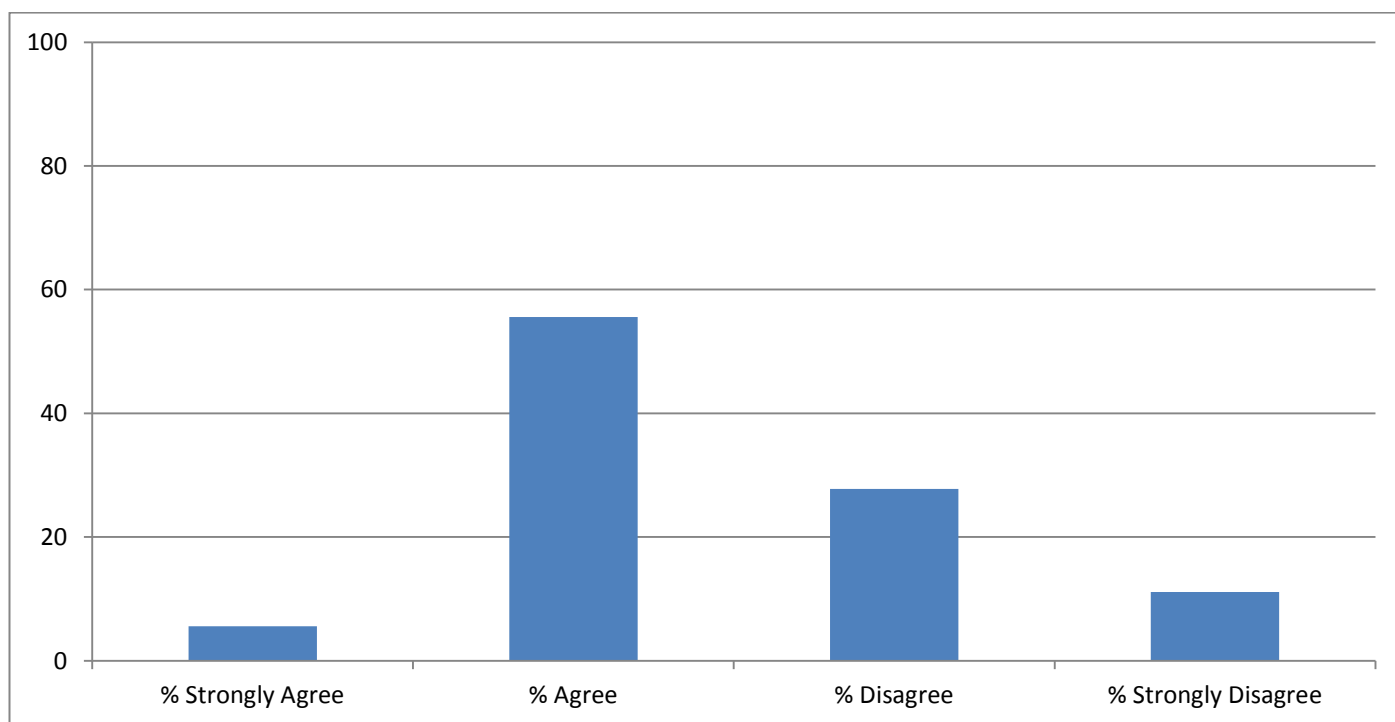


Figure 19: Response to Question 28. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=18)

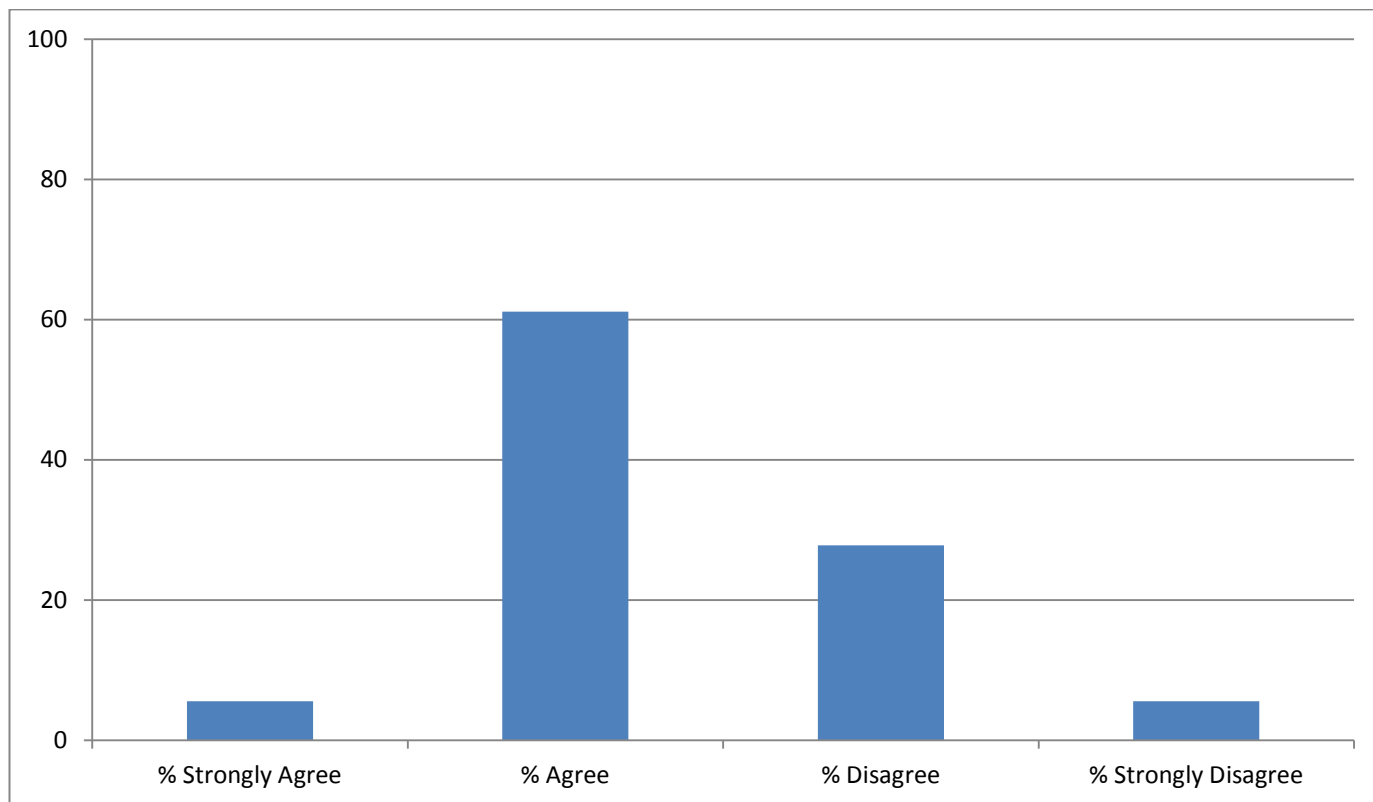


Figure 20: Response to Question 29. Unit 3: The unit description clearly describes the focus and scope for this unit (n=18)

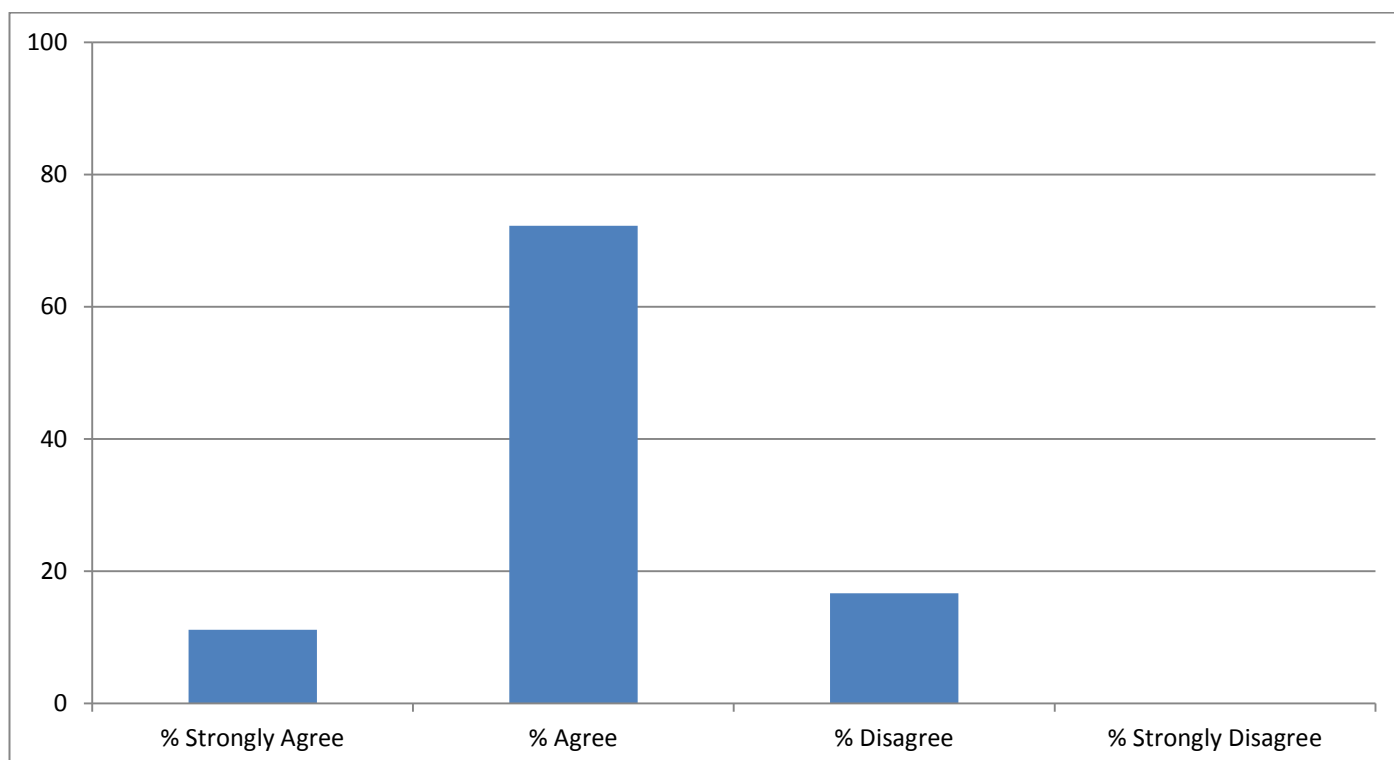


Figure 21: Response to Question 30. The unit outcomes describe clearly the expected learning for this unit (n=18)

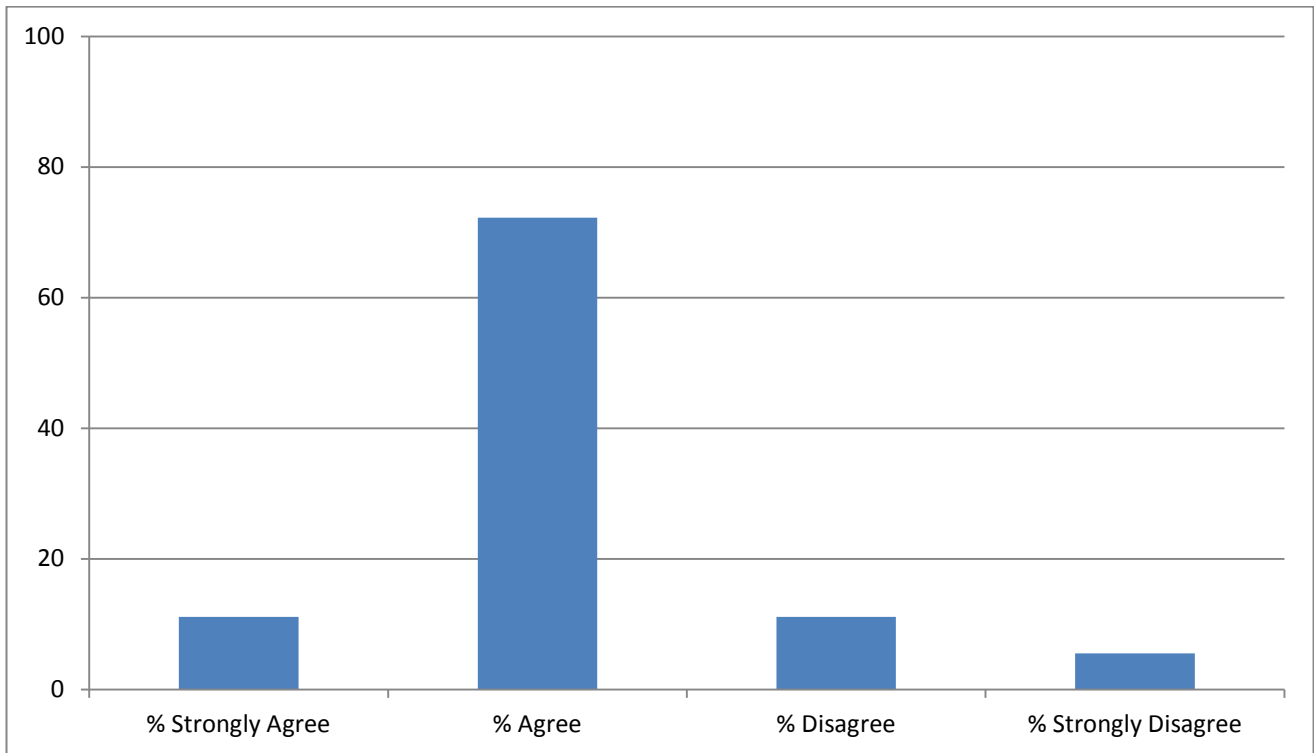


Figure 22: Response to Question 31. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=19)

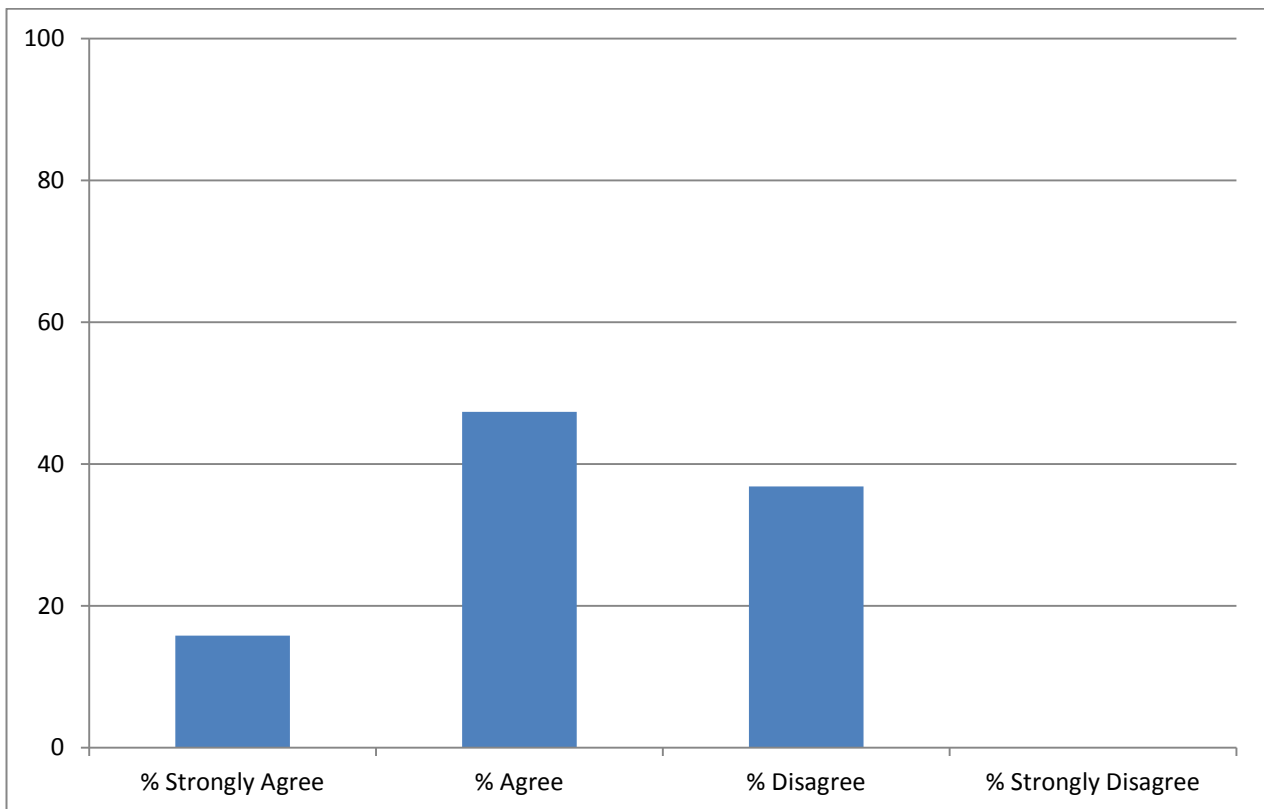


Figure 23: Response to Question 32. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=18)

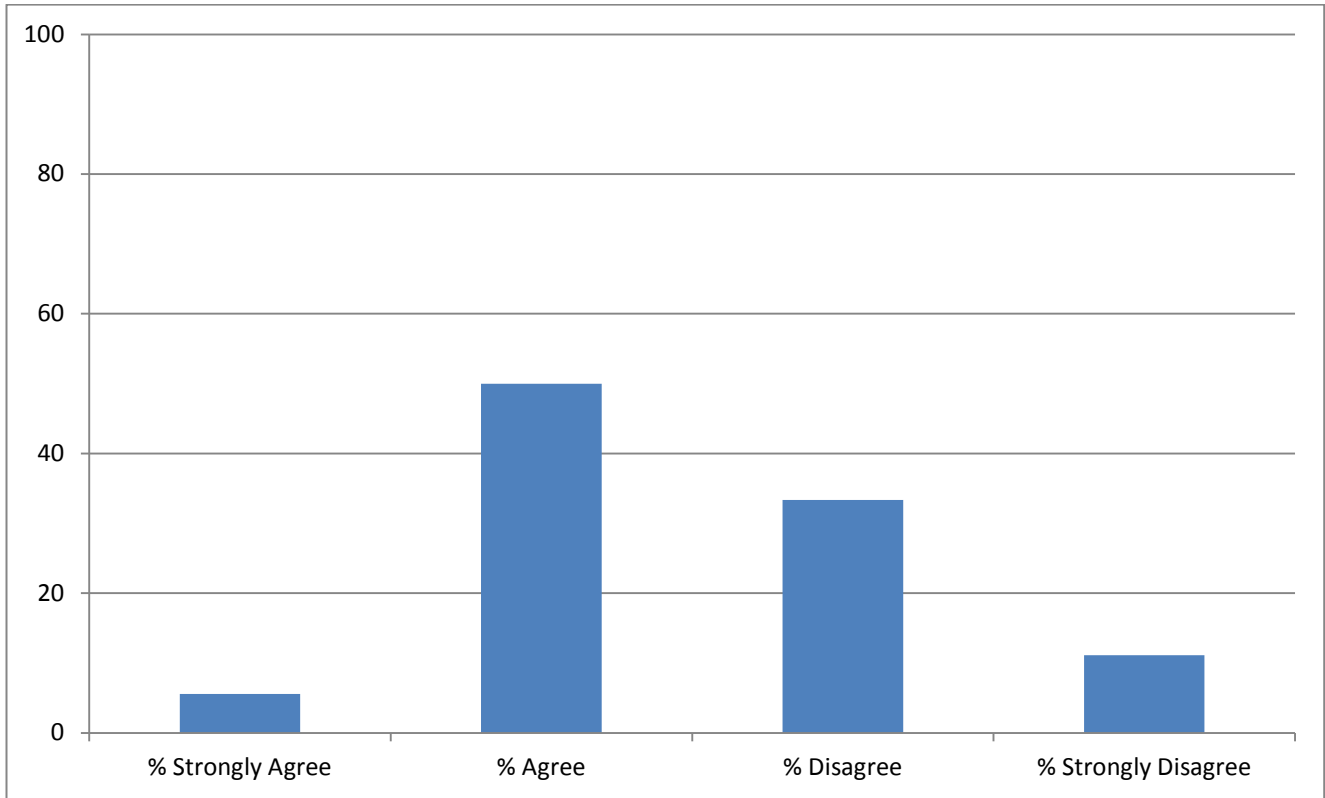


Figure 24: Response to Question 33. The content descriptions are specific about what is to be taught (n=18)

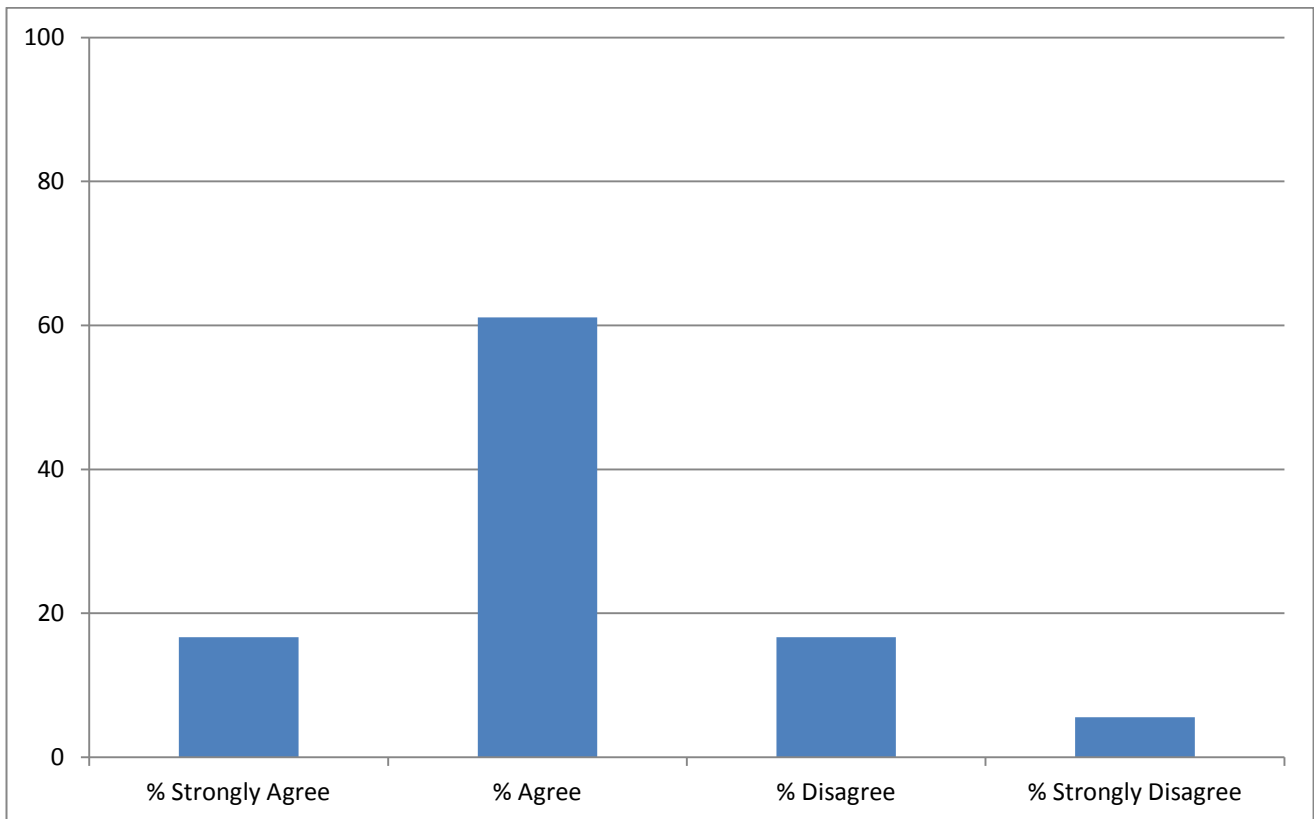


Figure 25: Response to Question 34. Unit 4: The unit description clearly describes the focus and scope for this unit (n=18)

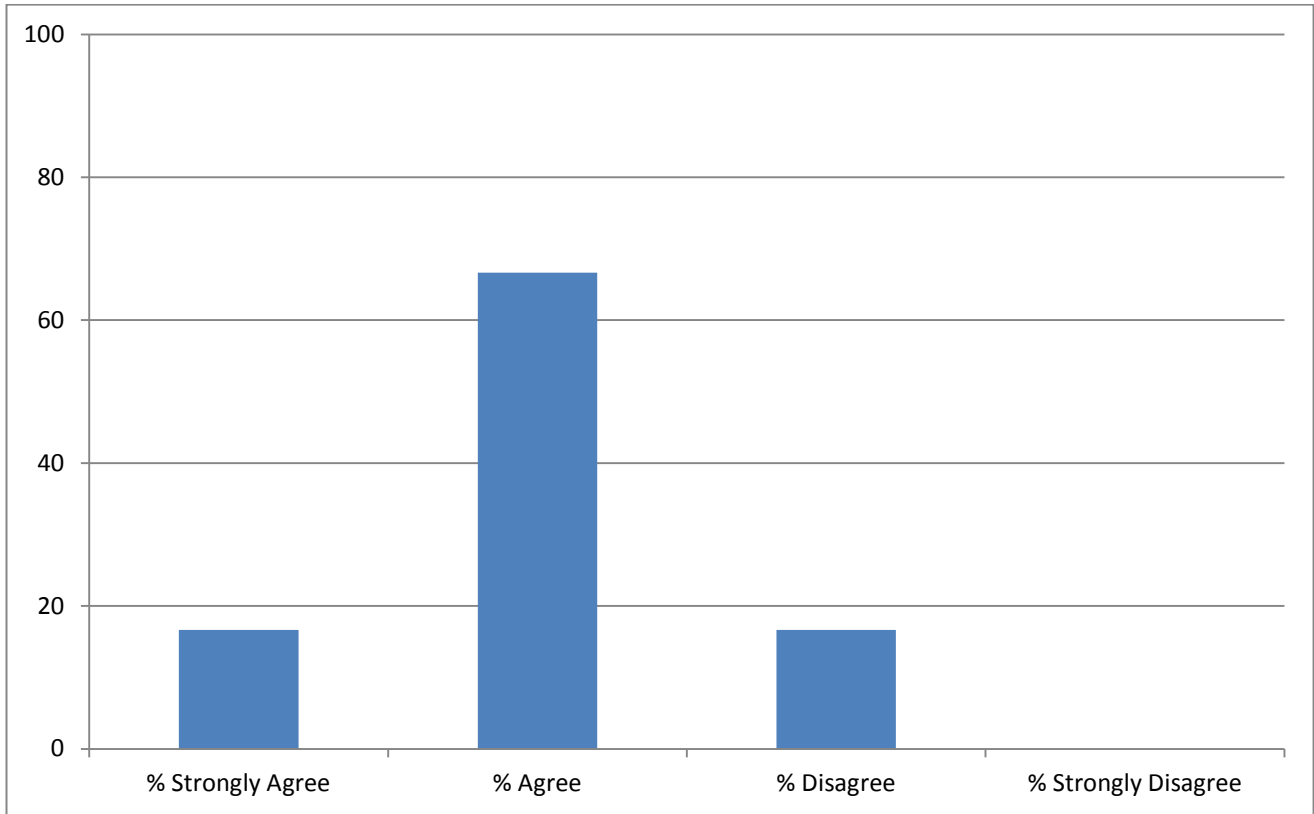


Figure 26: Response to Question 35. The unit outcomes describe clearly the expected learning for this unit (n=18)

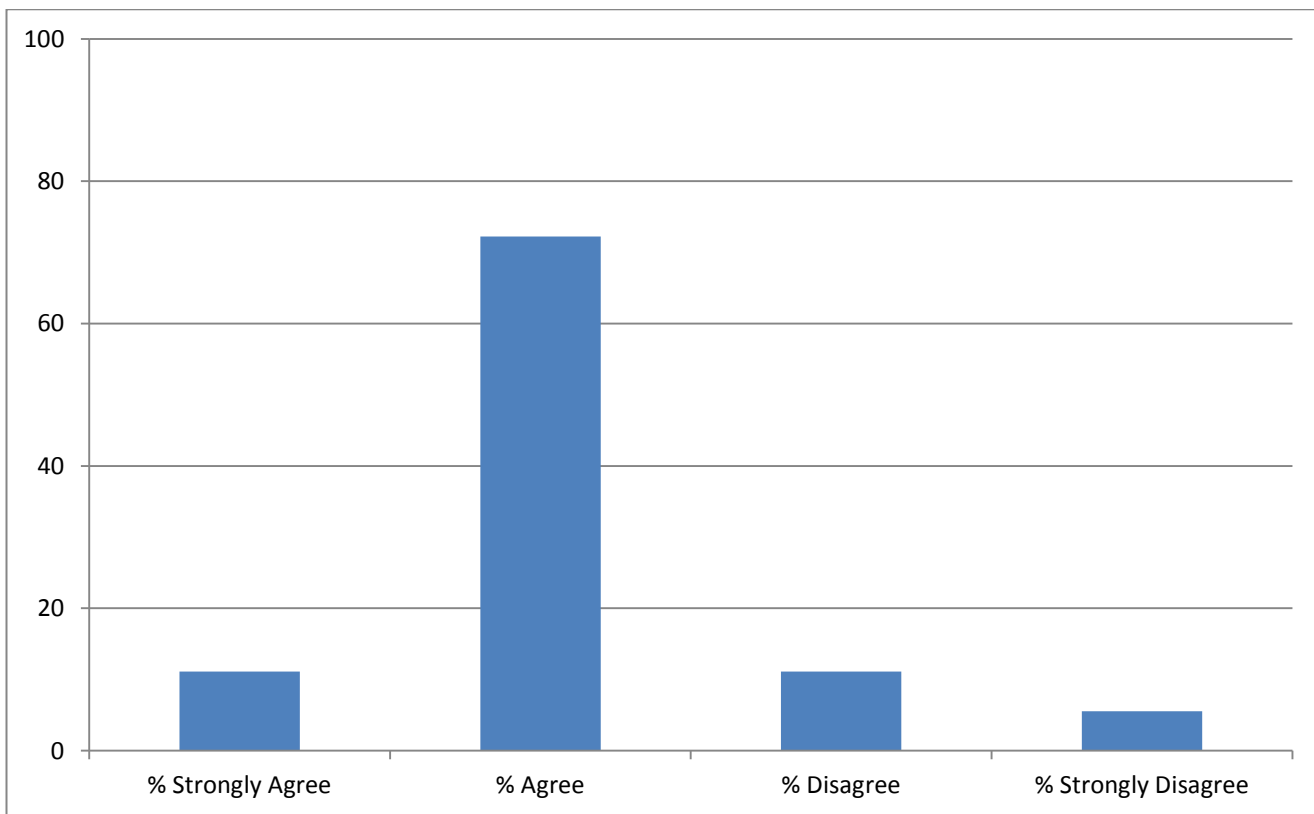


Figure 27: Response to Question 36. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=18)

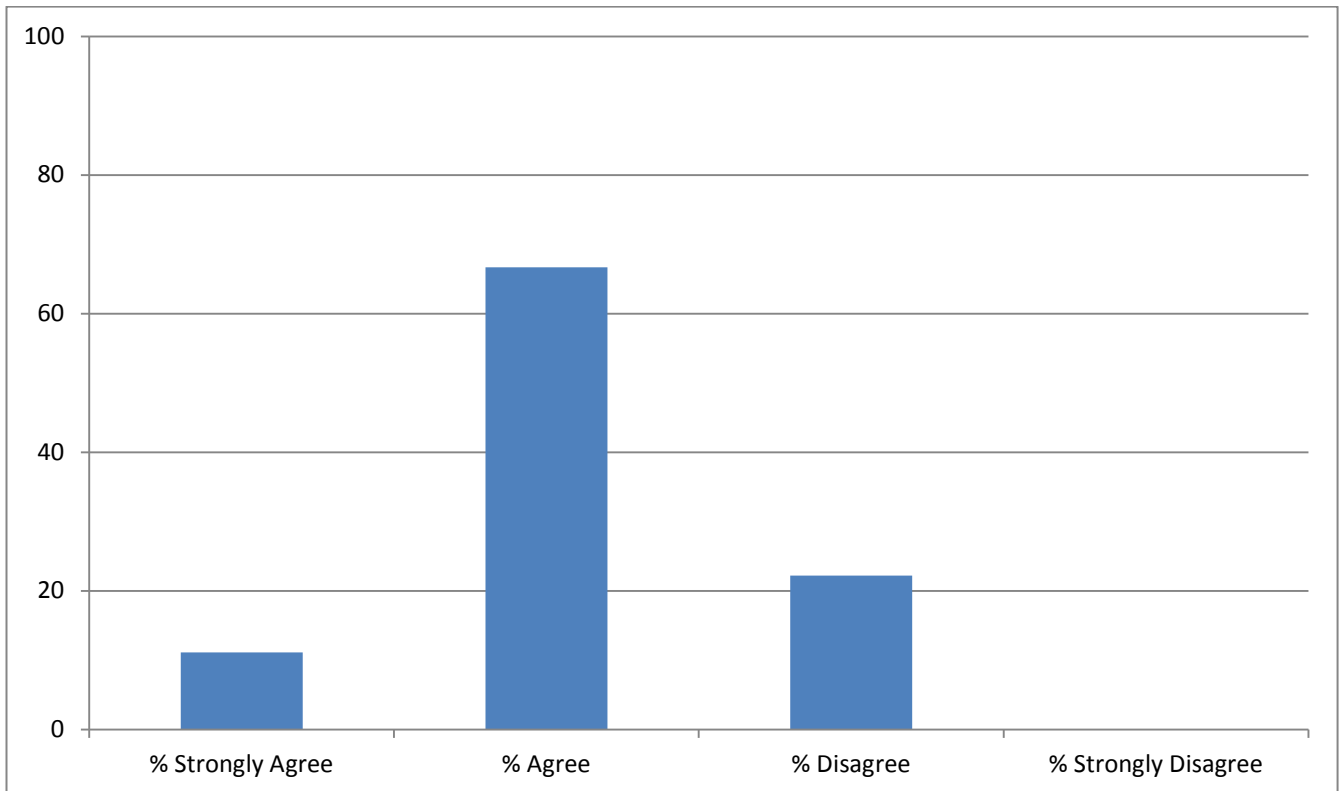


Figure 28: Response to Question 37. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=19)

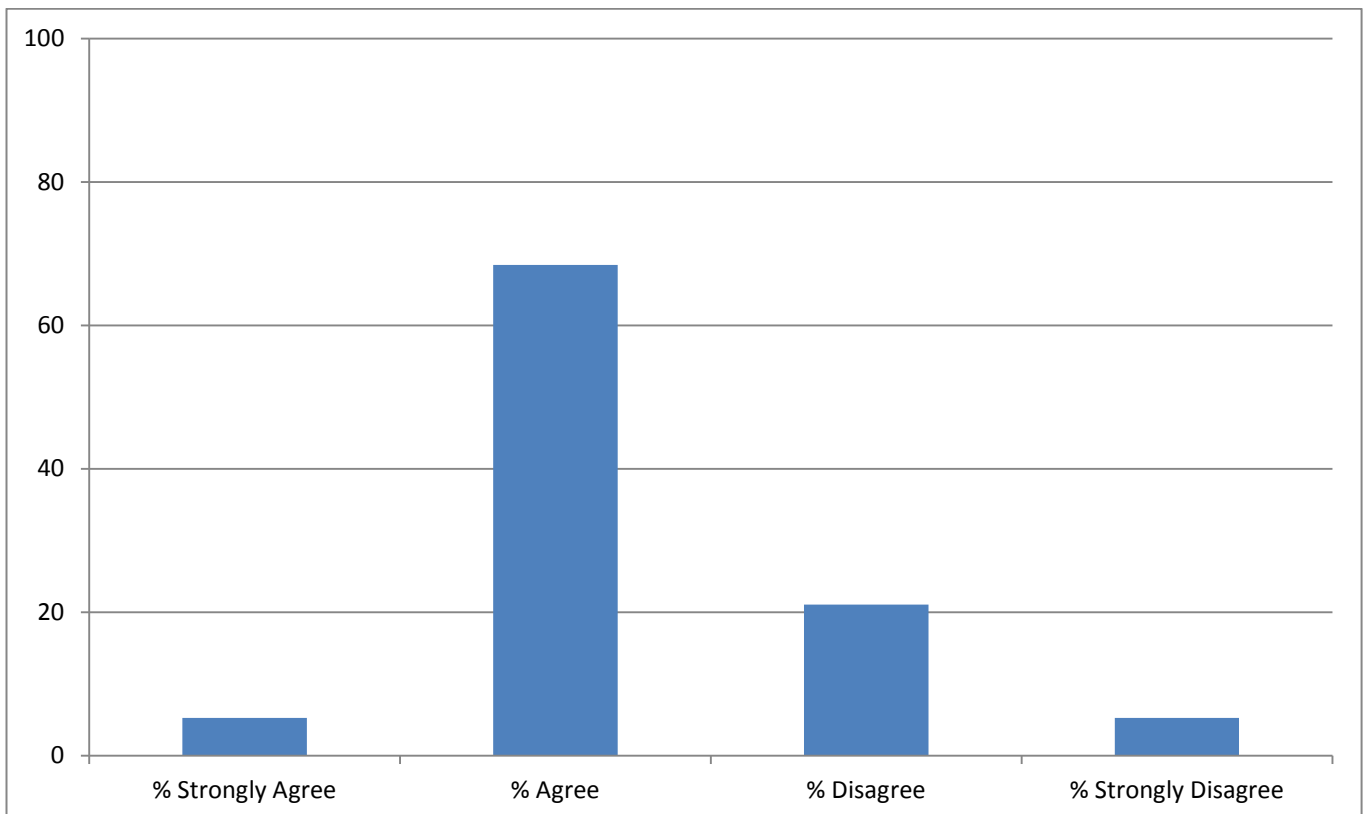


Figure 29: Response to Question 38. The content descriptions are specific about what is to be taught (n=17)

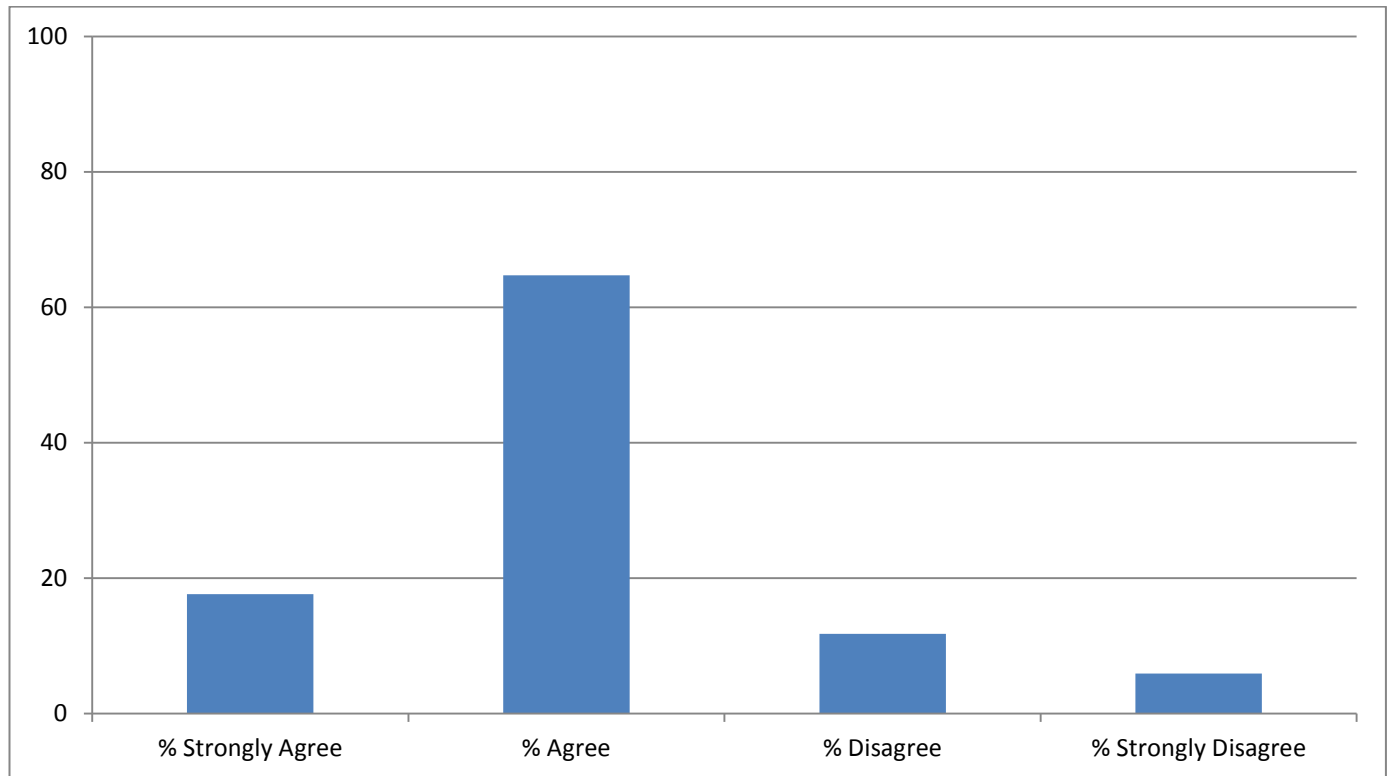


Figure 30: Response to Question 39. Achievement standards for Units 3 and 4: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=17)

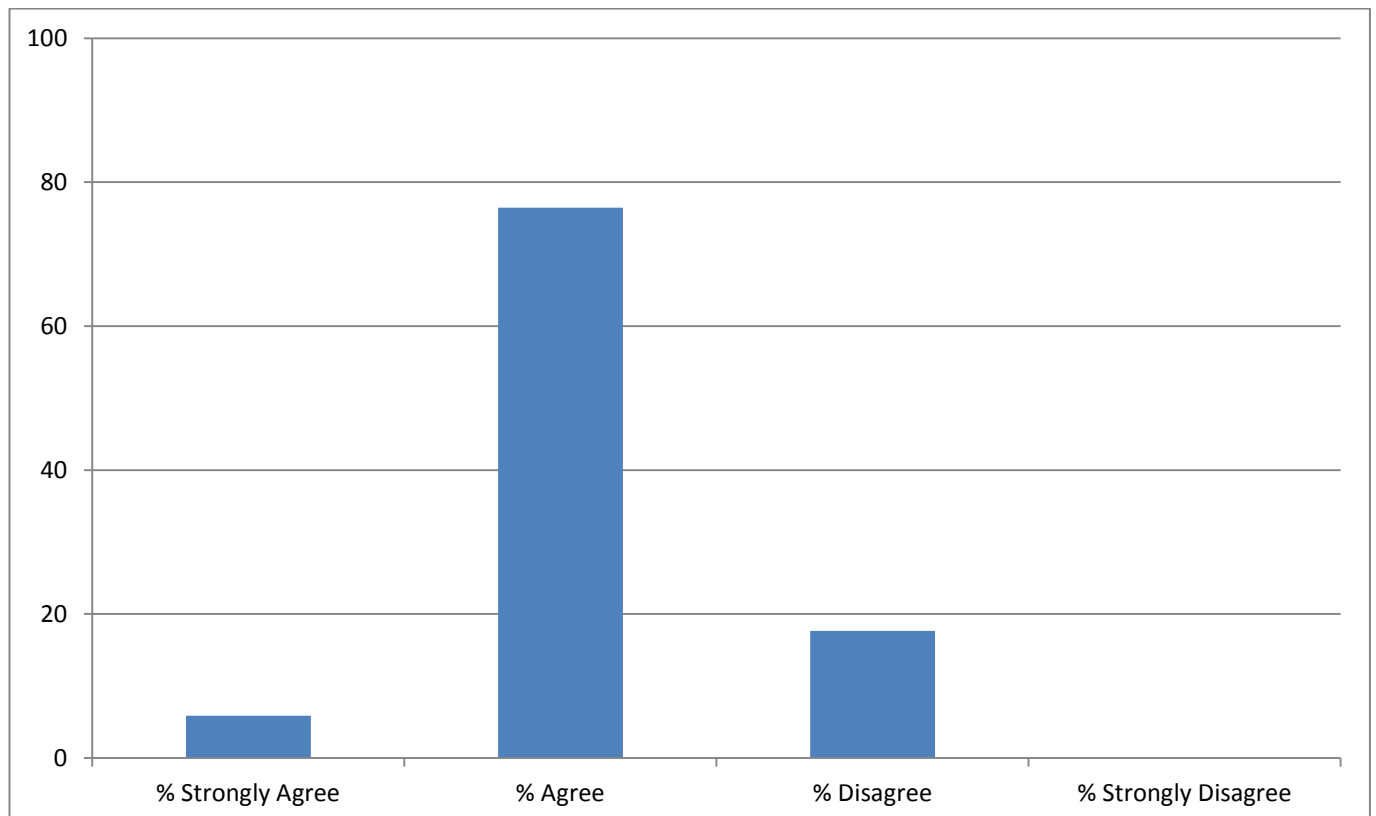




Figure 31: Response to Question 40. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=17)

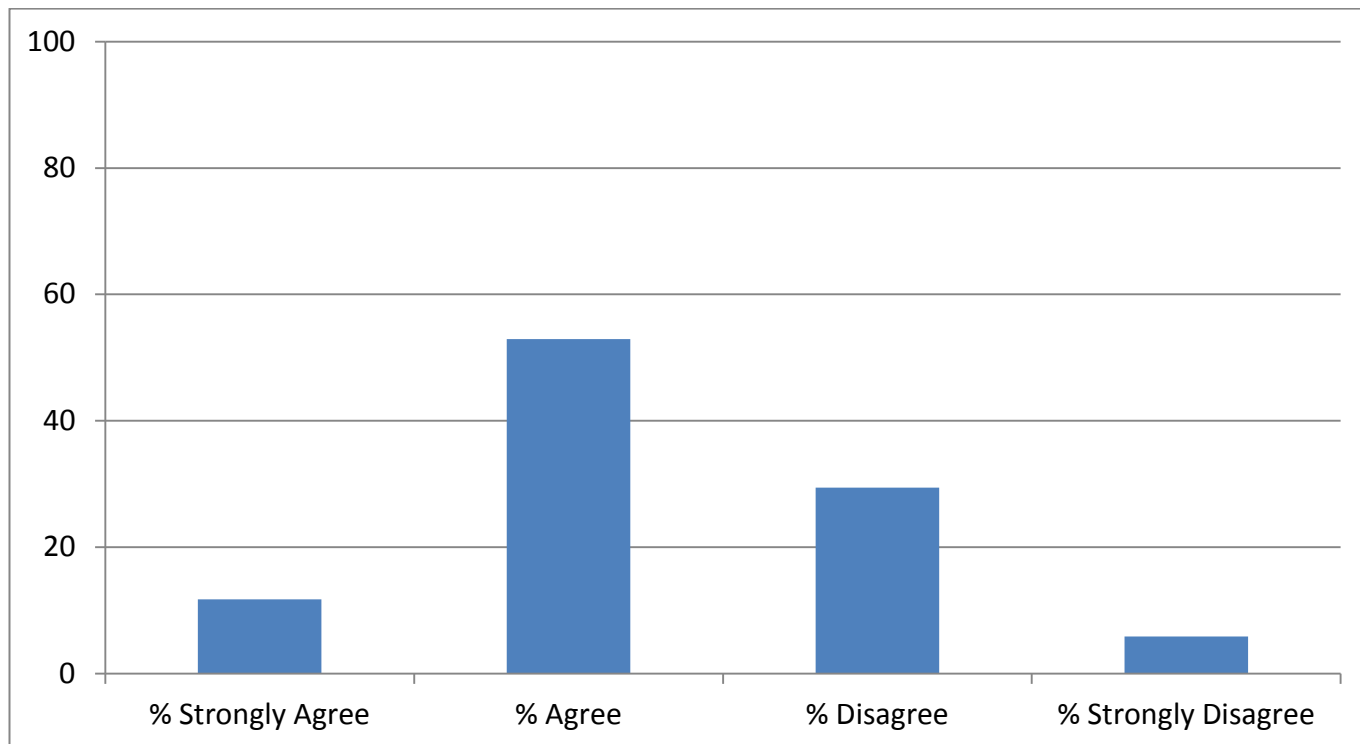


Figure 32: Response to Question 41. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units (n=17)

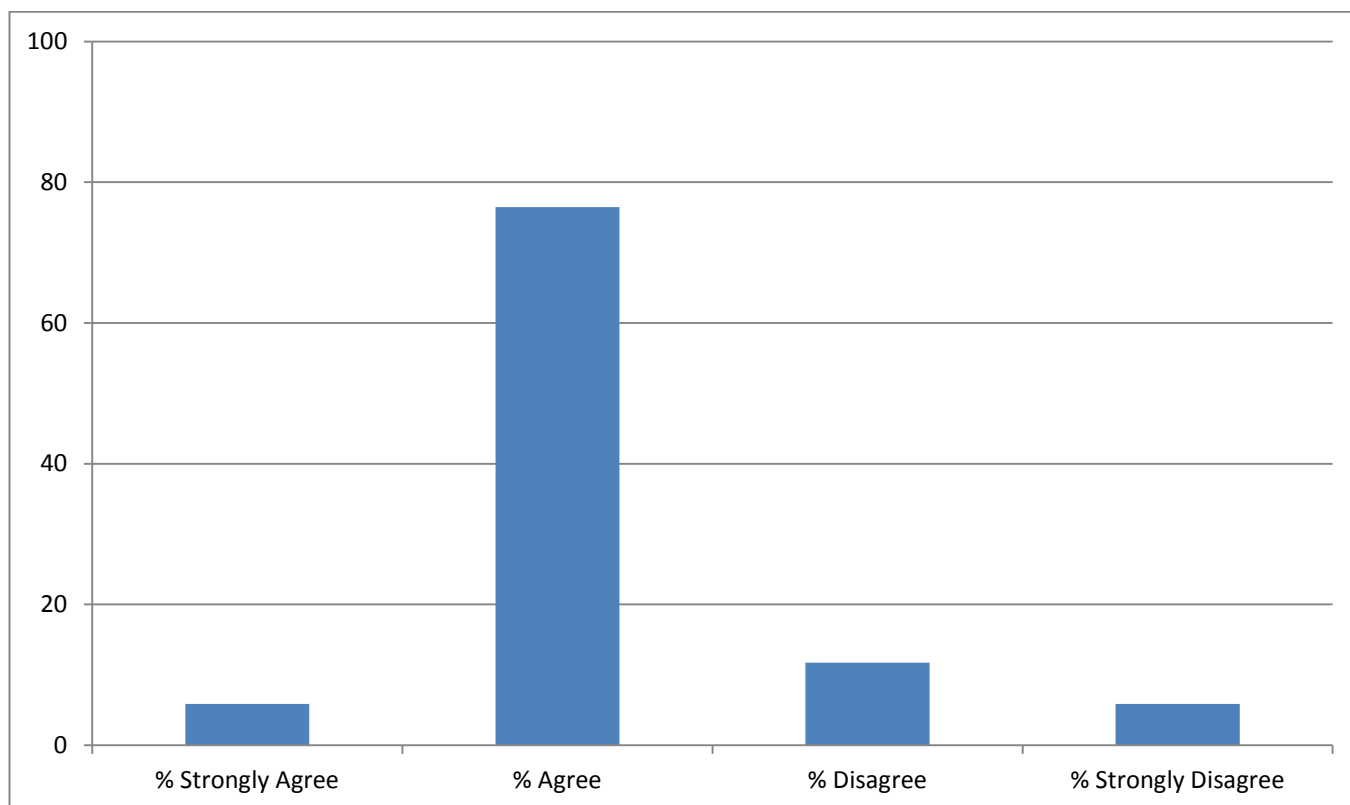


Figure 33: Response to Question 42. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=17)

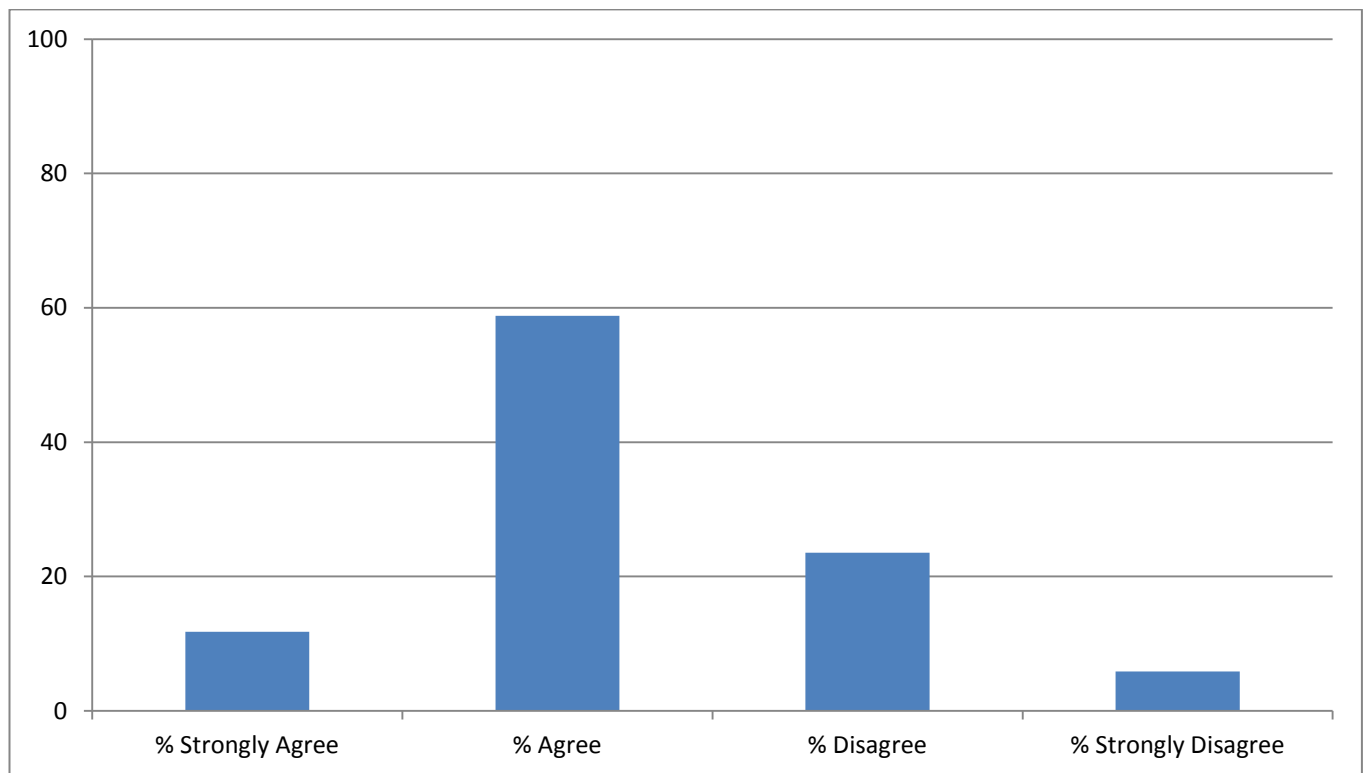


Figure 34: Response to Question 43. The general capabilities that naturally fit with this subject are appropriately represented (n=17)

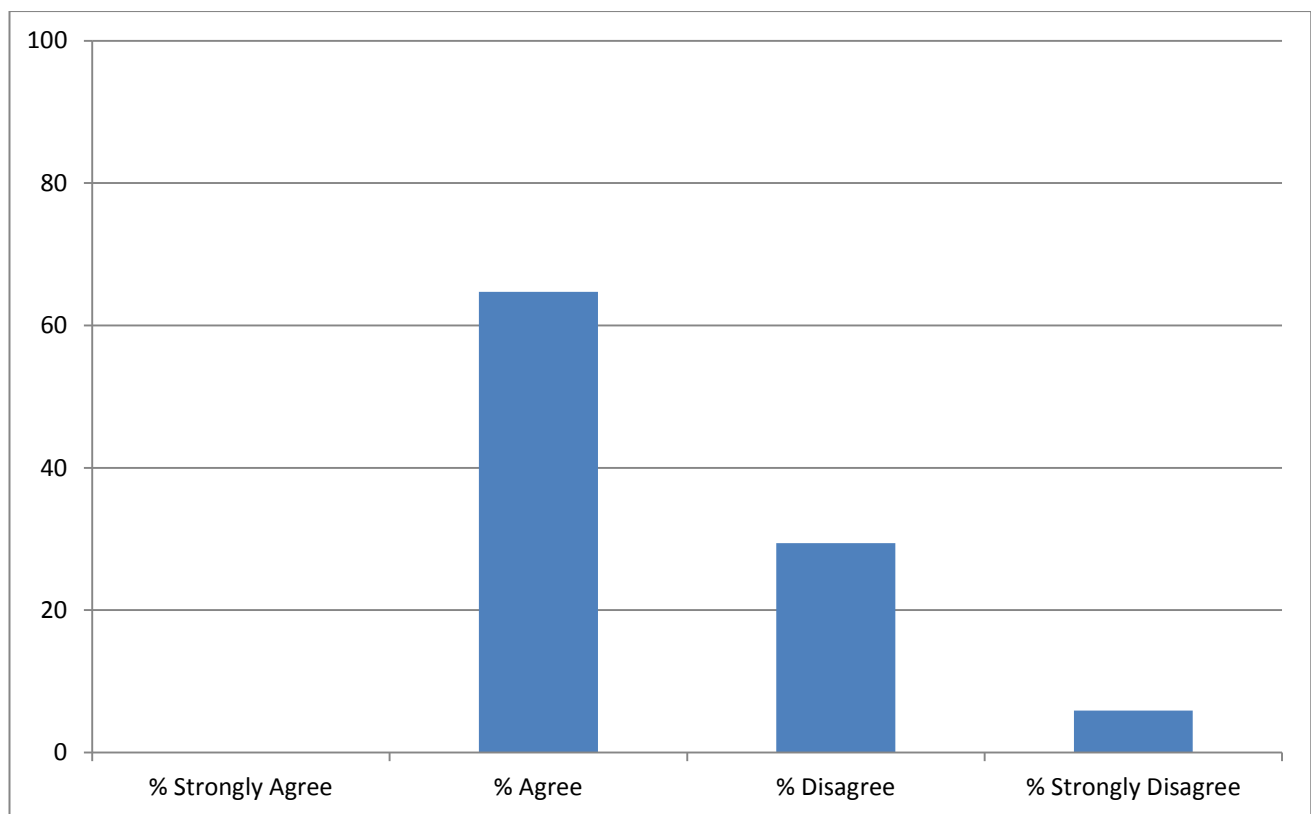


Figure 35: Response to Question 44. The cross-curriculum priorities that naturally fit with this subject are appropriately represented (n=18)

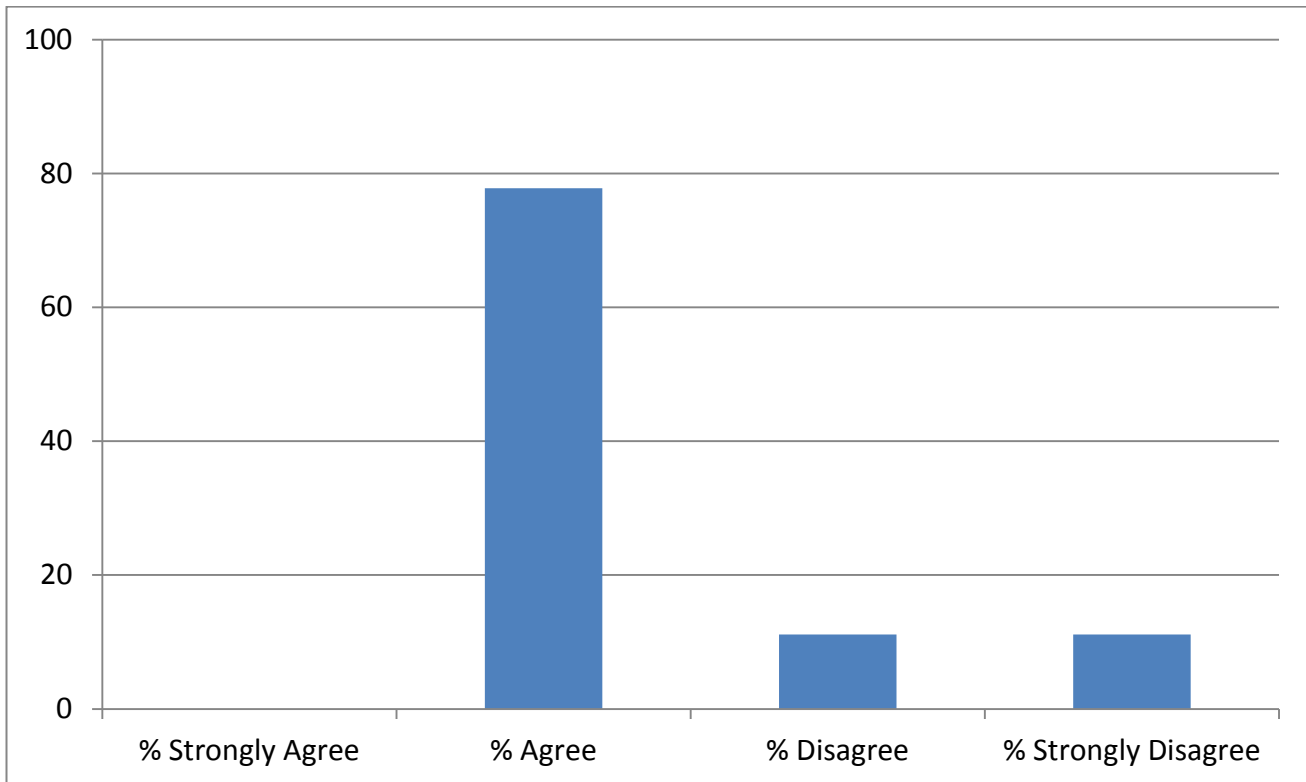
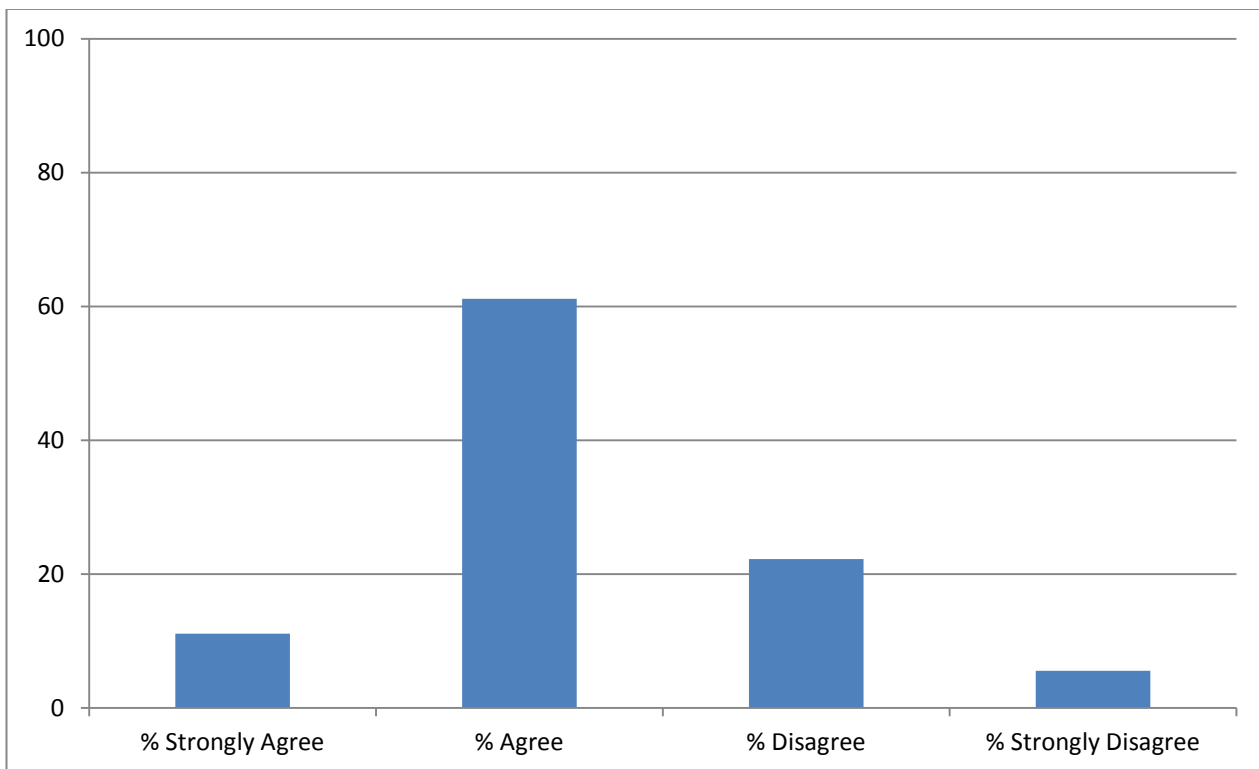


Figure 36: Response to Question 45. The glossary is comprehensive (n=18)



## General Mathematics

Figure 1: Response to Question 9. The rationale provides clarity about the subject's broad scope, distinctive nature and importance (n=17)

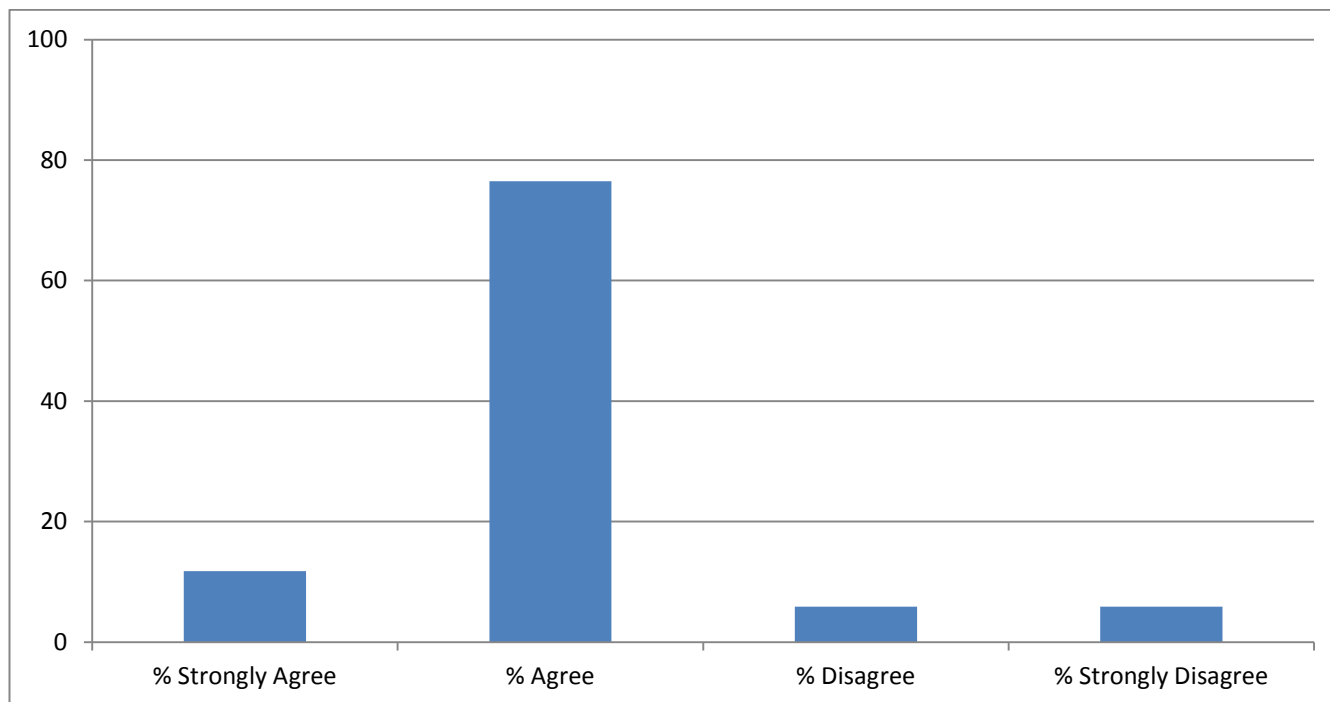


Figure 2: Response to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject (n=21)

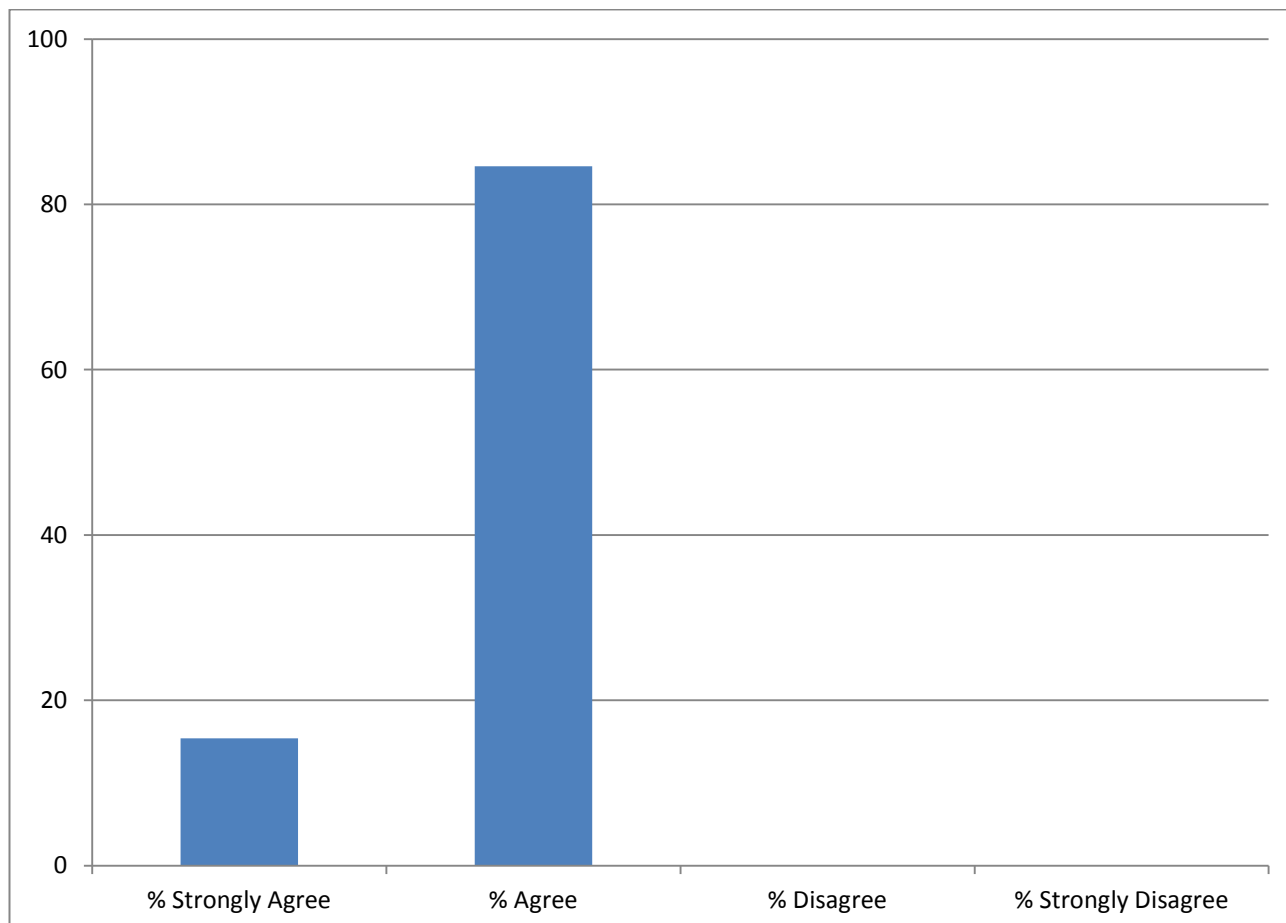


Figure 3: Response to Question 11. The four-unit structure has internal logic and coherence (n=23)

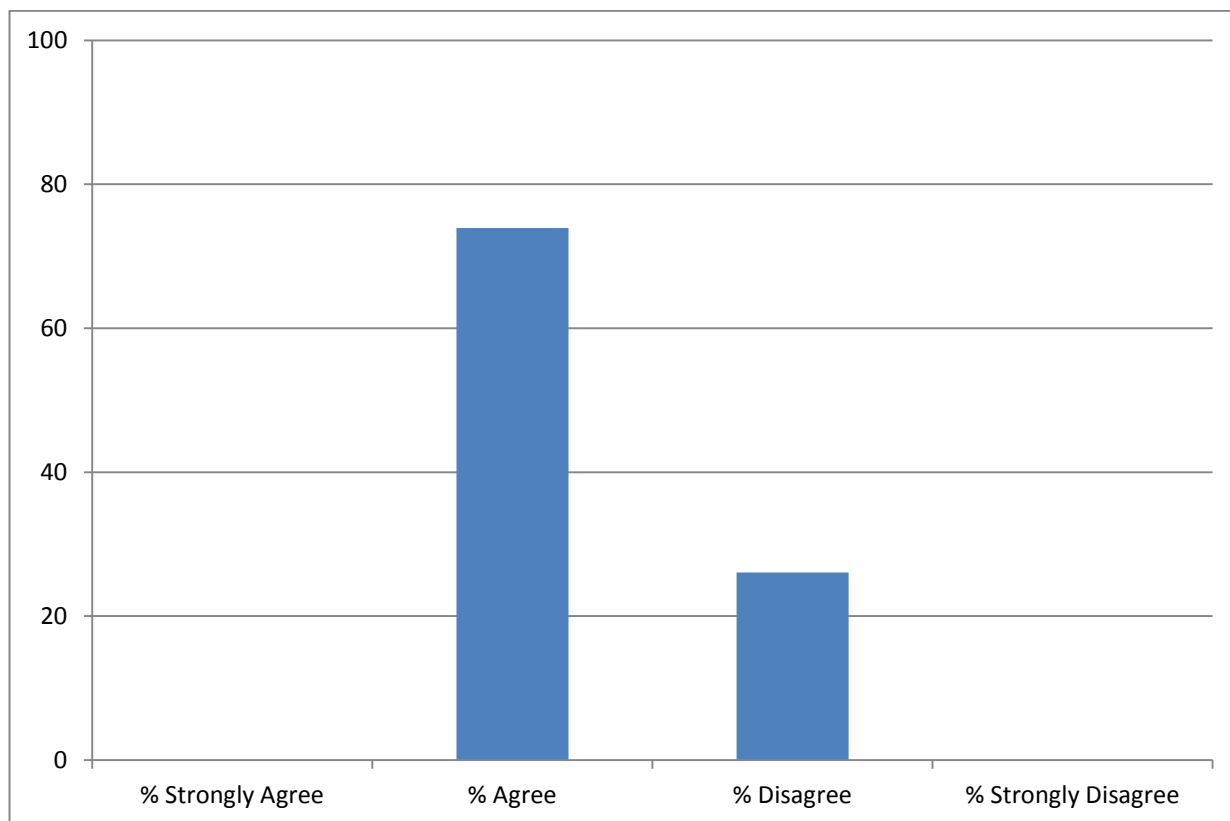


Figure 4: Response to Question 12. Units 3 and 4 are more cognitively demanding than Units 1 and 2 (n=22)

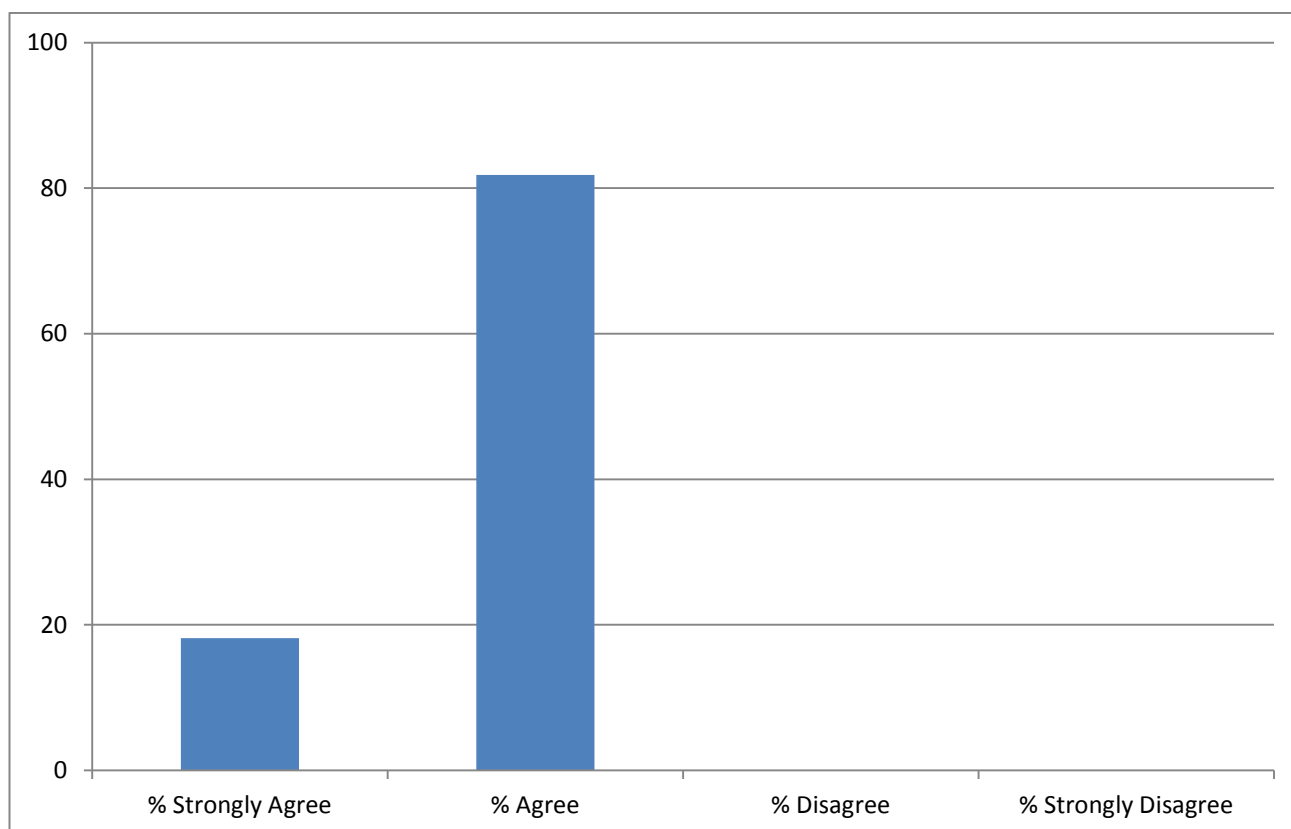


Figure 5: Response to Question 13. There is a clear link between this senior secondary curriculum and the relevant F–10 Australian Curriculum (n=23)

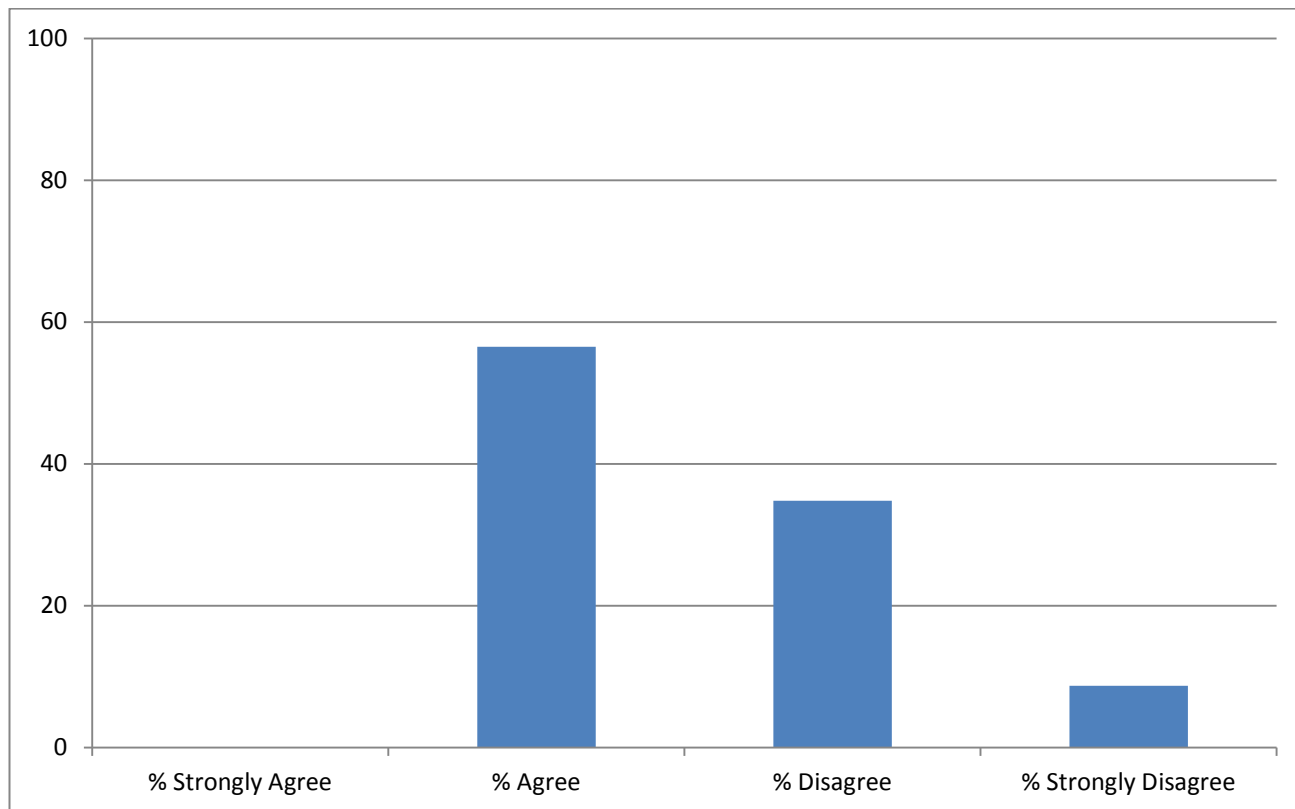


Figure 6: Response to Question 14. The achievement standards across Units 1 and 2 and Units 3 and 4 are organised in an order consistent with your experience (n=20)

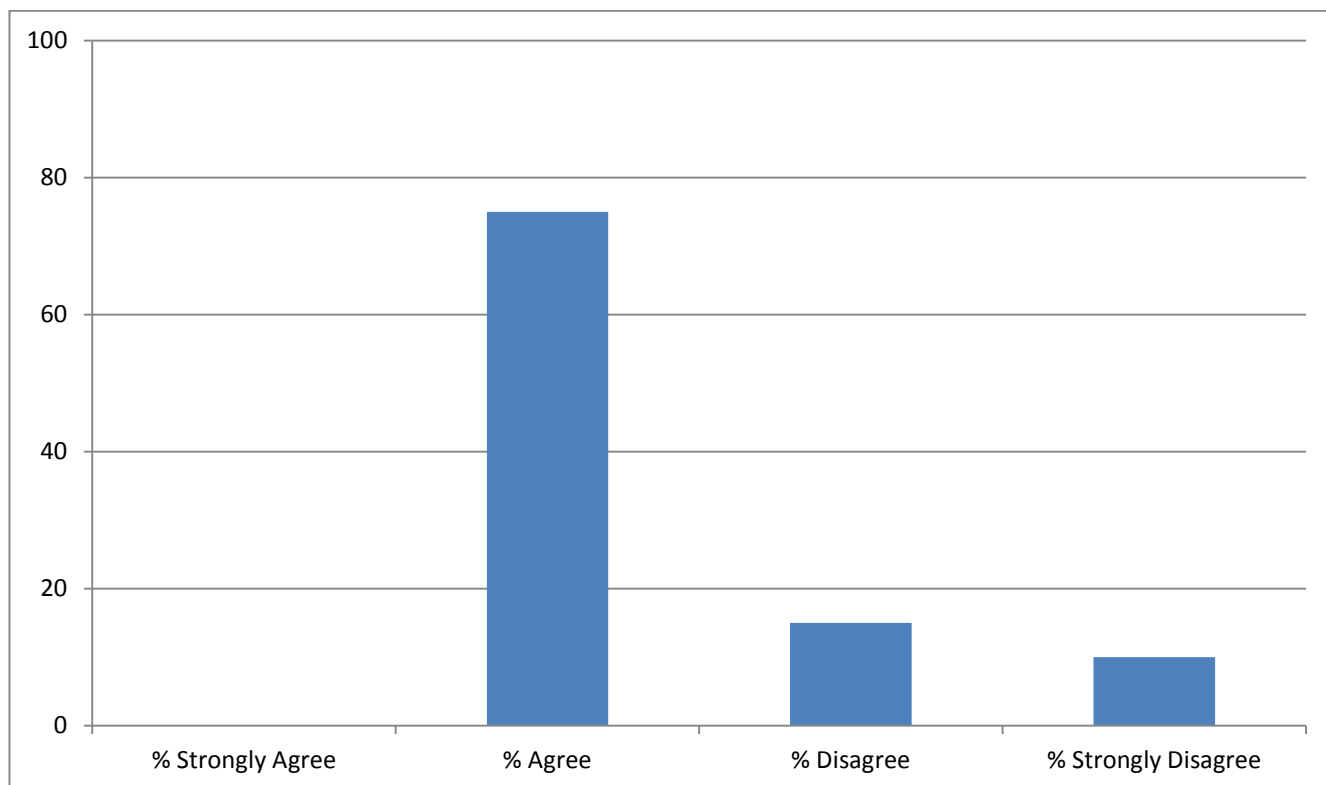


Figure 7: Response to Question 15. Unit 1: The unit description describes the focus and scope for this unit (n=21)

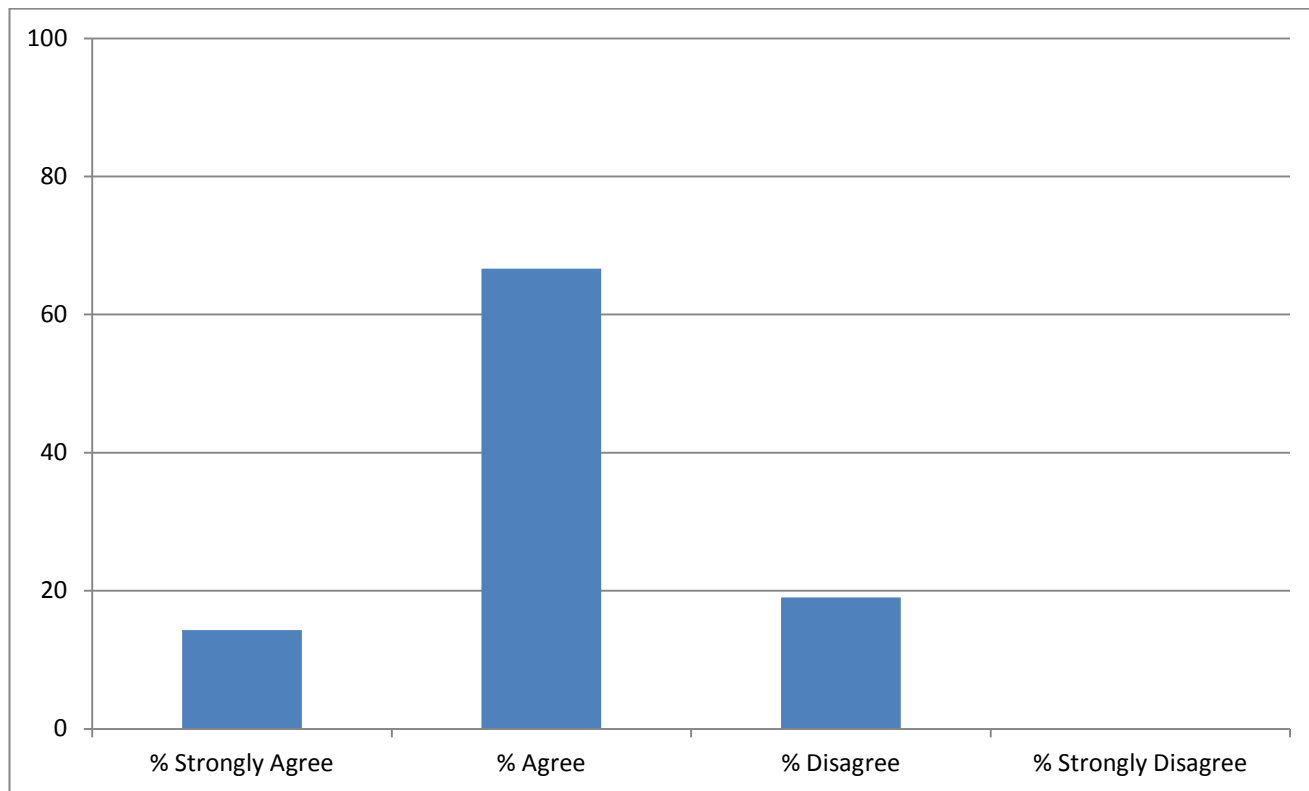


Figure 8: Response to Question 16. The outcomes describe clearly the expected learning for this unit (n=21)

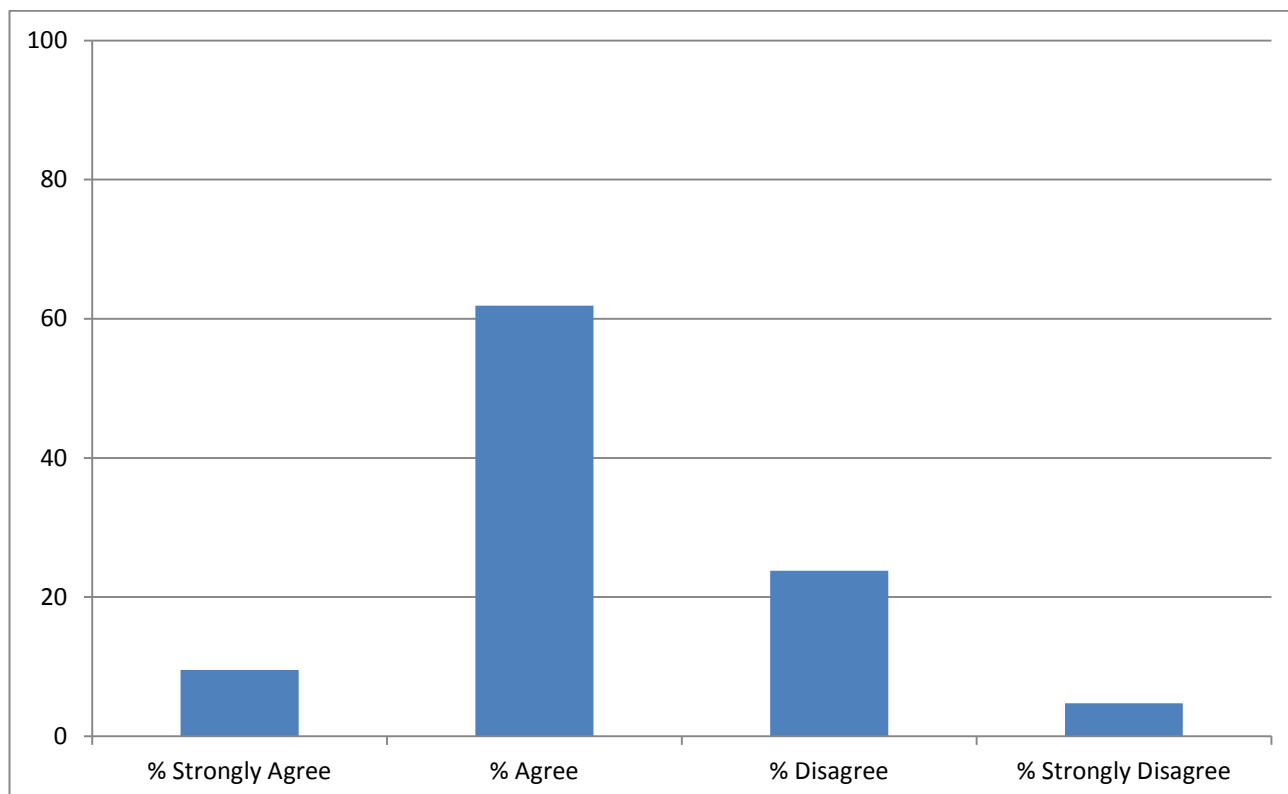


Figure 9: Response to Question 17. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=23)

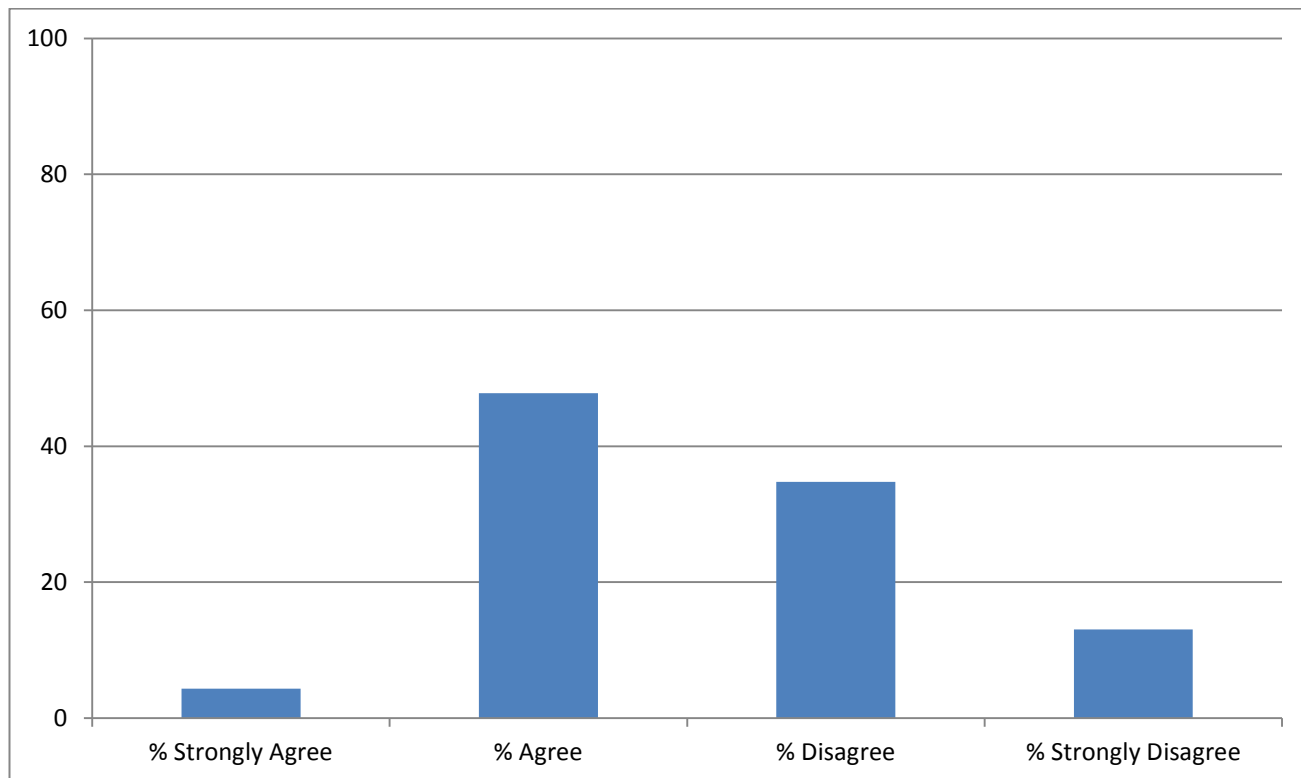


Figure 10: Response to Question 18. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=22)

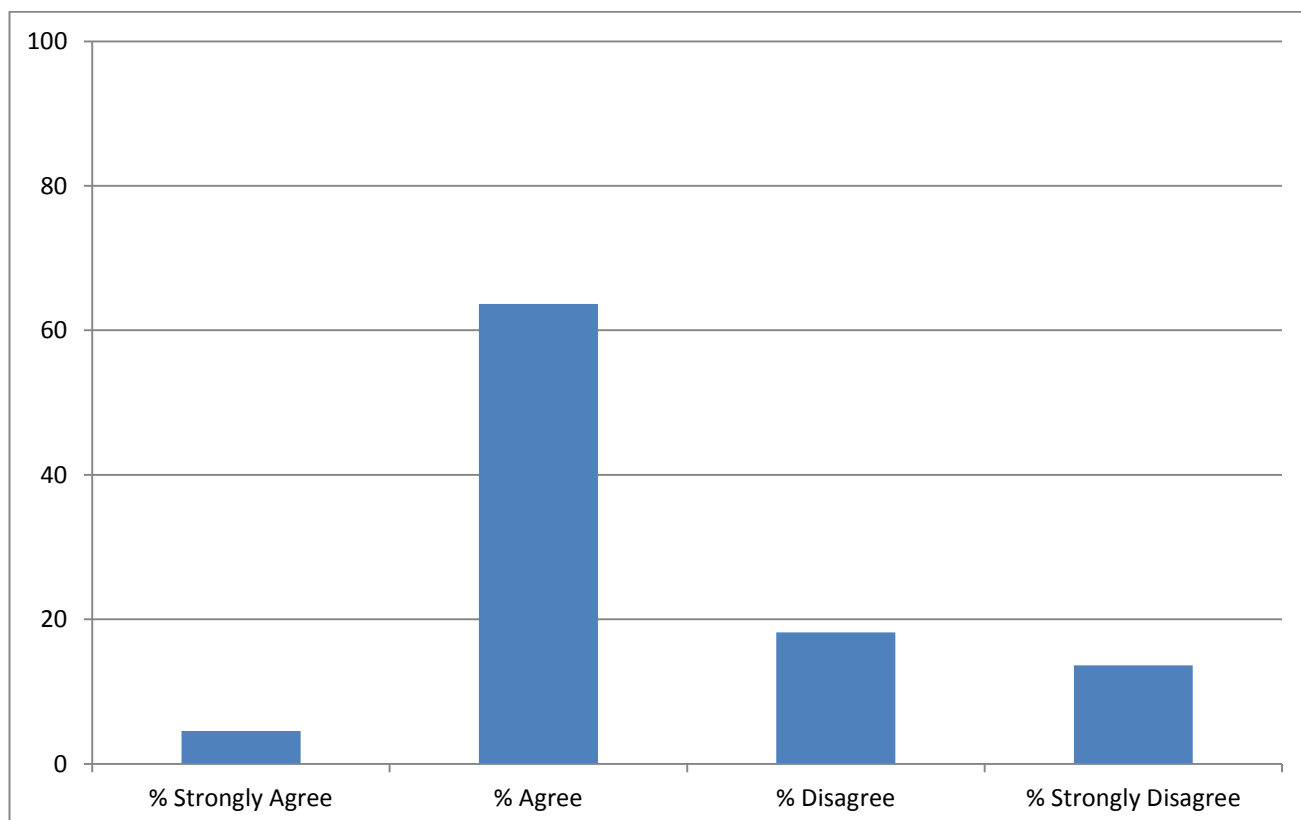




Figure 11: Response to Question 19. The content descriptions are specific about what is to be taught (n=22)

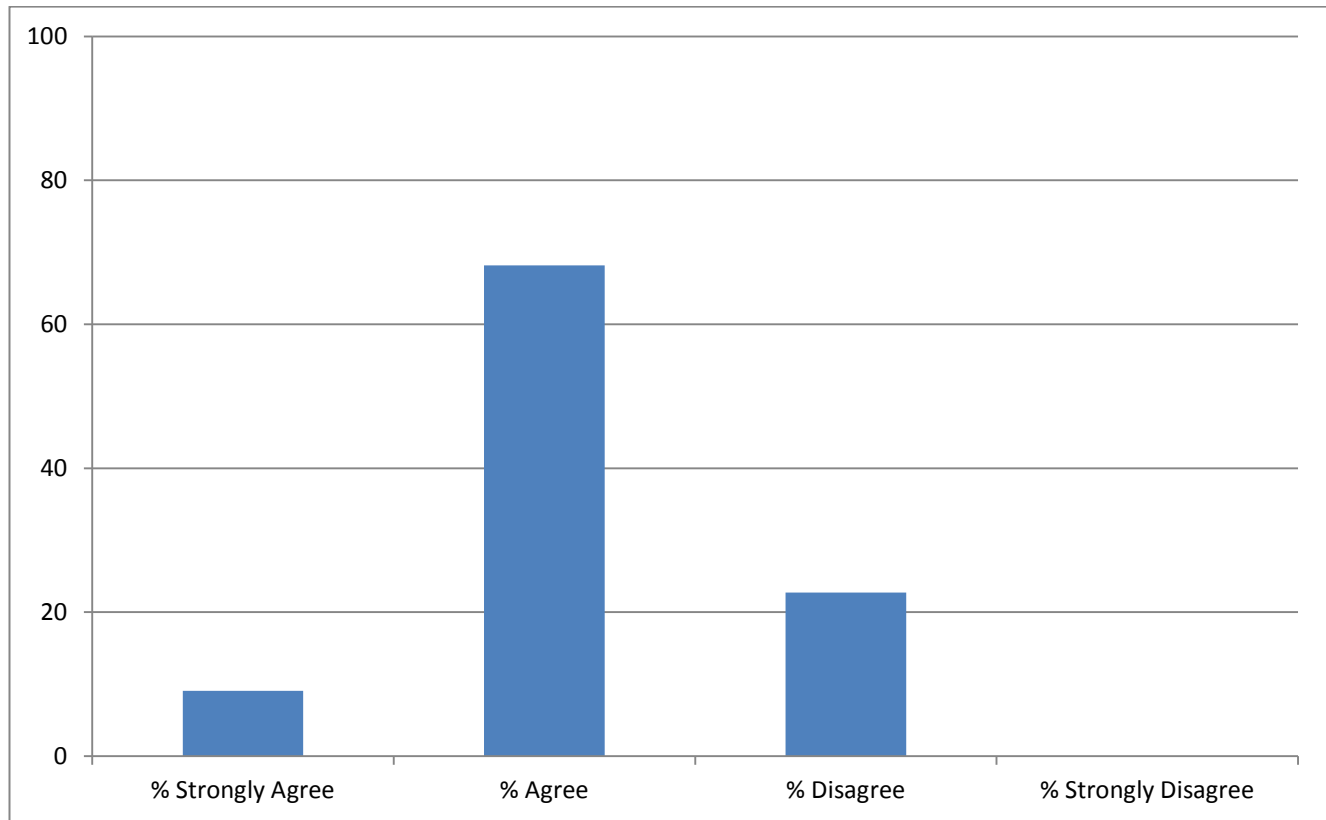


Figure 12: Response to Question 20. Unit 2: The unit description clearly describes the focus and scope for this unit (n=21)

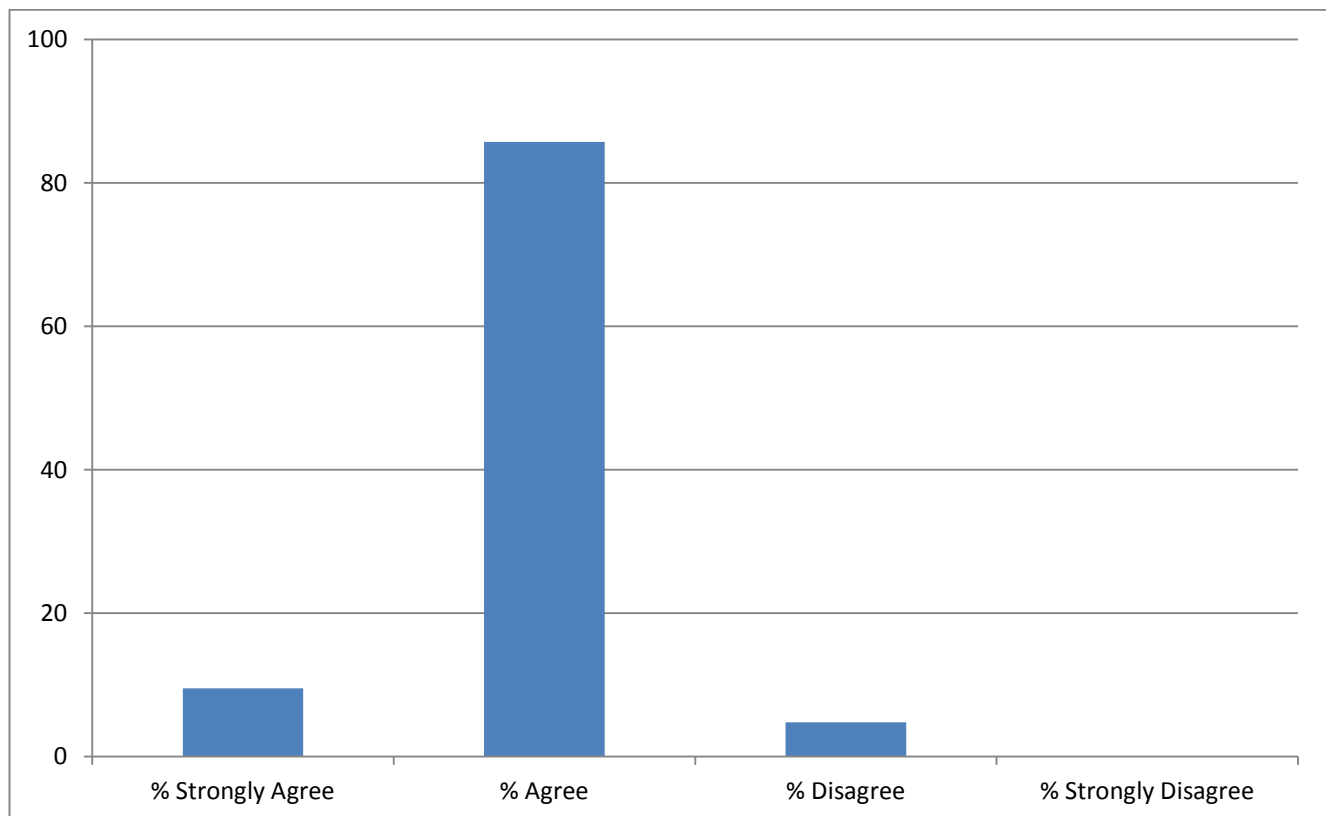


Figure 13: Response to Question 21. The unit outcomes describe clearly the expected learning for this unit (n=21)

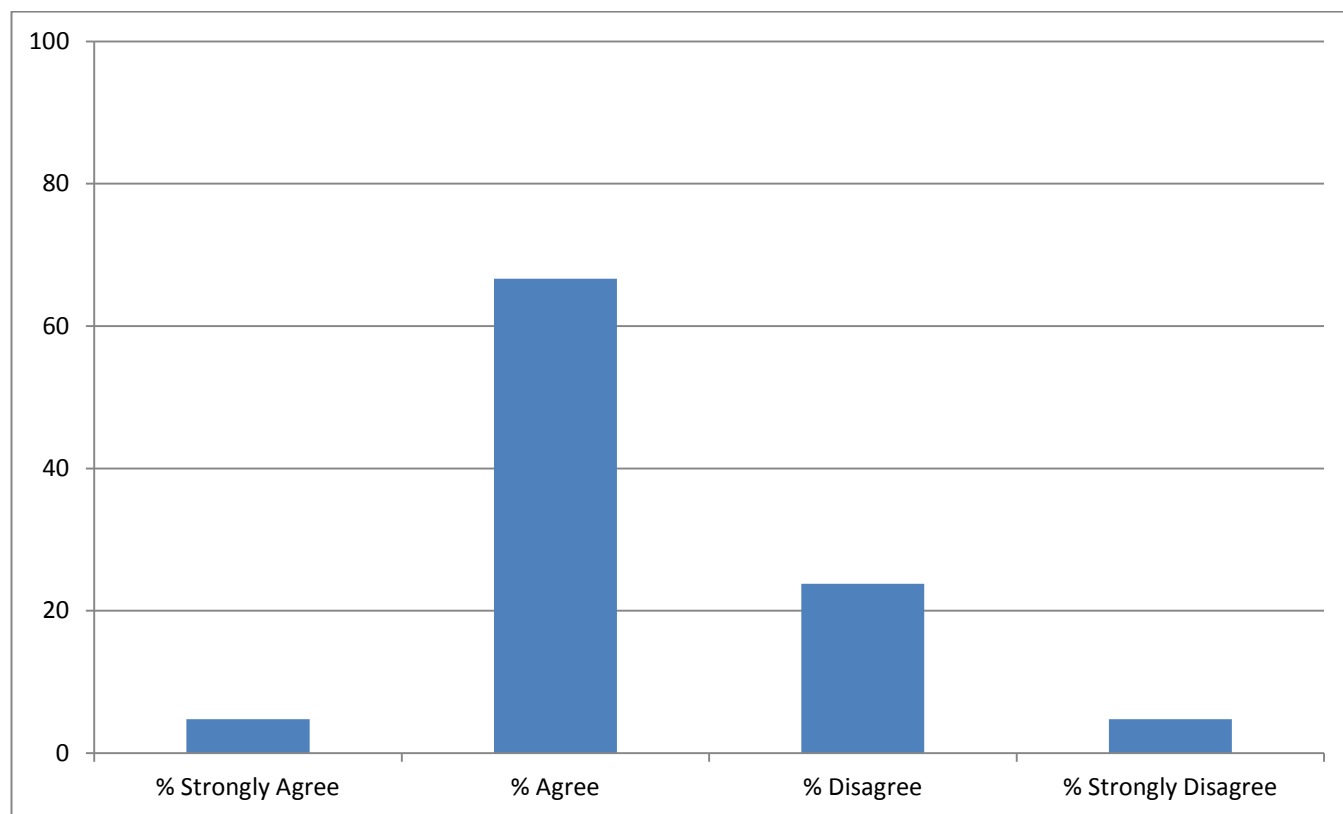


Figure 14: Response to Question 22. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=21)

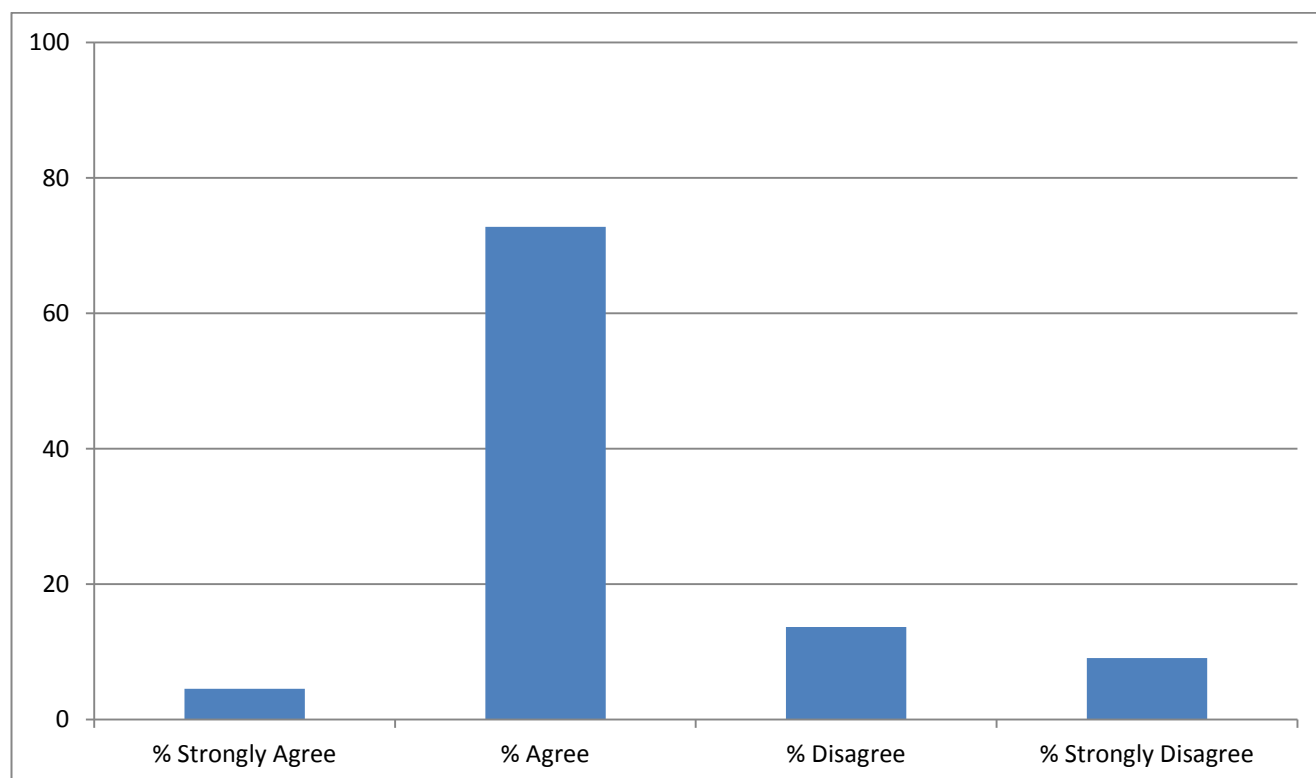


Figure 15: Response to Question 23. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=22)

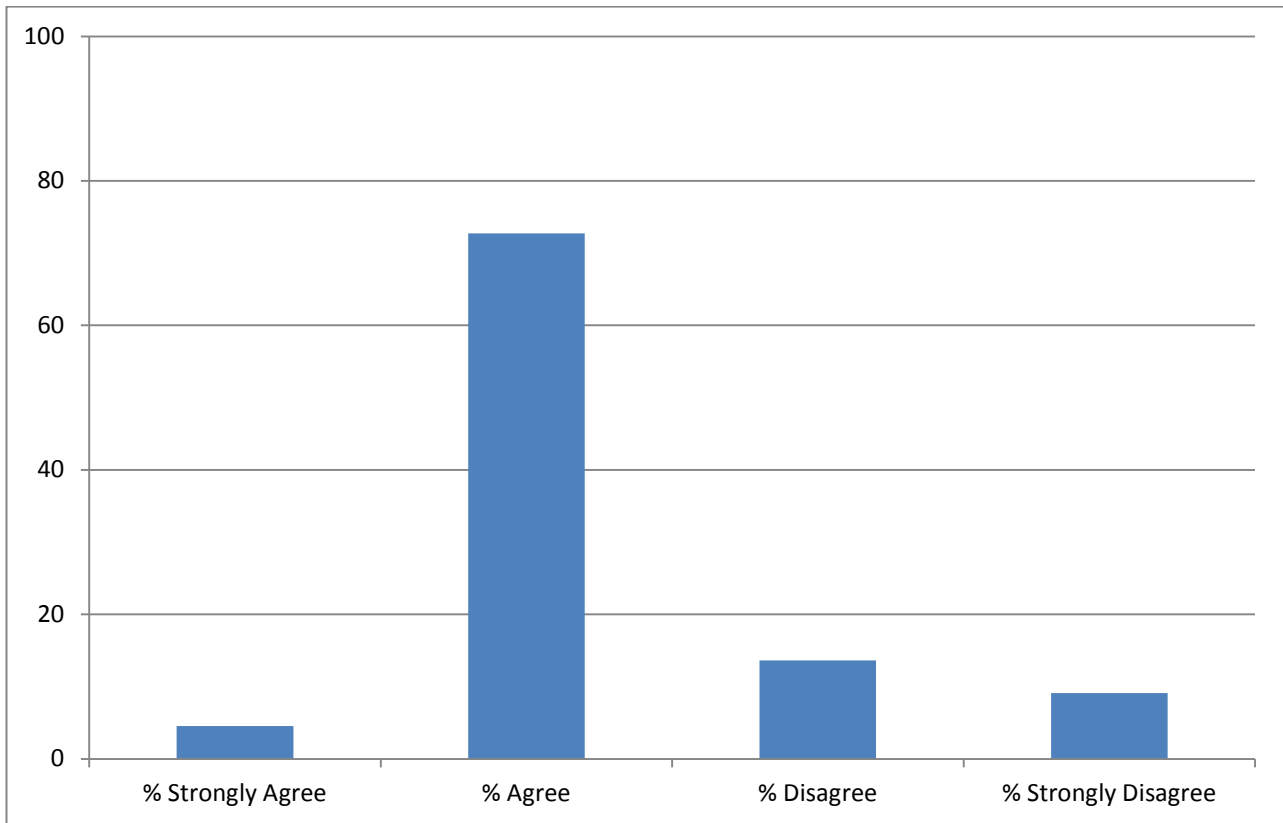


Figure 16: Response to Question 24. The content descriptions are specific about what is to be taught (n=21)

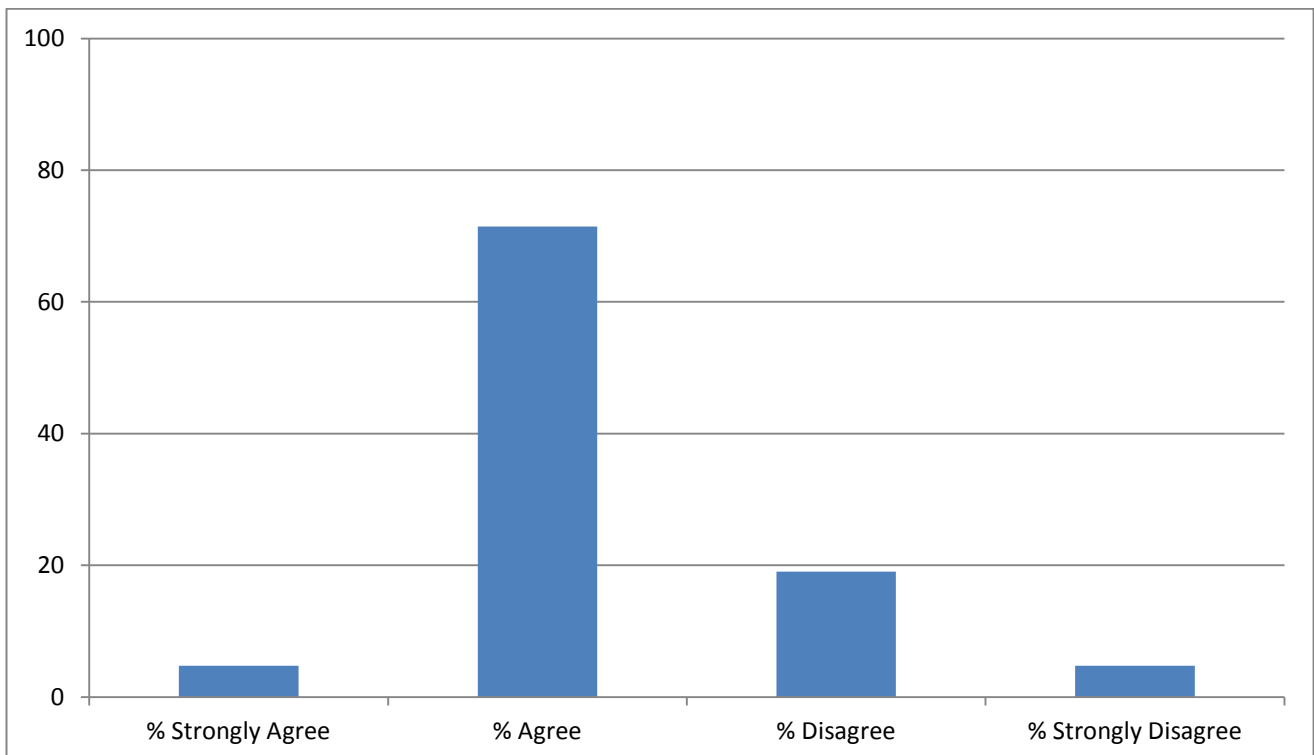


Figure 17: Response to Question 25. Achievement standards for Units 1 and 2: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=21)

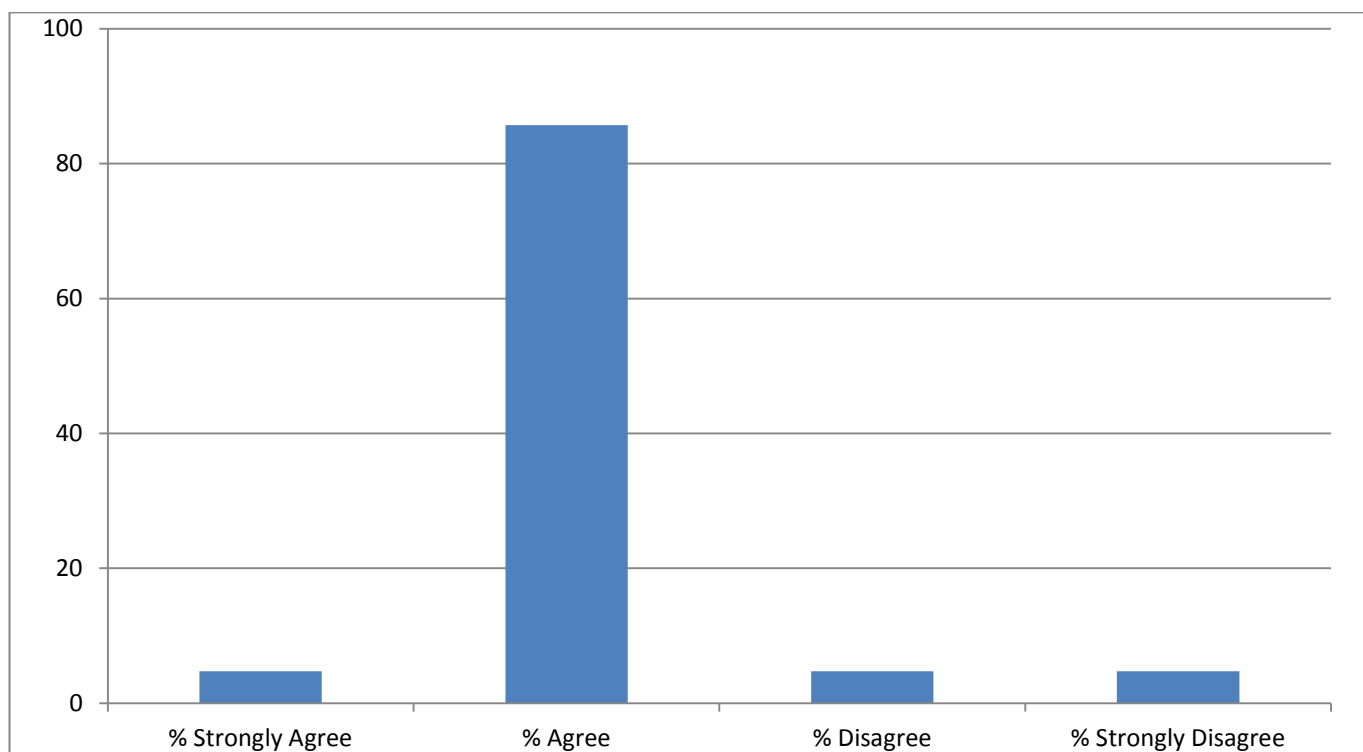


Figure 18: Response to Question 26. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=21)

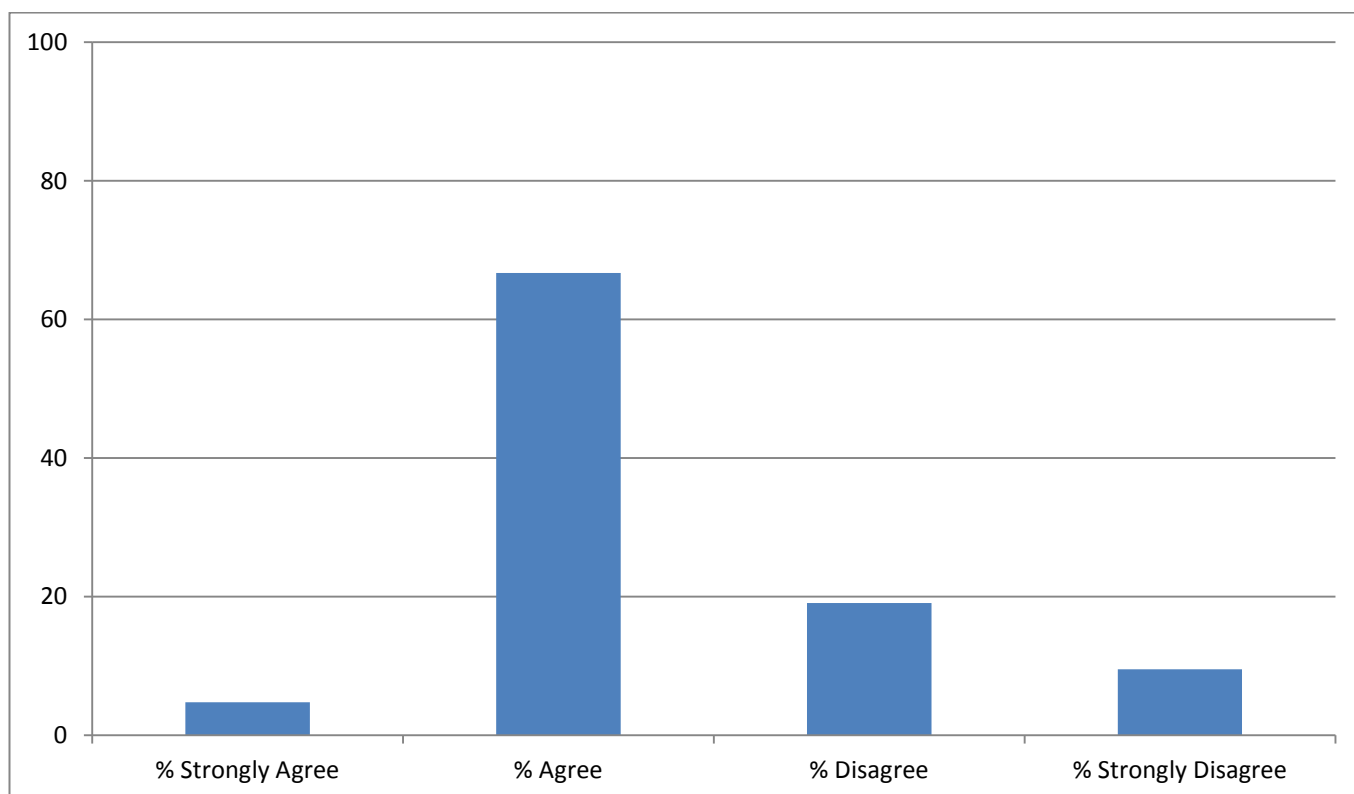


Figure 19: Response to Question 27. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units (n=20)

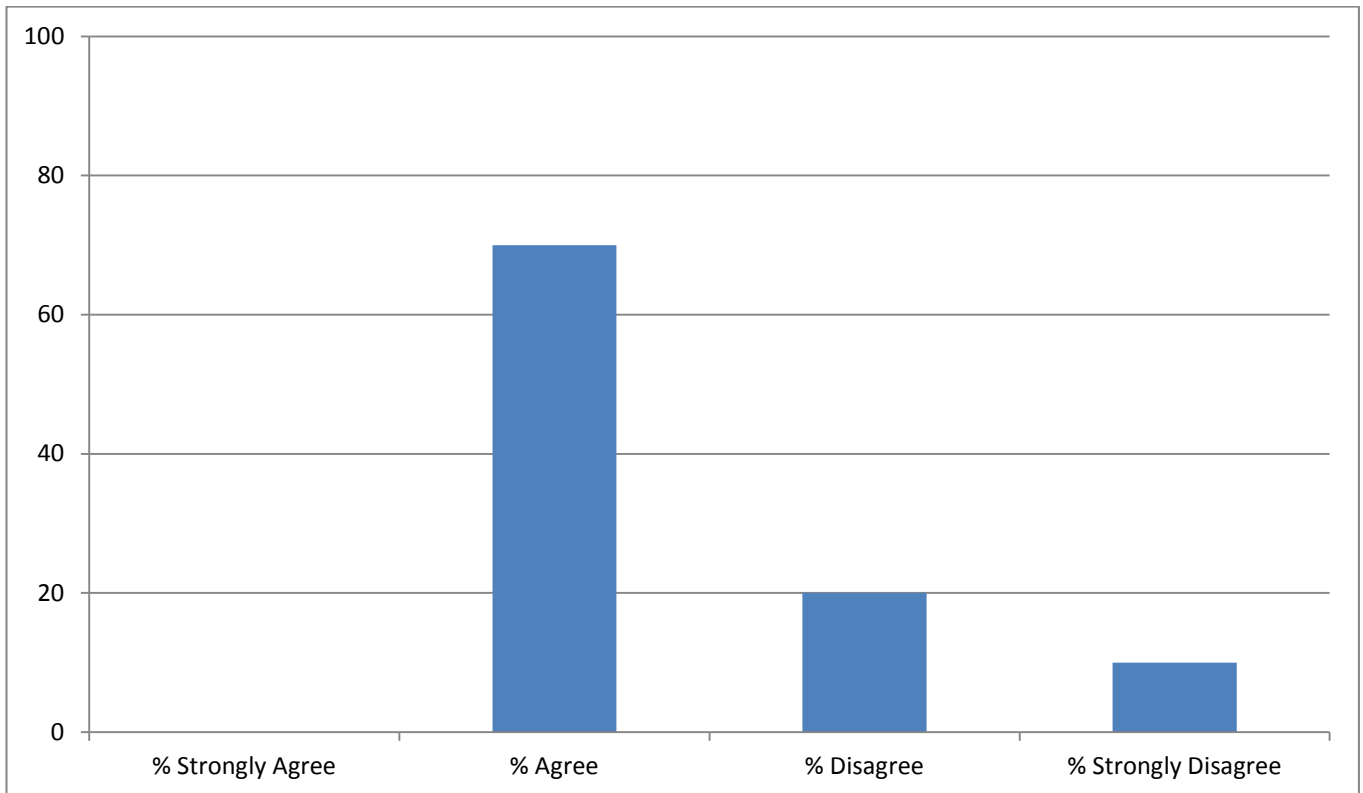


Figure 20: Response to Question 28. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=20)

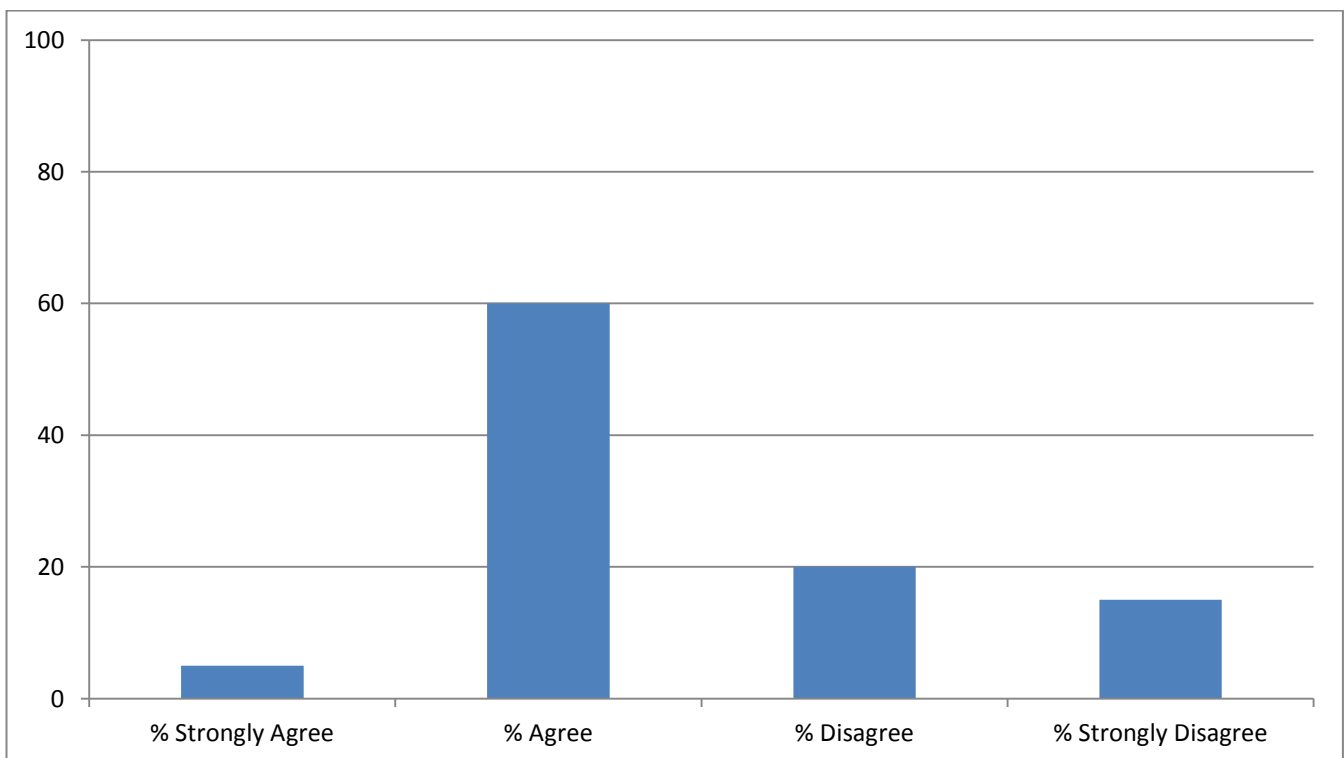


Figure 21: Response to Question 29. Unit 3: The unit description clearly describes the focus and scope for this unit (n=20)

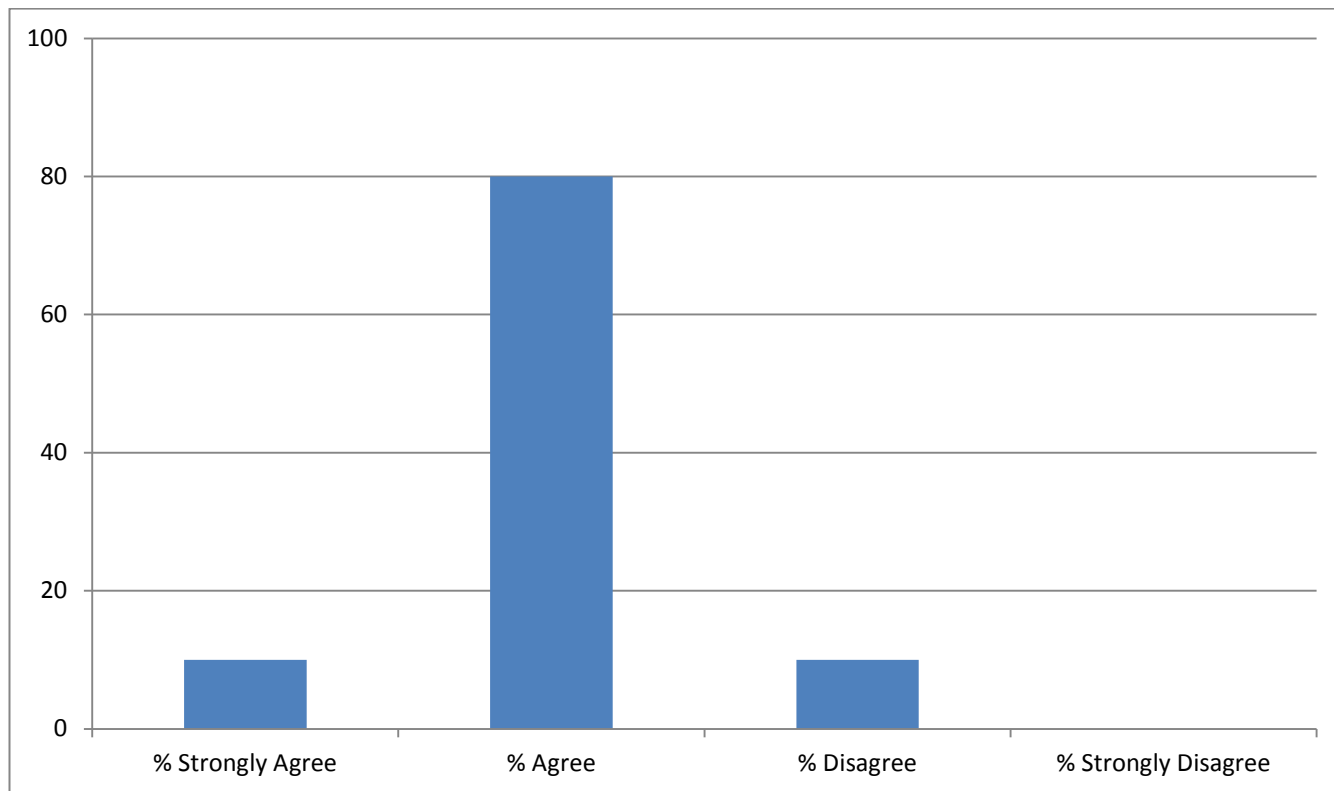


Figure 22: Response to Question 30. The unit outcomes describe clearly the expected learning for this unit (n=20)

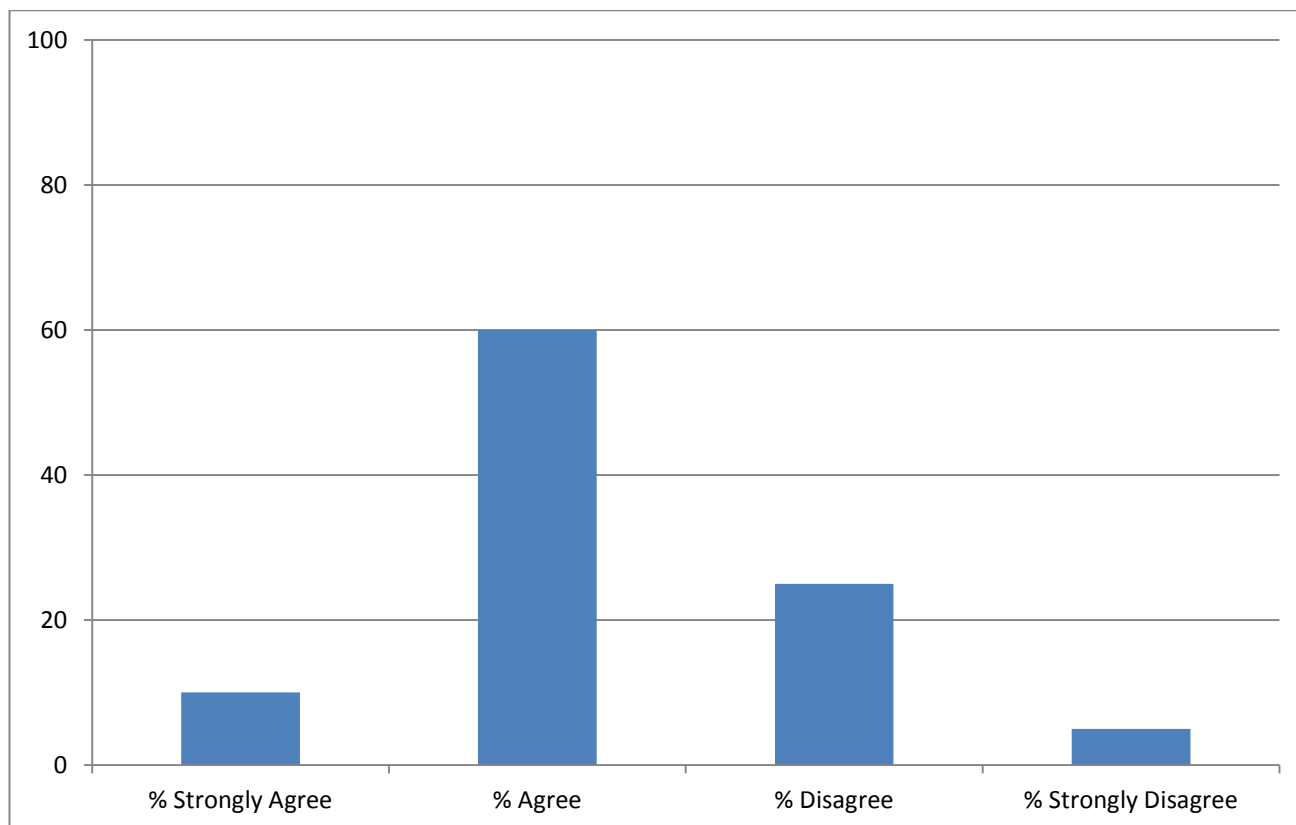


Figure 23: Response to Question 31. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=22)

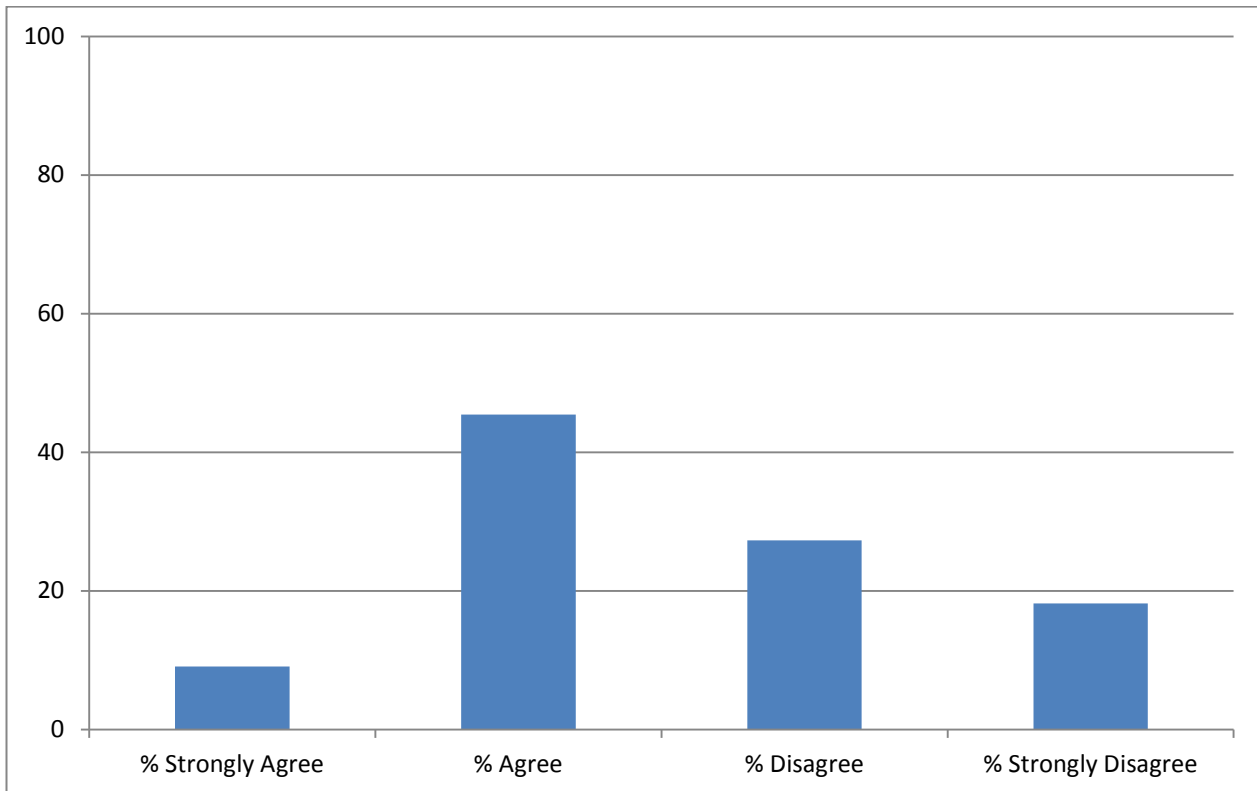


Figure 24: Response to Question 32. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=21)

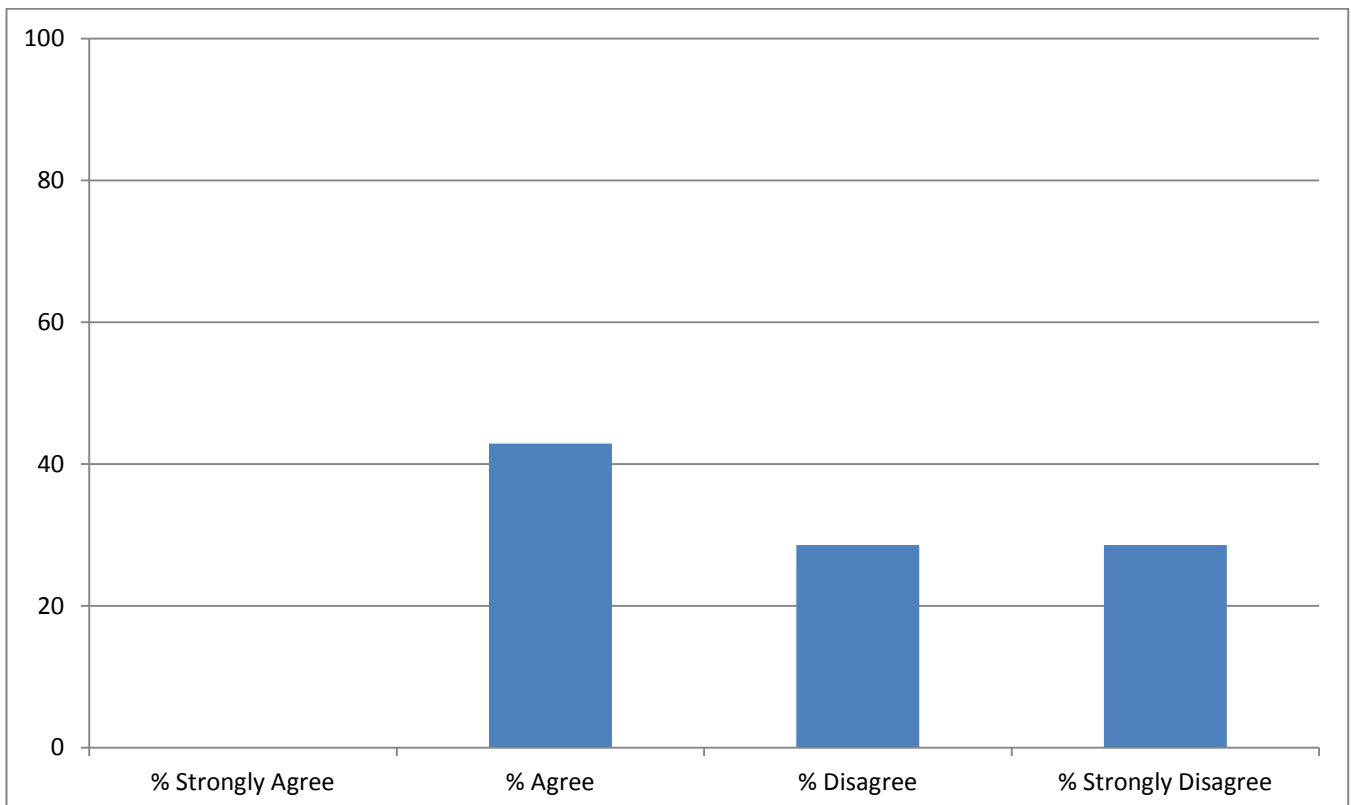


Figure 25: Response to Question 33. The content descriptions are specific about what is to be taught (n=21)

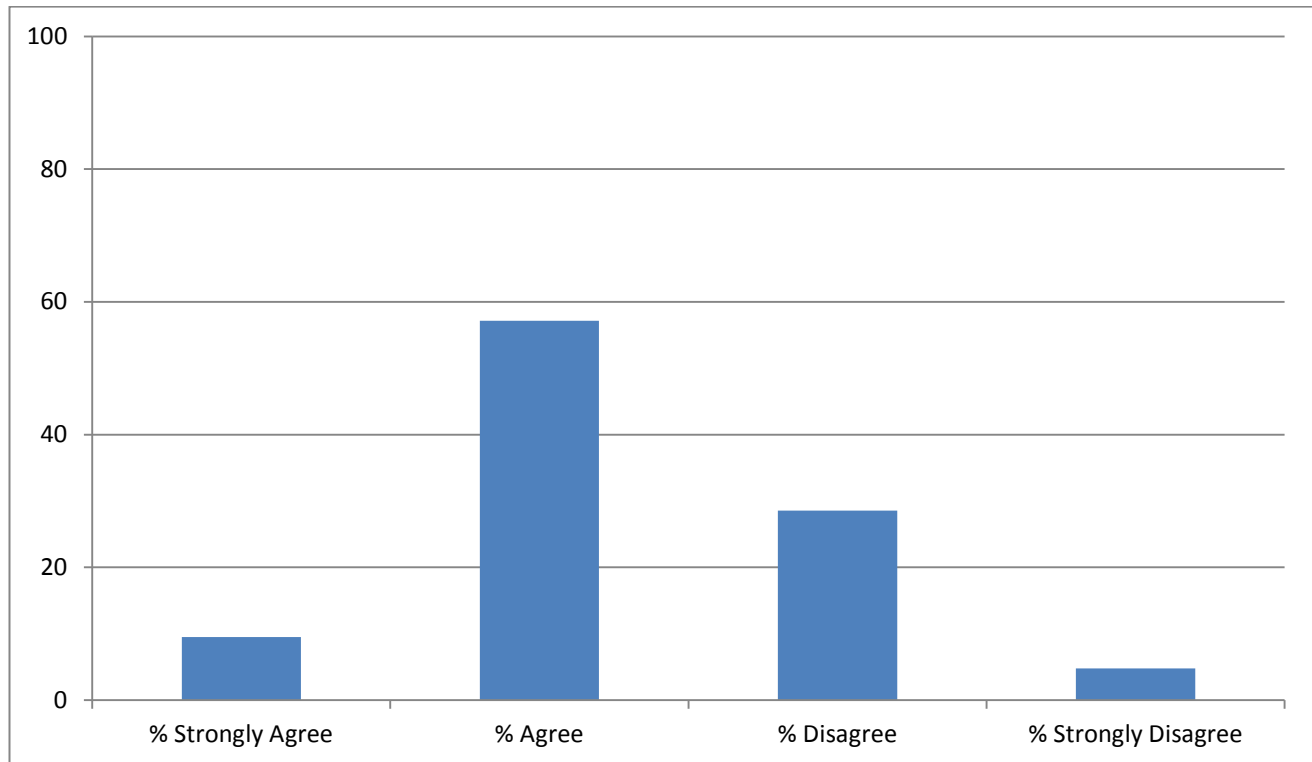


Figure 26: Response to Question 34. Unit 4: The unit description clearly describes the focus and scope for this unit (n=20)

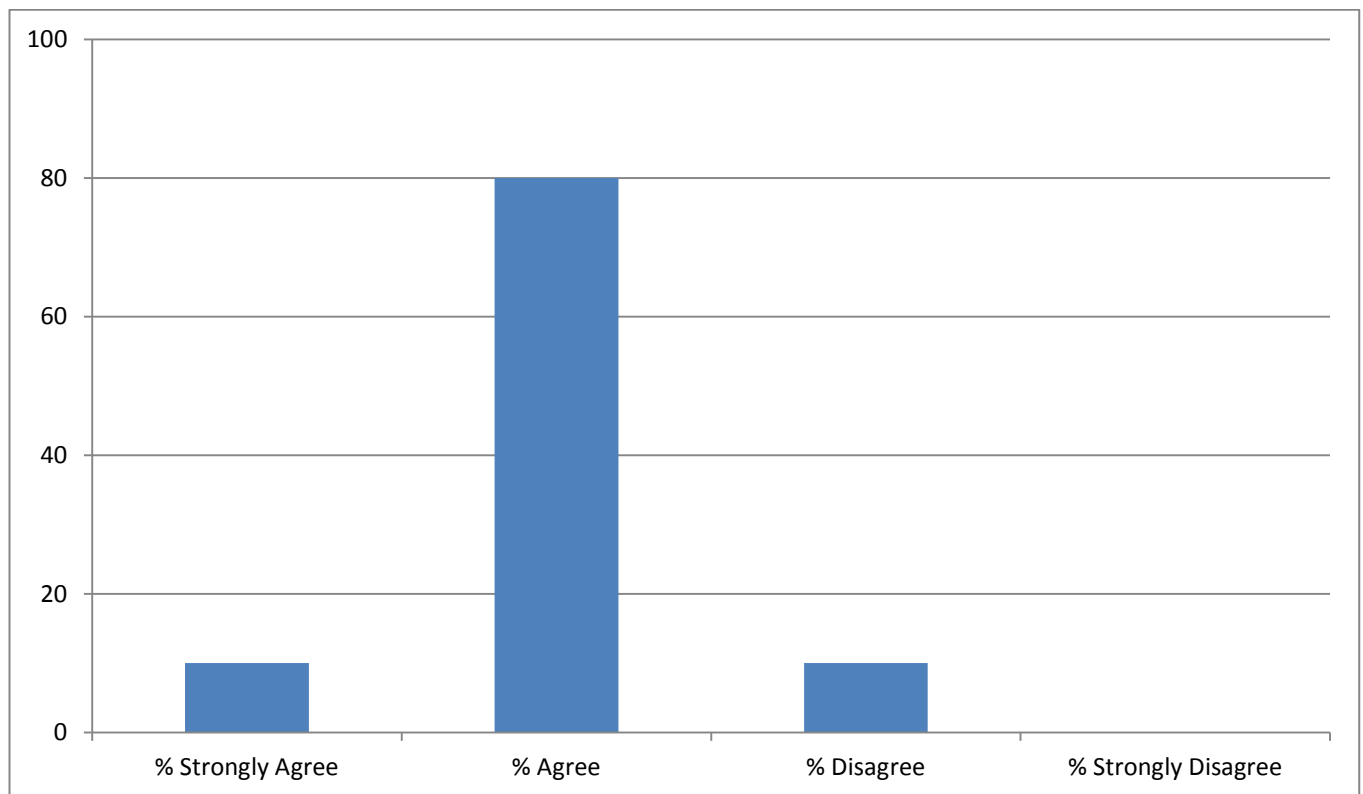




Figure 27: Response to Question 35. The unit outcomes describe clearly the expected learning for this unit (n=20)

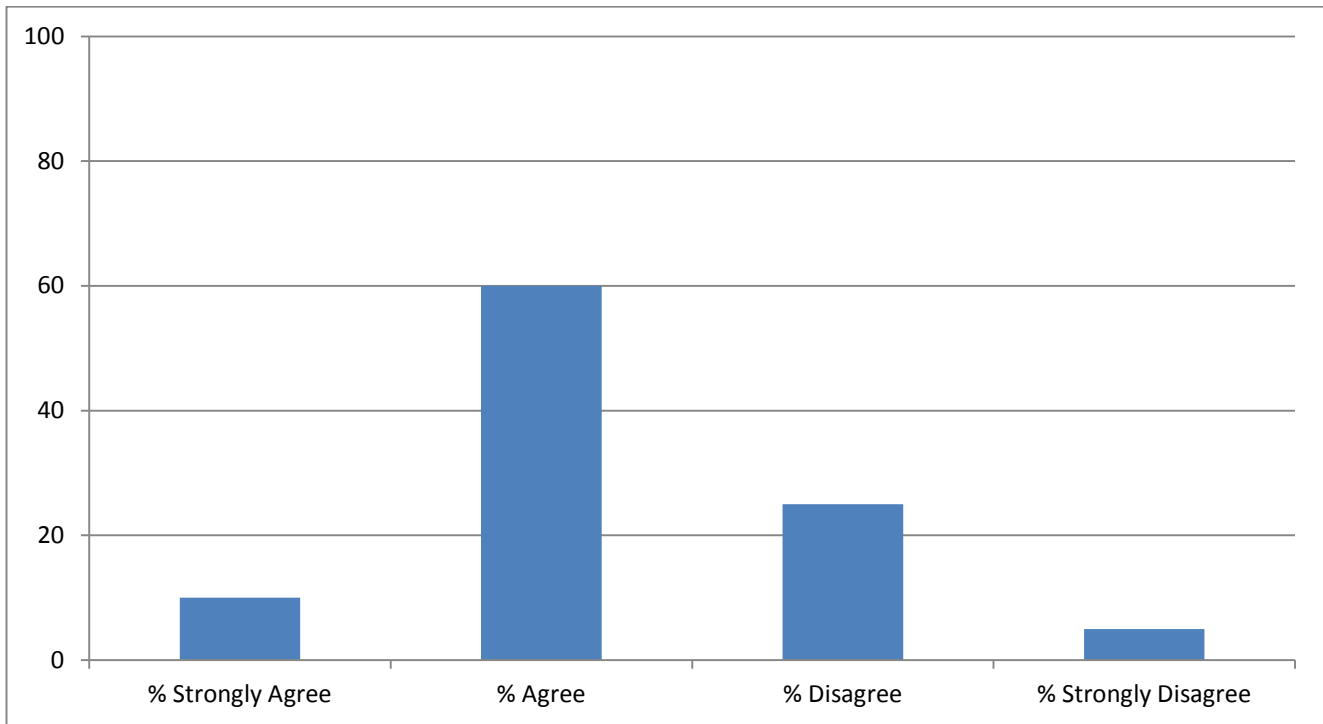


Figure 28: Response to Question 36. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=21)

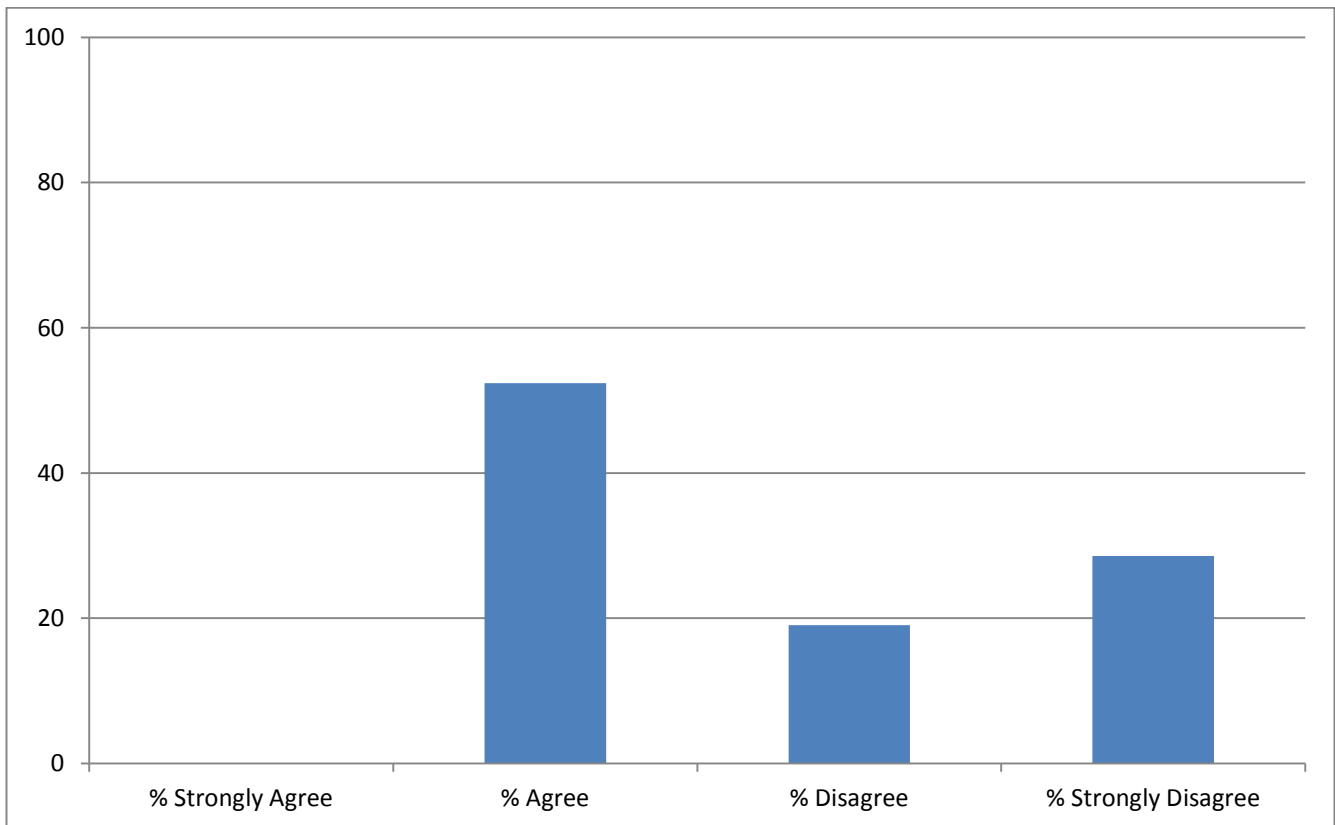


Figure 29: Response to Question 37. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=21)

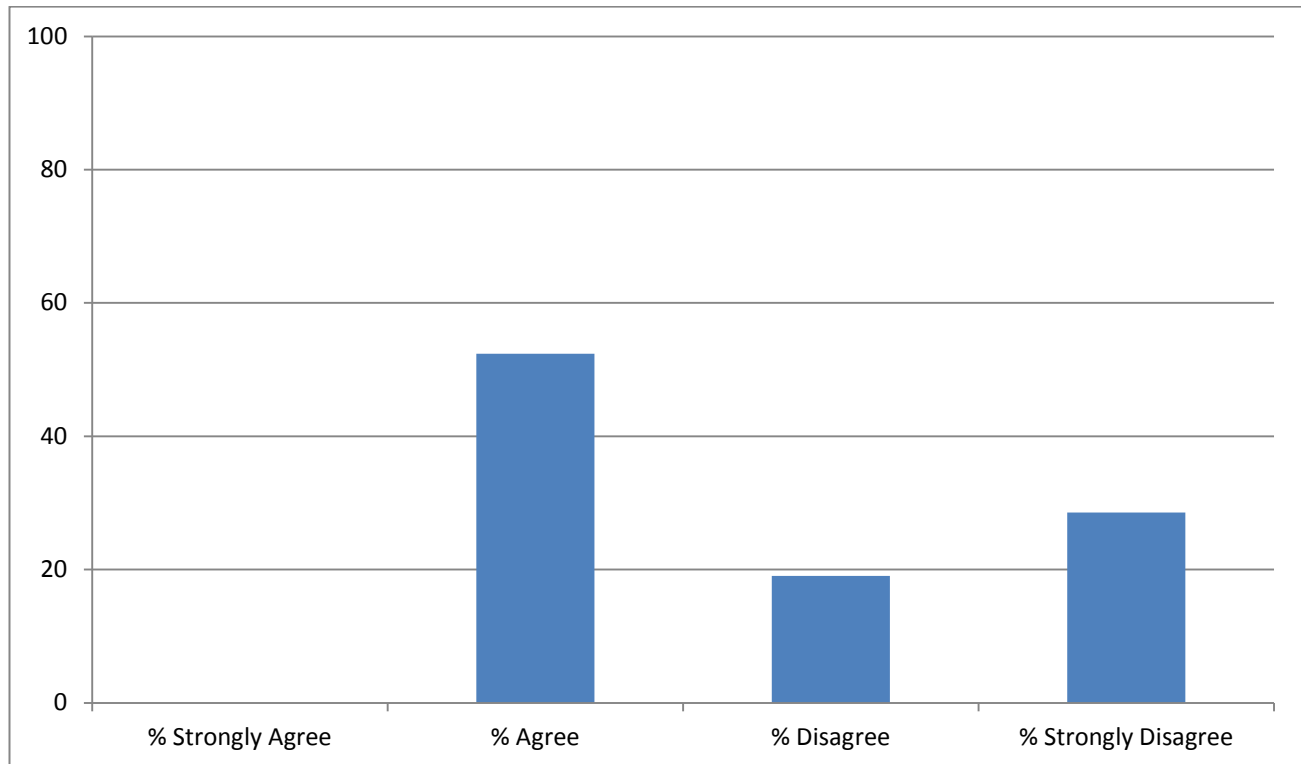


Figure 30: Response to Question 38. The content descriptions are specific about what is to be taught (n=19)

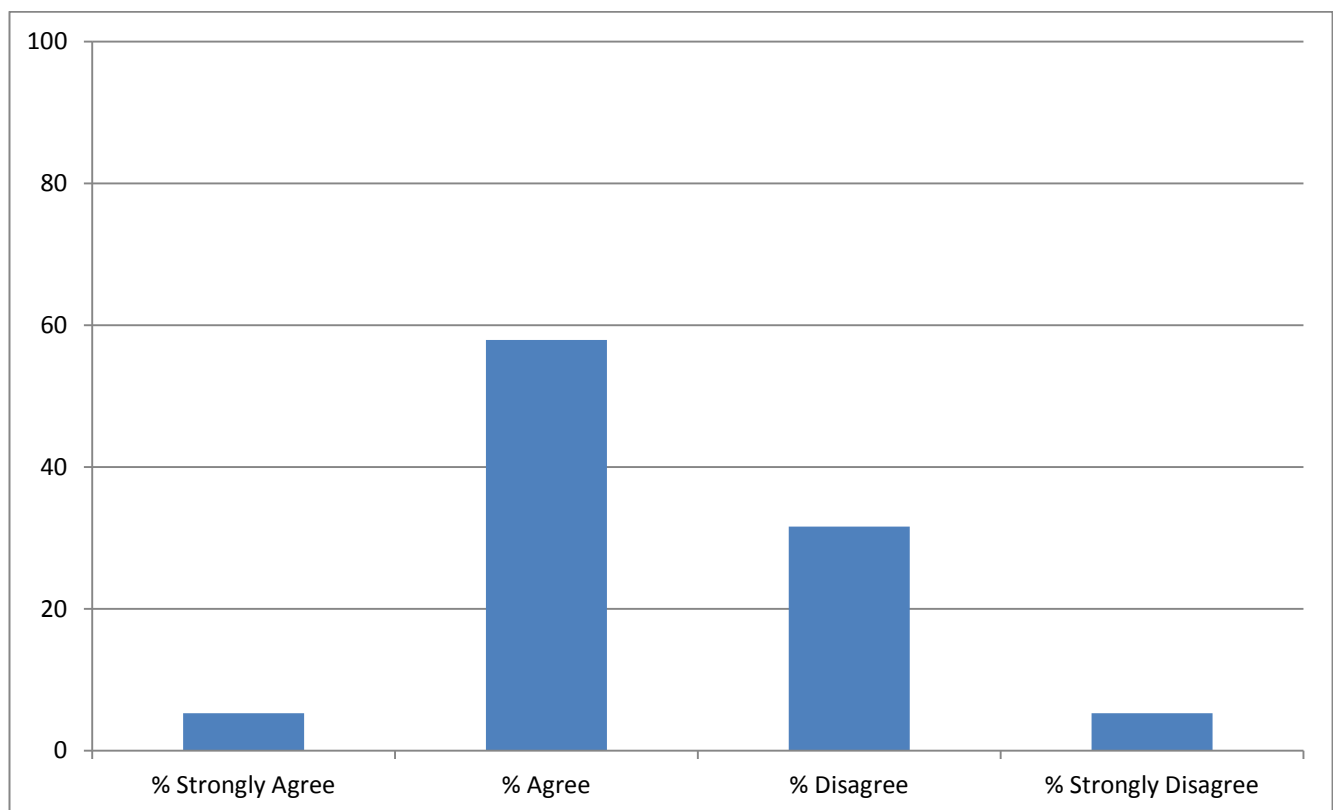


Figure 31: Response to Question 39. Achievement standards for Units 3 and 4: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=21)

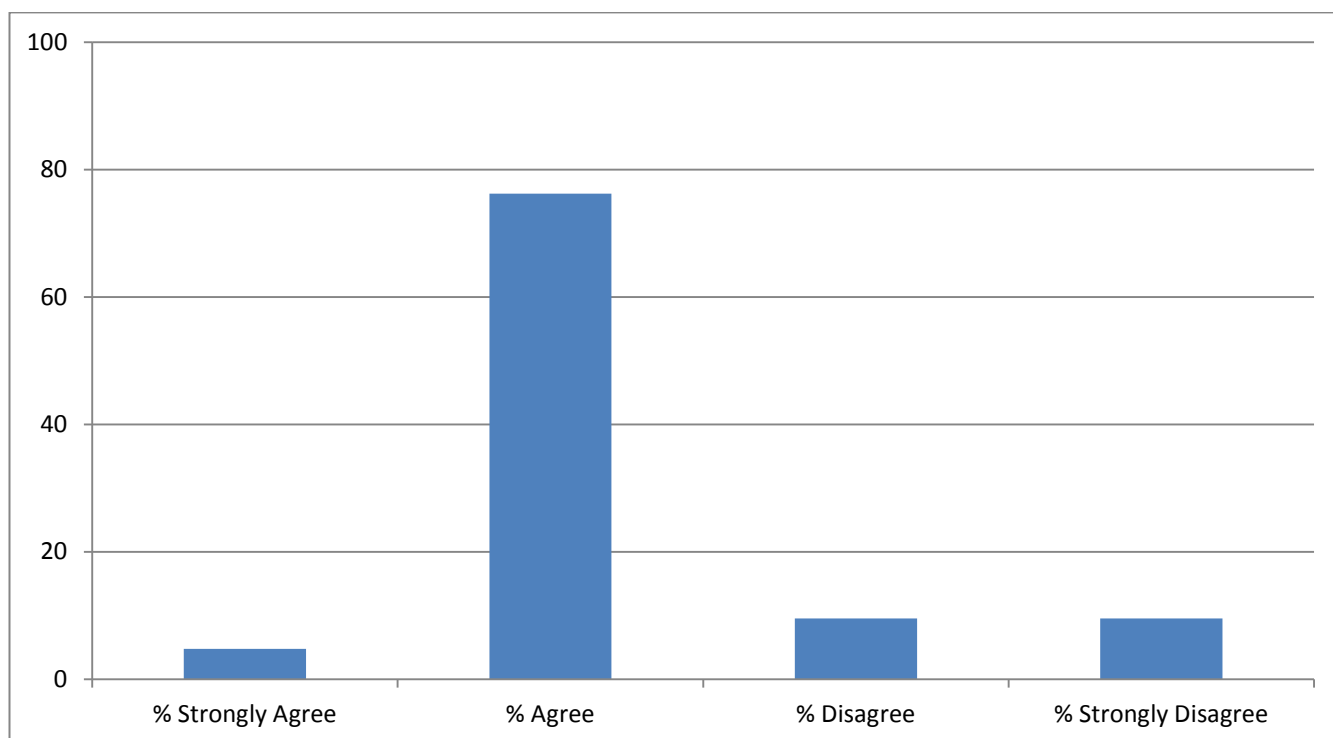


Figure 32: Response to Question 40. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=21)

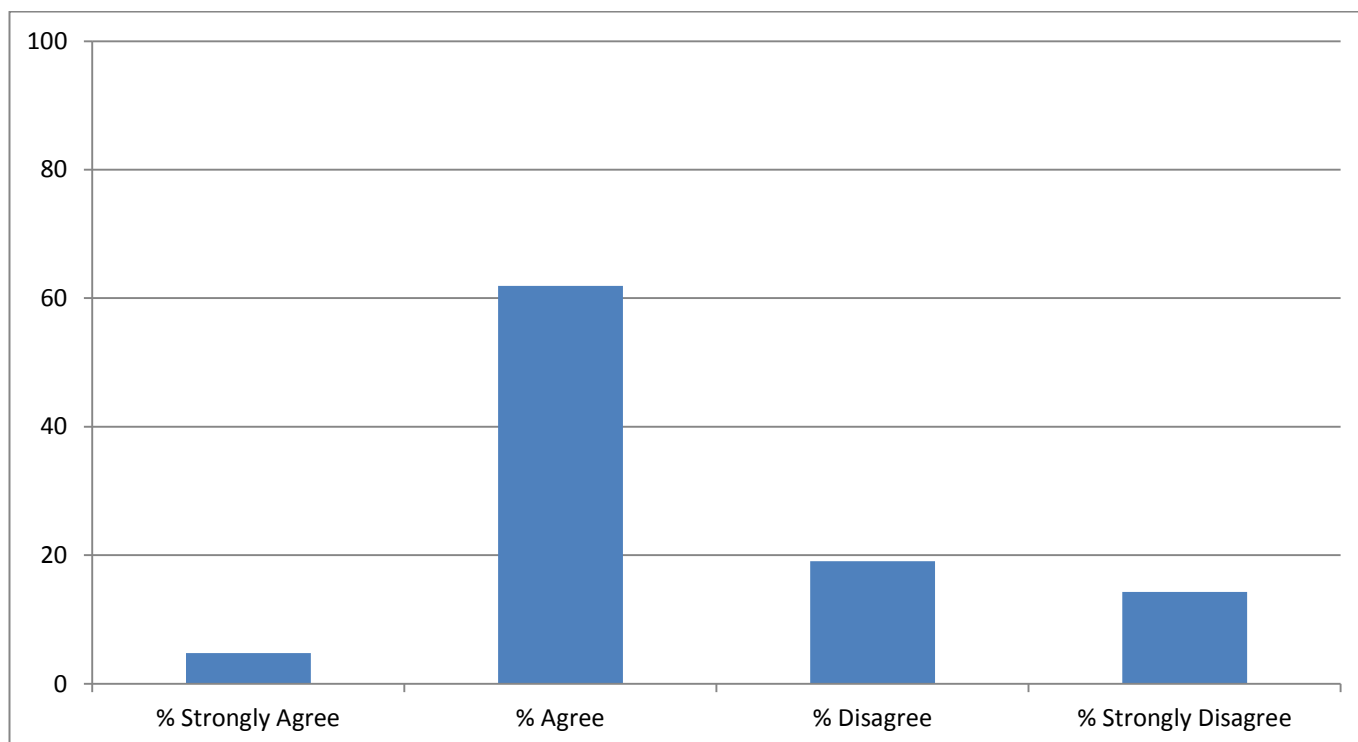


Figure 33: Response to Question 41. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units (n=21)

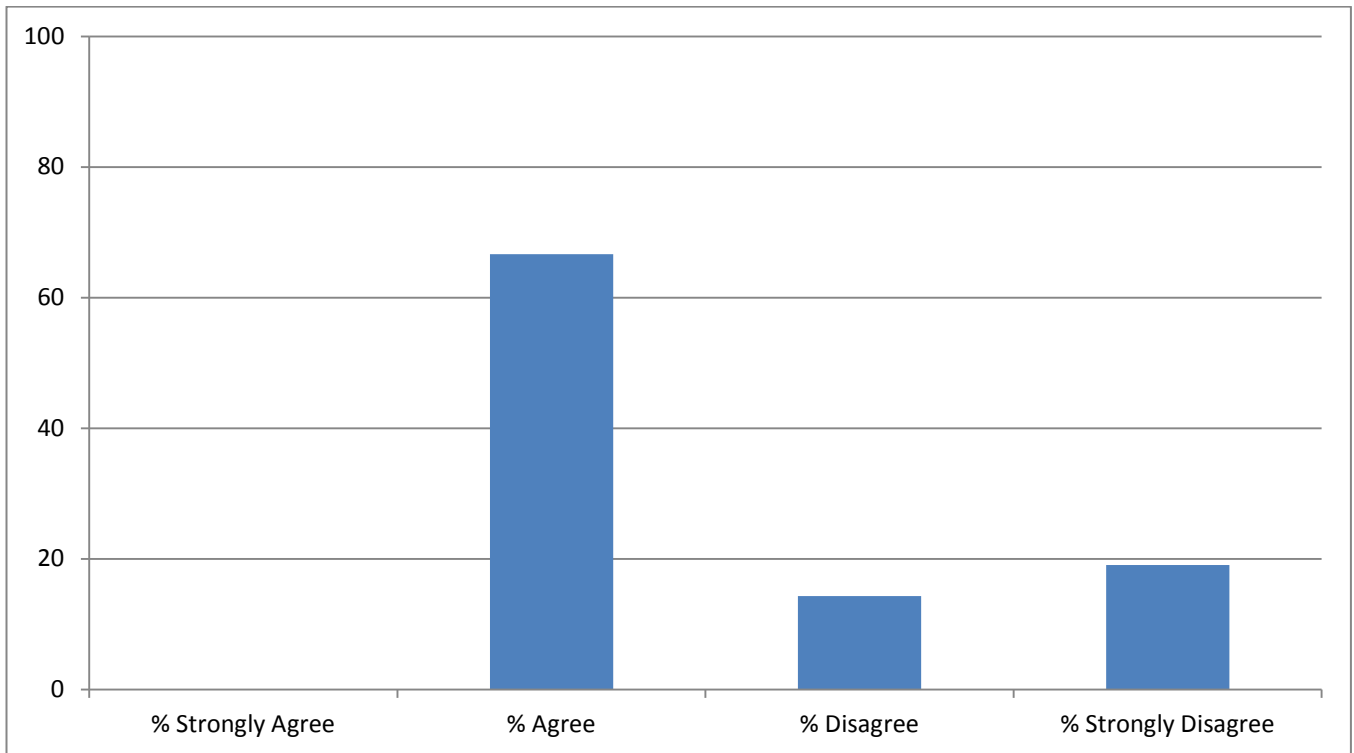


Figure 34: Response to Question 42. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=21)

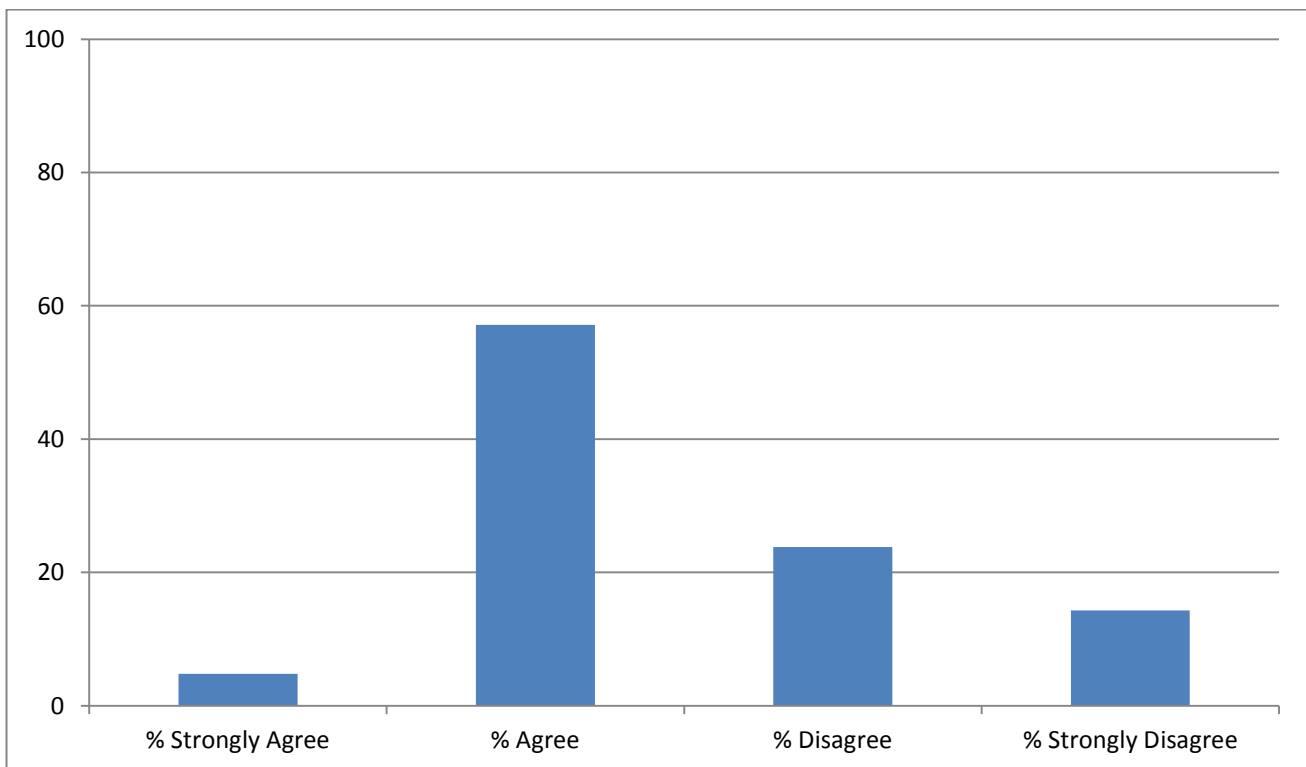


Figure 35: Response to Question 43. The general capabilities that naturally fit with this subject are appropriately represented (n=18)

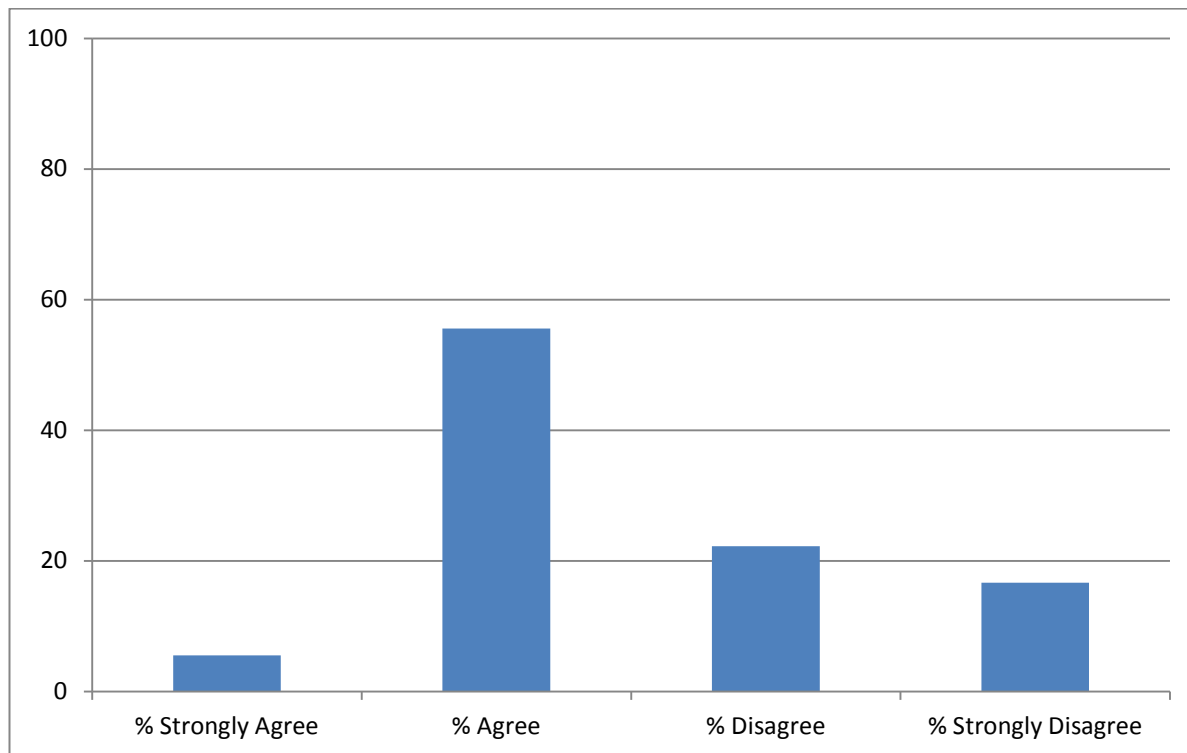


Figure 36: Response to Question 44. The cross-curriculum priorities that naturally fit with this subject are appropriately represented (n=19)

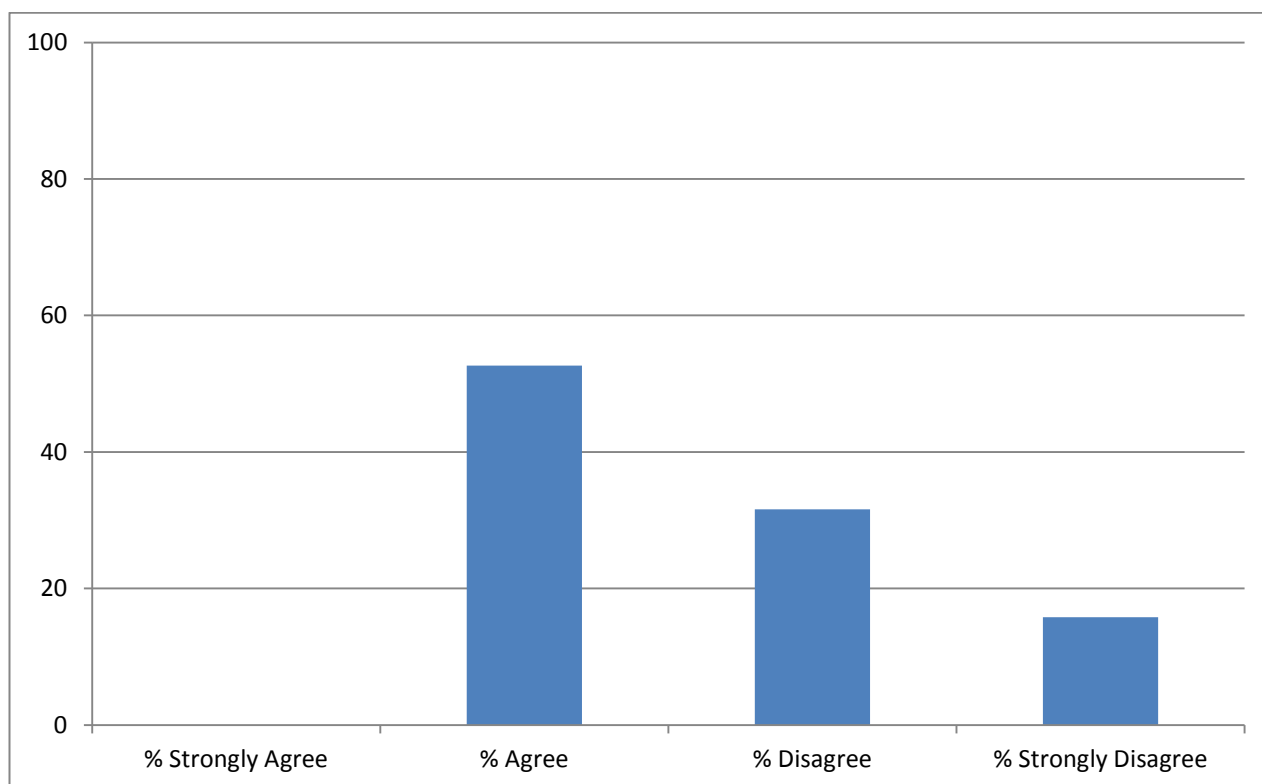
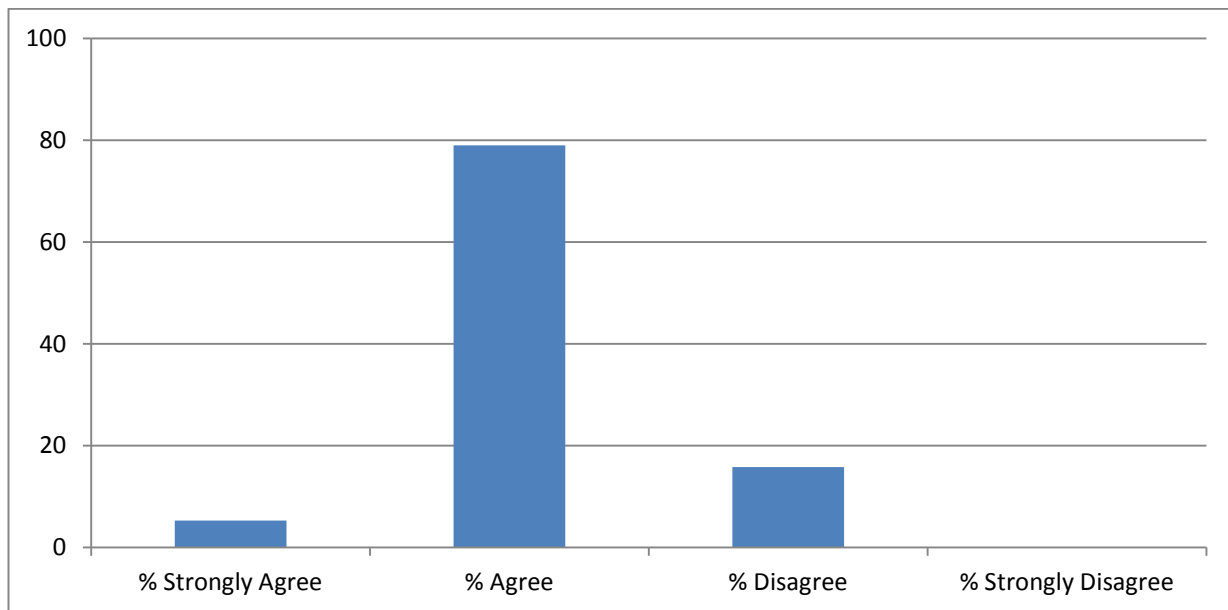


Figure 37: Response to Question 45. The glossary is comprehensive (n=19)



## Mathematical Methods

Figure 1: Response to Question 9. The rationale provides clarity about the subject's broad scope, distinctive nature and importance (n=17)

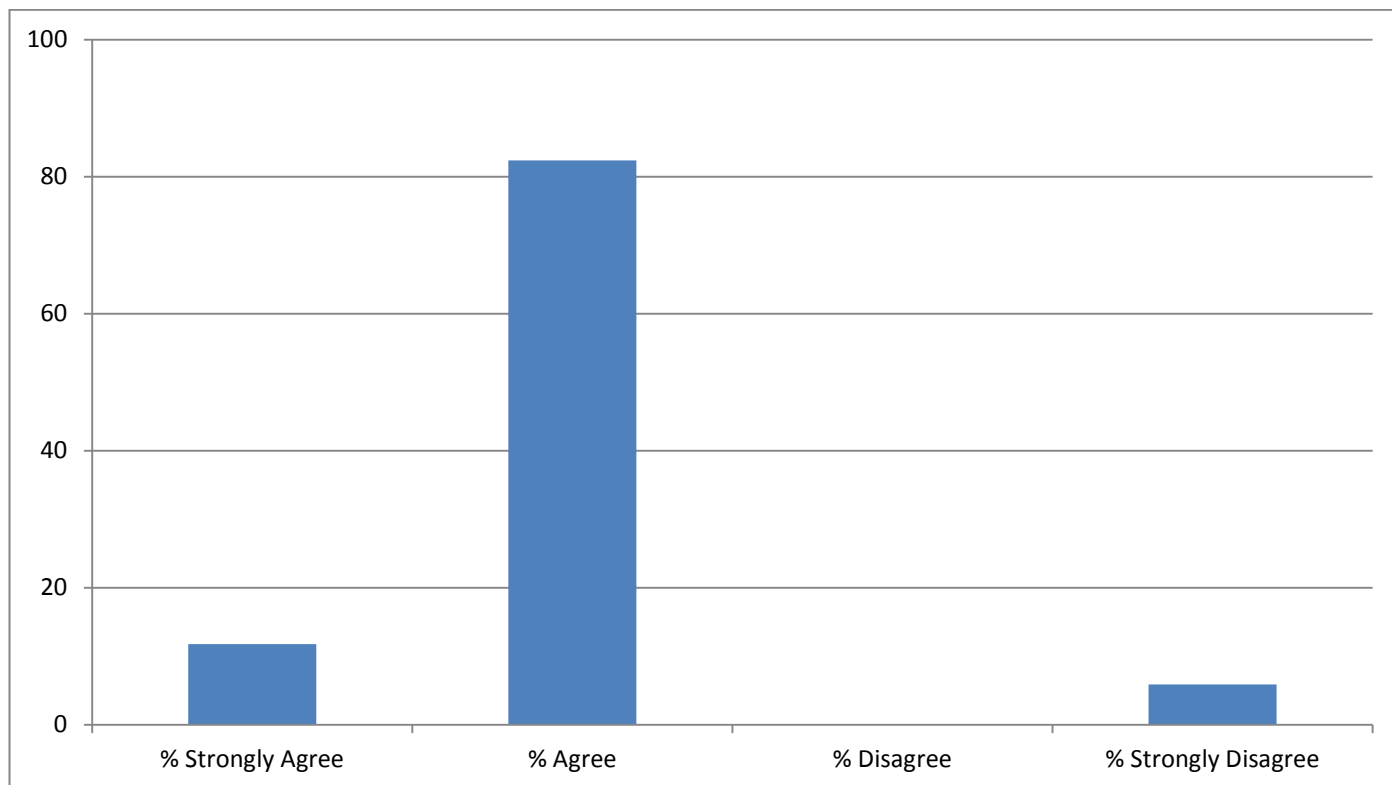


Figure 2: Response to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject (n=17)

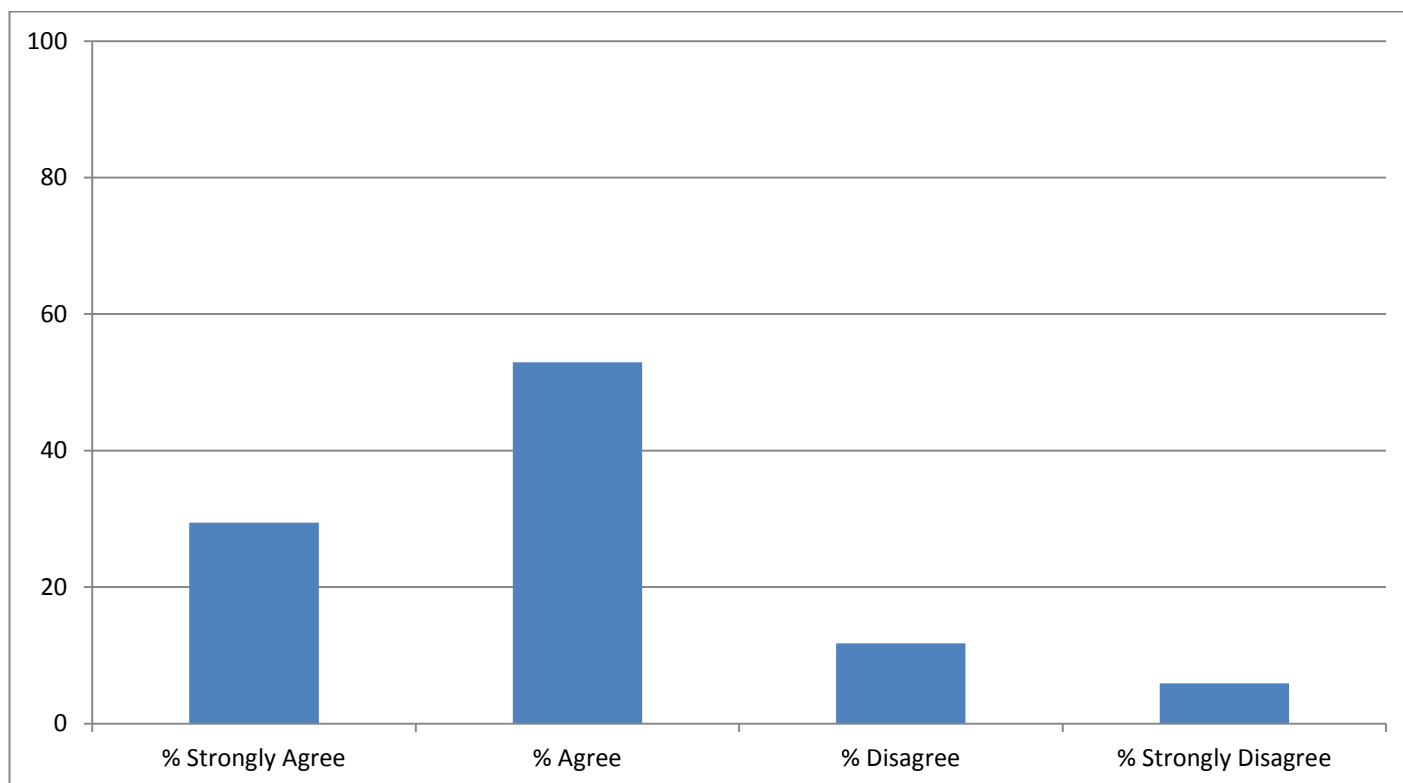


Figure 3: Response to Question 11. The four-unit structure has internal logic and coherence (n=28)

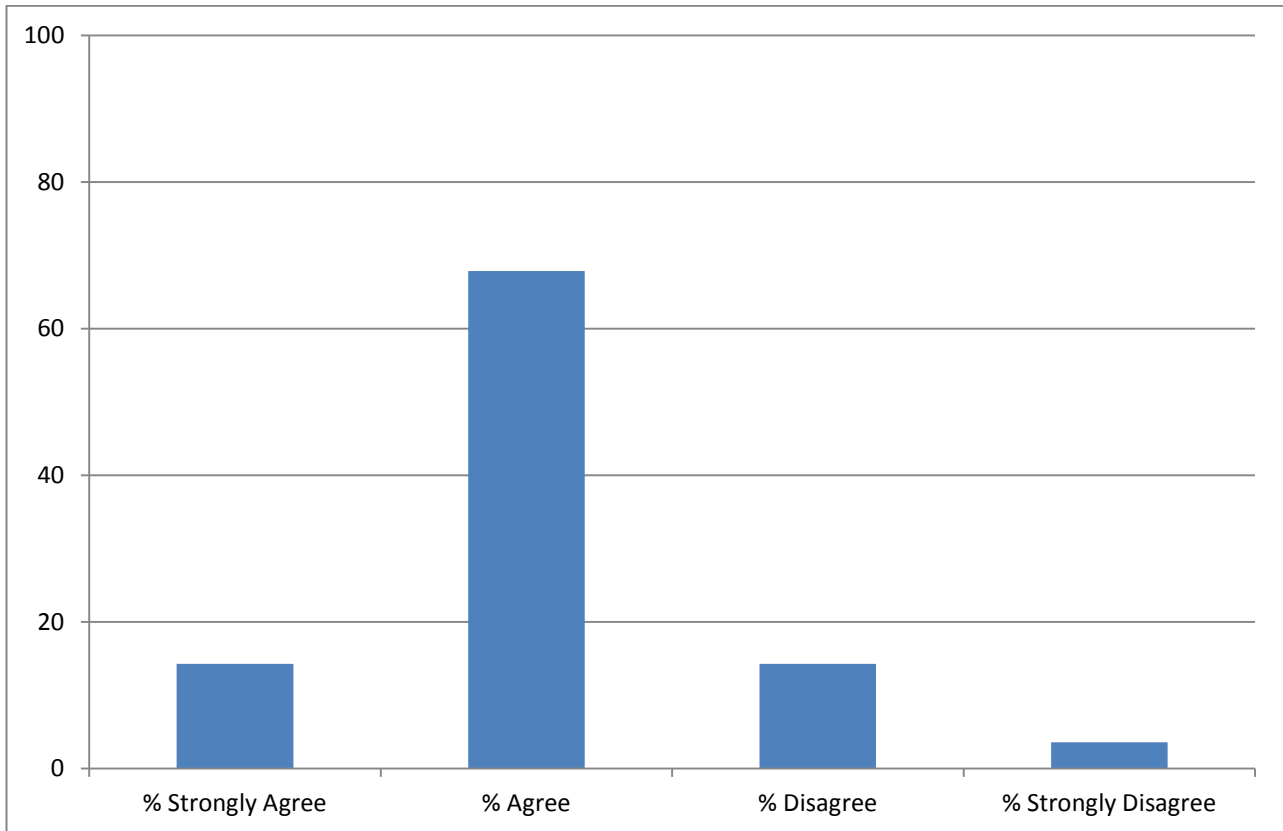


Figure 4: Response to Question 12. Units 3 and 4 are more cognitively demanding than Units 1 and 2 (n=30)

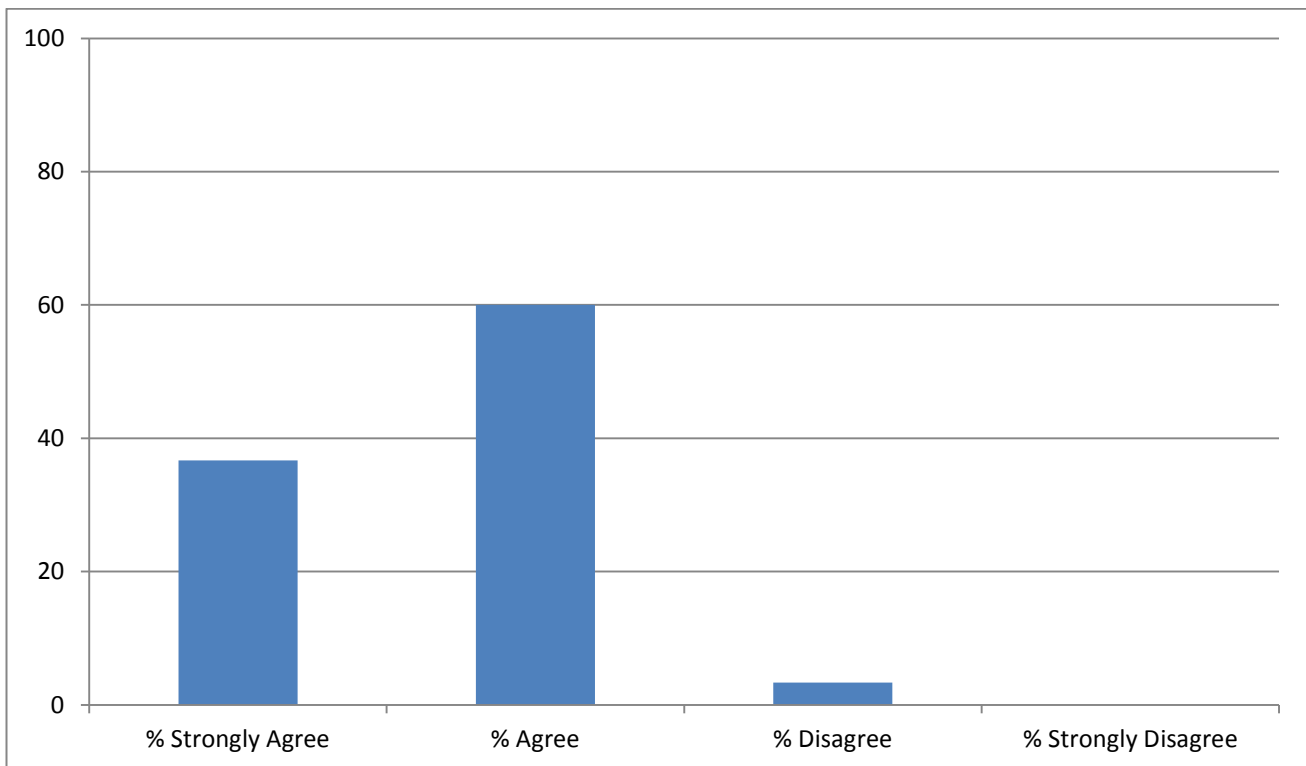




Figure 5: Response to Question 13. There is a clear link between this senior secondary curriculum and the relevant F–10 Australian Curriculum (n=24)

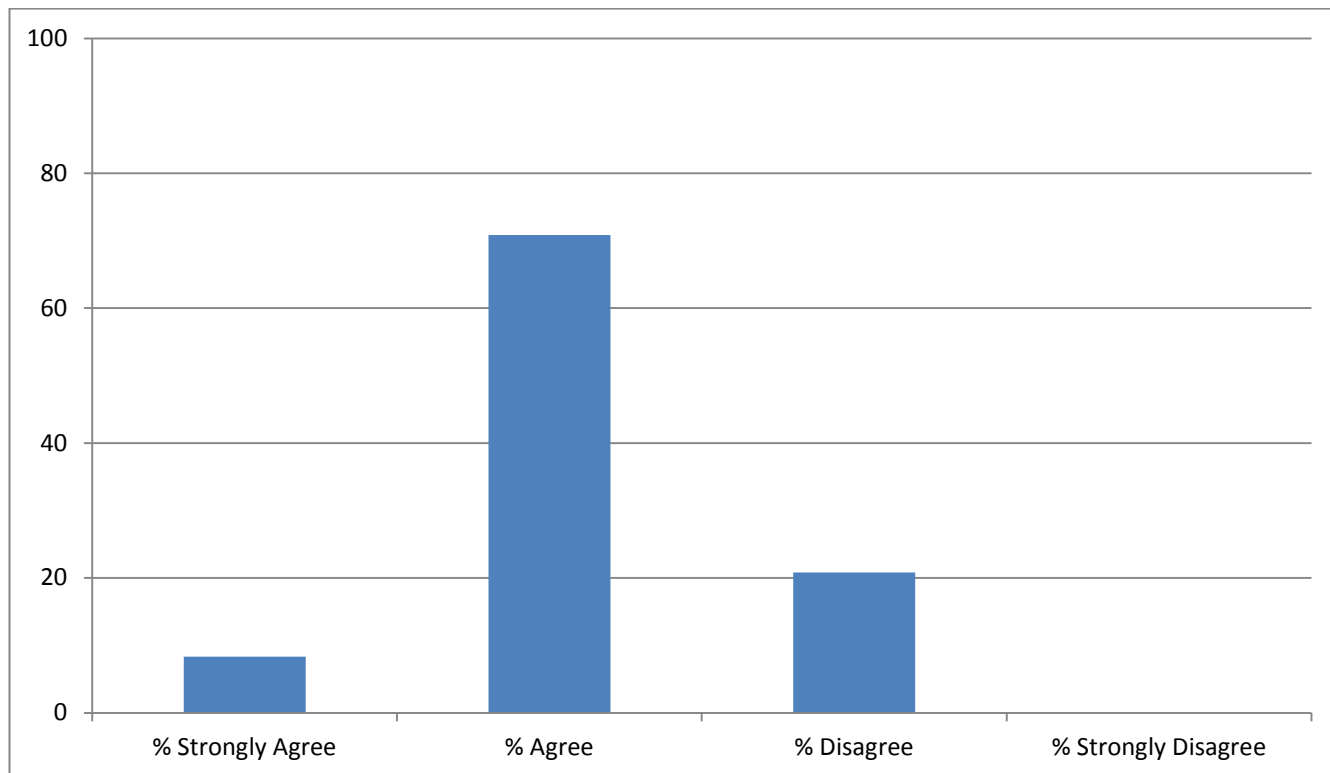


Figure 6: Response to Question 14. The achievement standards across Units 1 and 2 and Units 3 and 4 are organised in an order consistent with your experience (n=26)

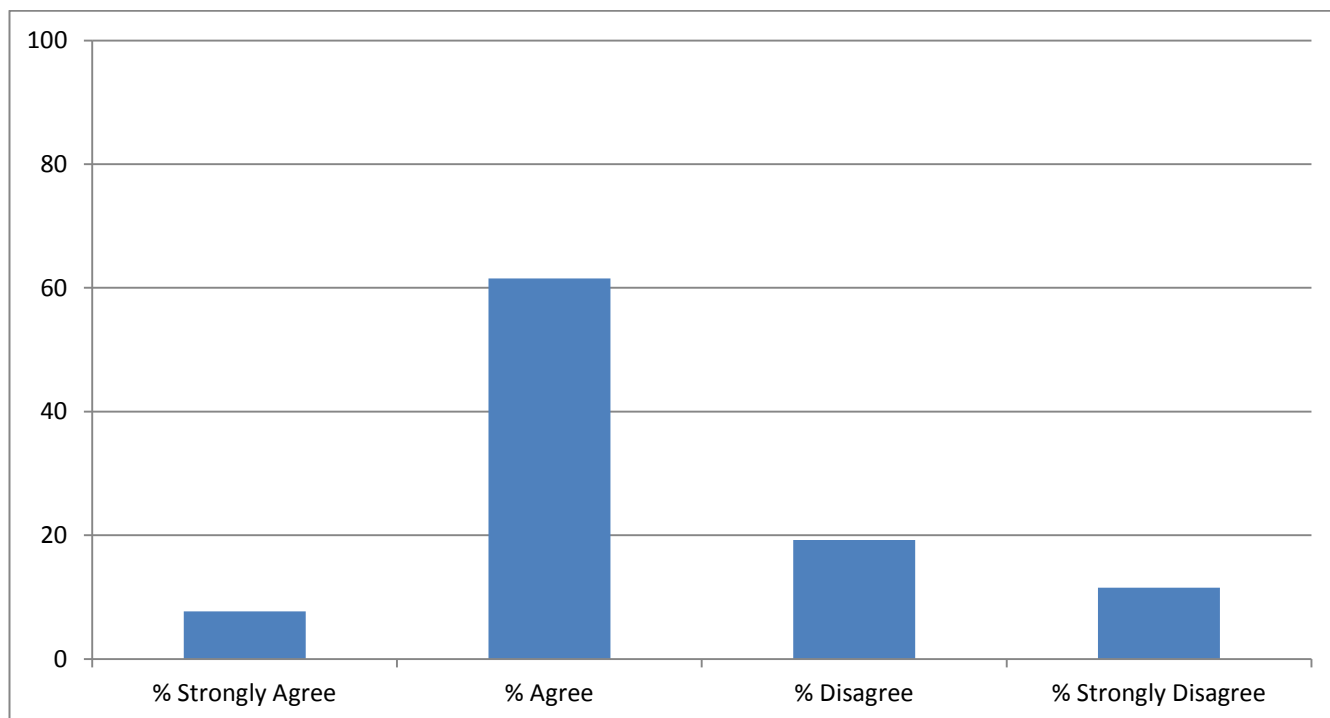


Figure 7: Response to Question 15. Unit 1: the unit description describes the focus and scope for this unit (n=25)

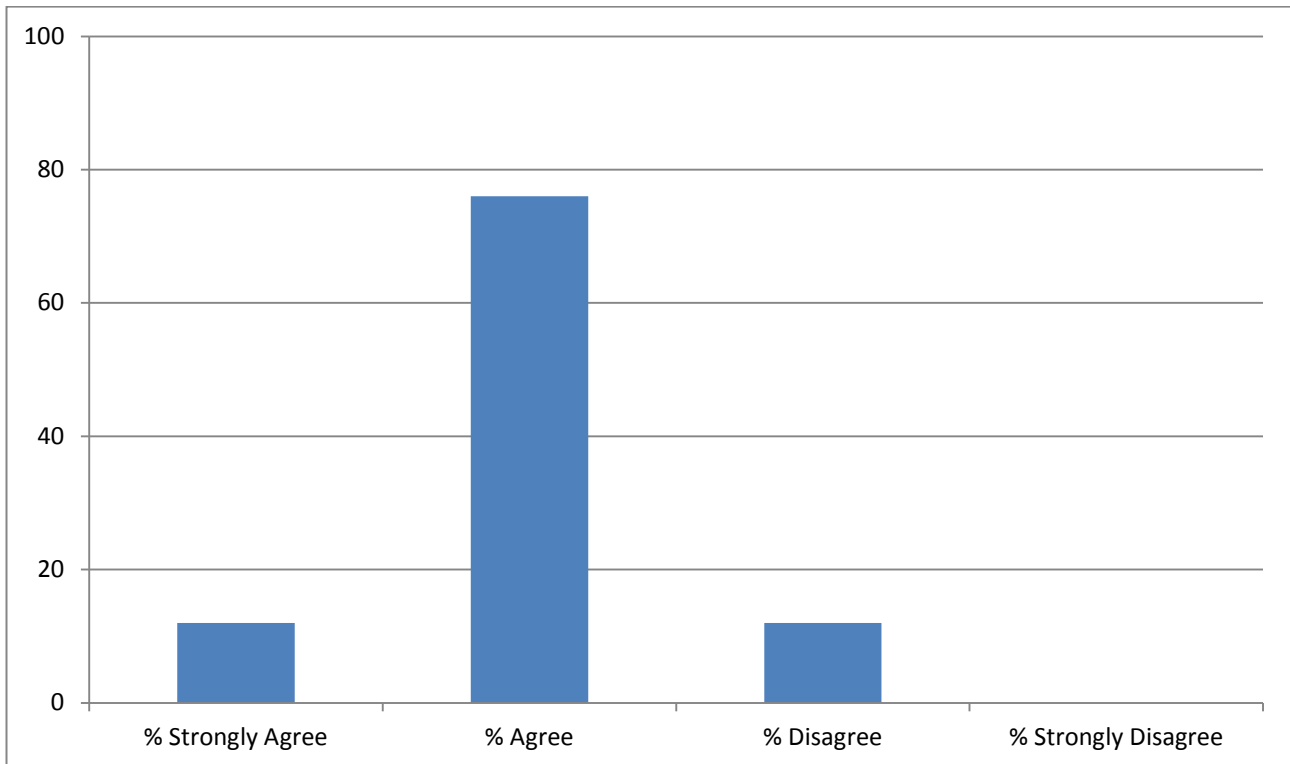


Figure 8: Response to Question 16. The outcomes describe clearly the expected learning for this unit (n=25)

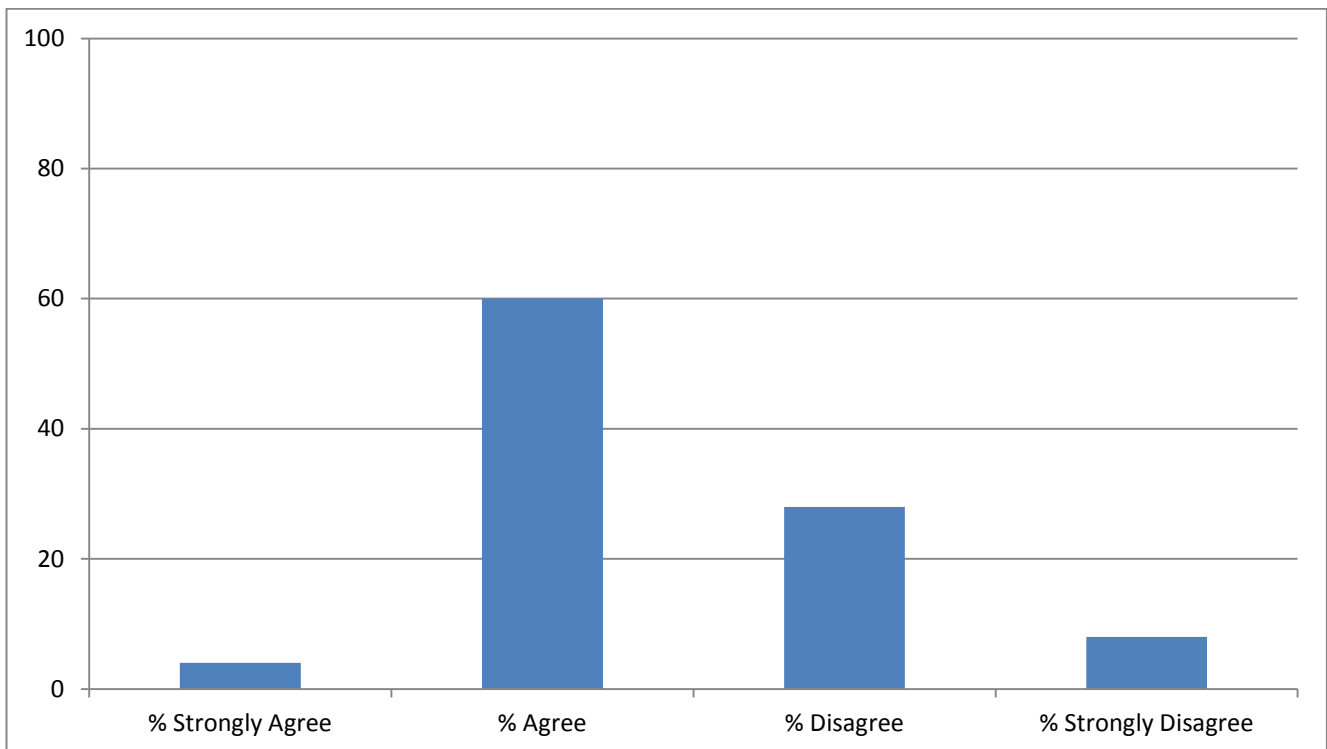


Figure 9: Response to Question 17. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=24)

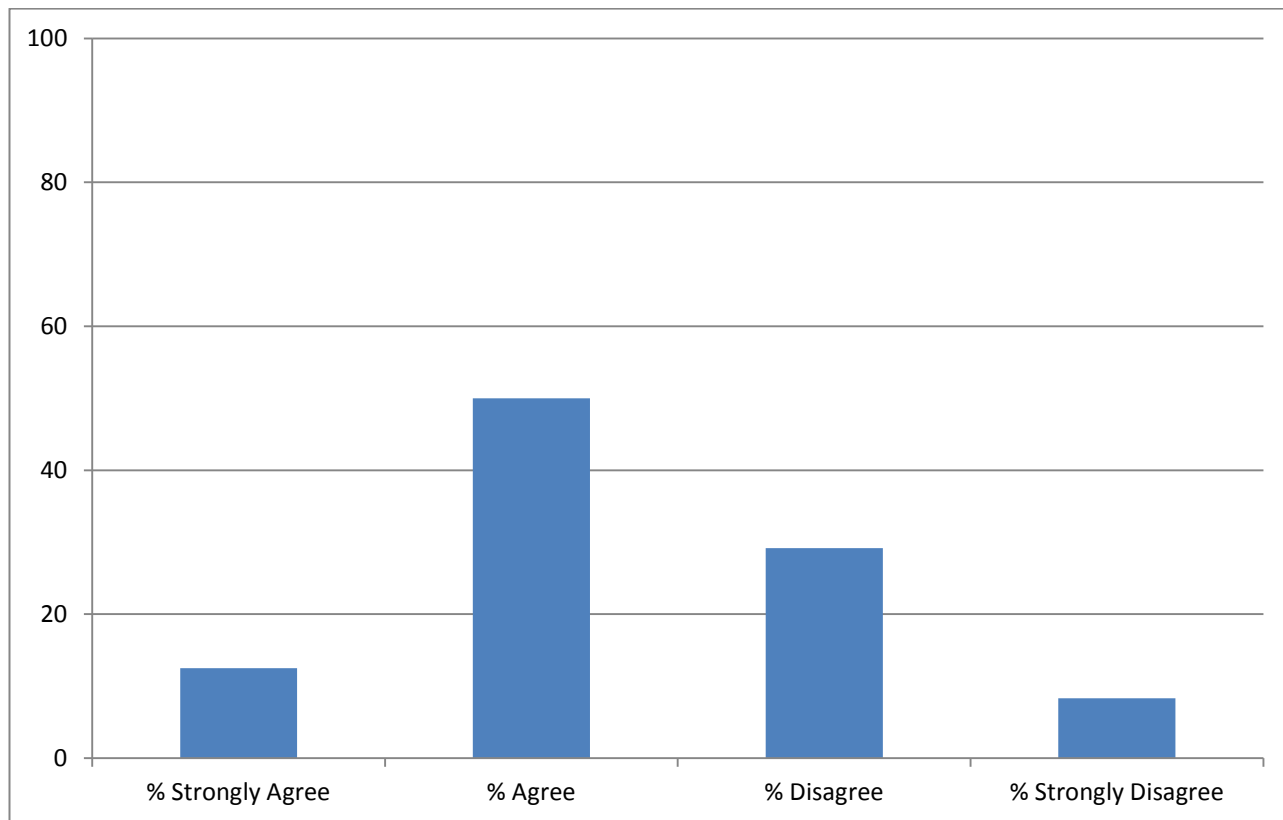


Figure 10: Response to Question 18. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=28)

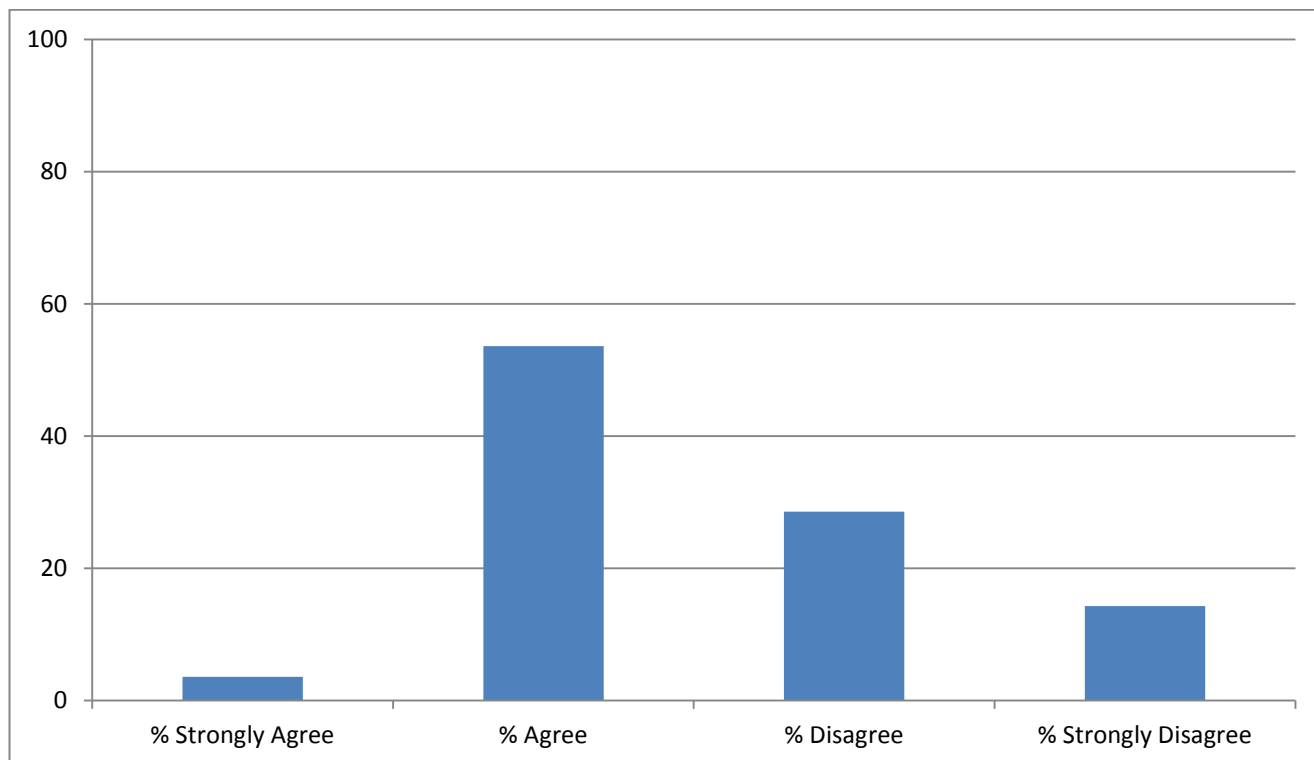


Figure 11: Response to Question 19. The content descriptions are specific about what is to be taught (n=26)

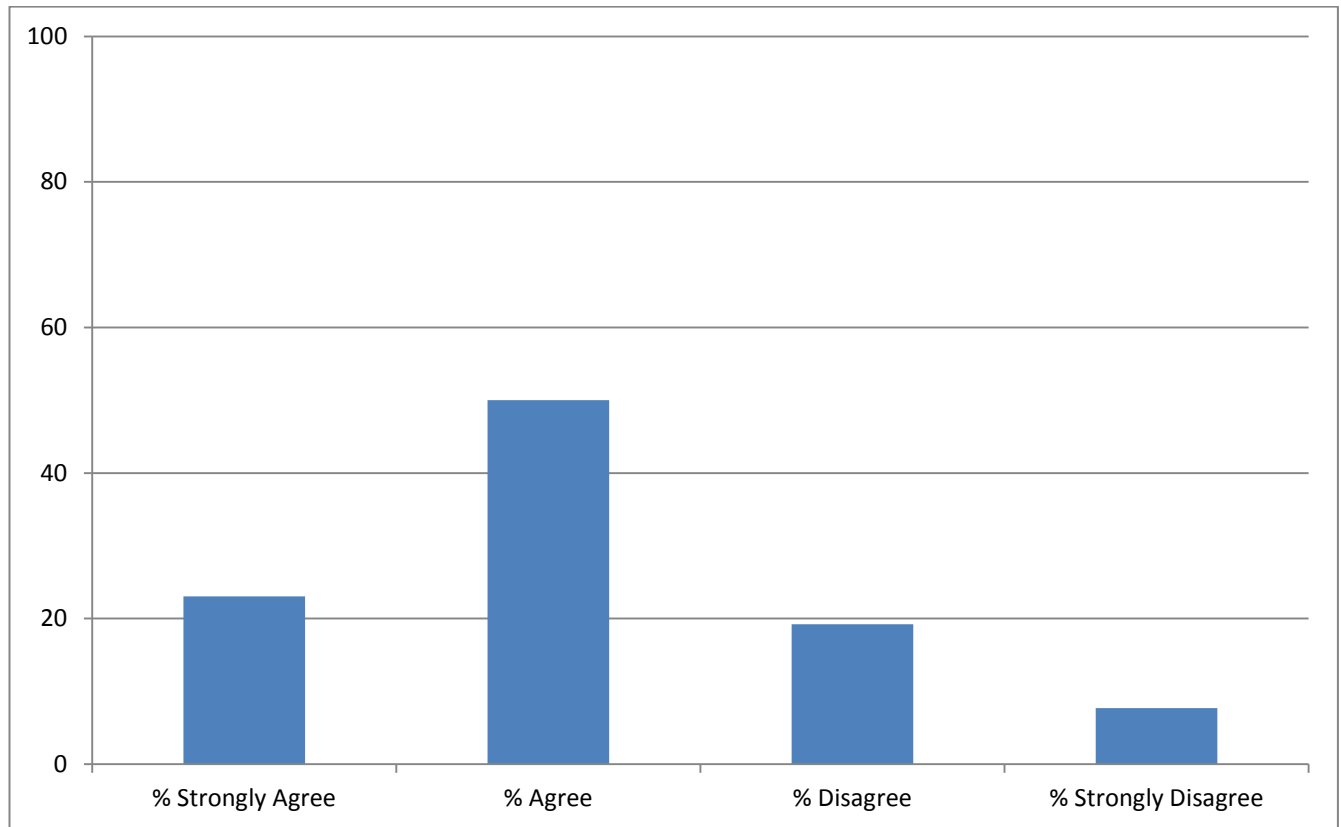


Figure 12: Response to Question 20. Unit 2: The unit description clearly describes the focus and scope for this unit (n=25)

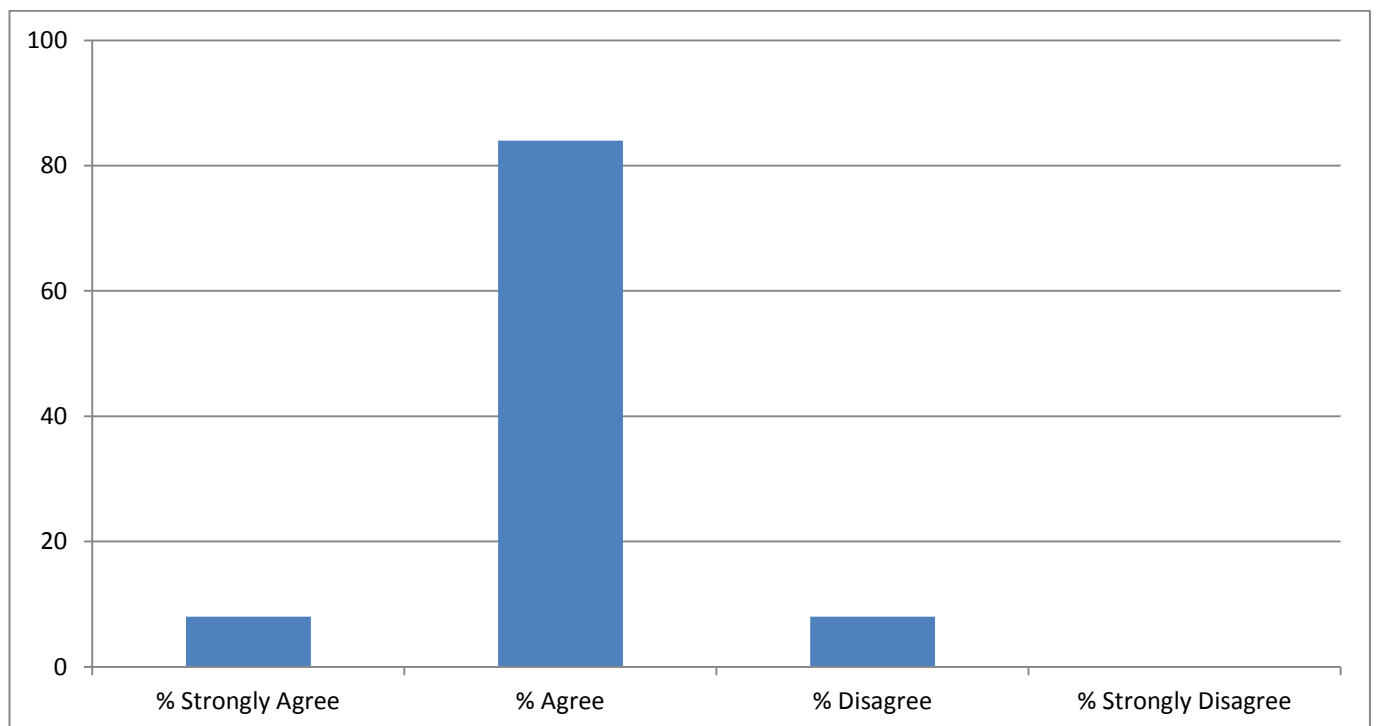


Figure 13: Response to Question 21. The unit outcomes describe clearly the expected learning for this unit (n=25)

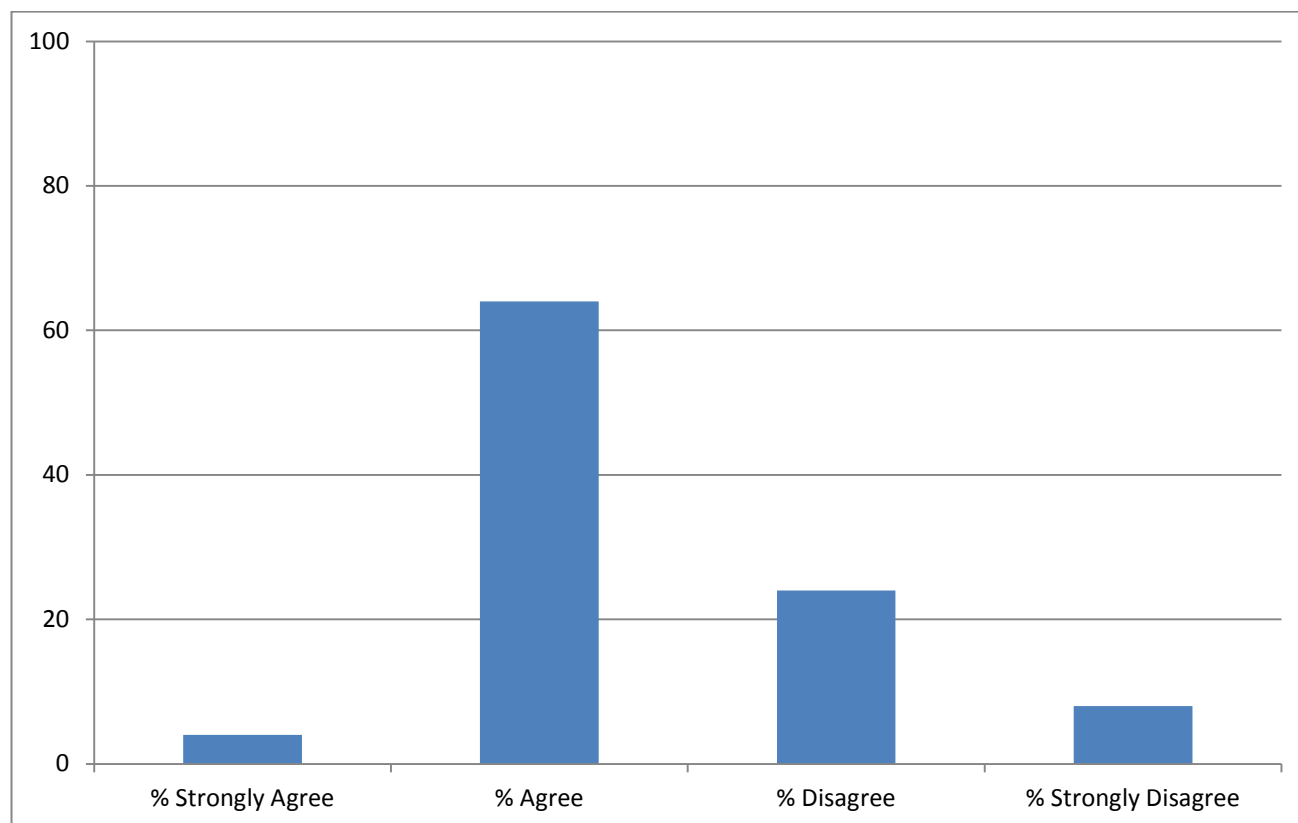


Figure 14: Response to Question 22. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=25)

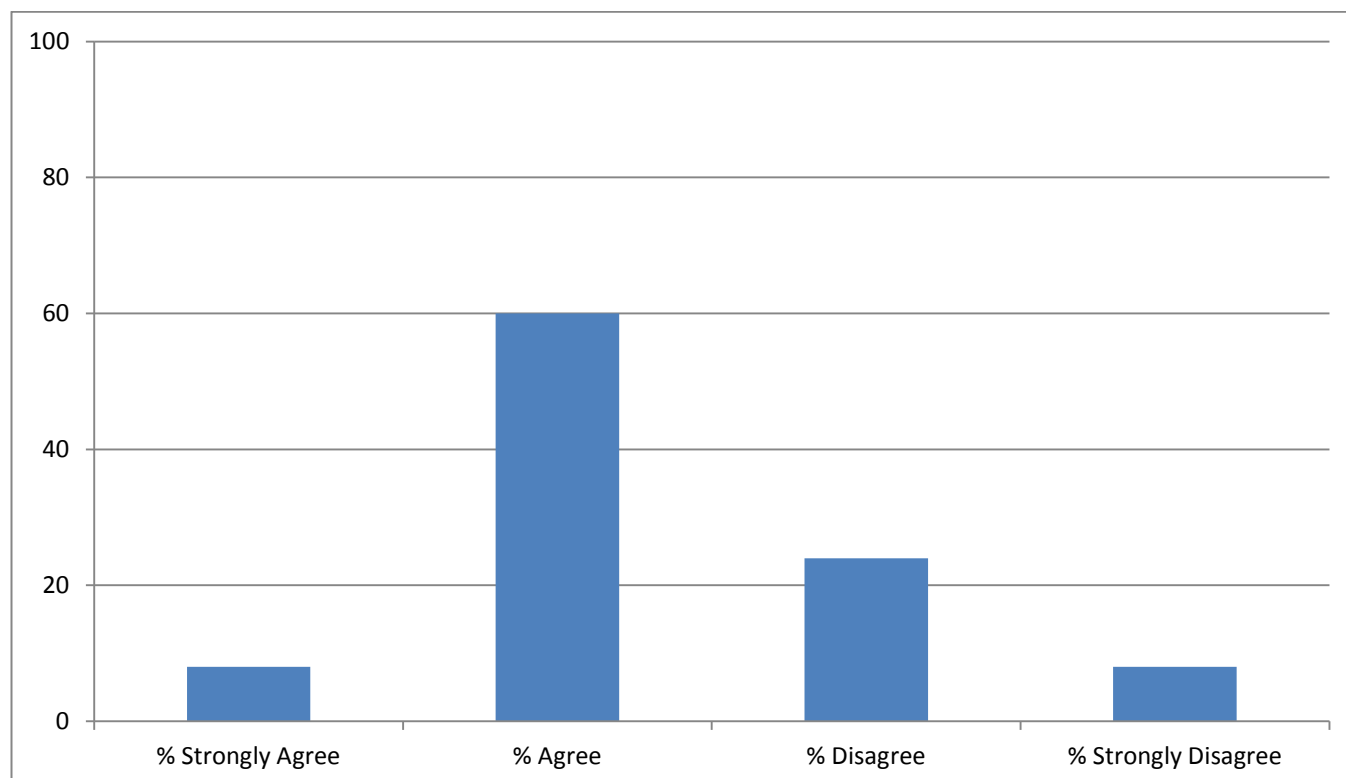


Figure 15: Response to Question 23. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=28)

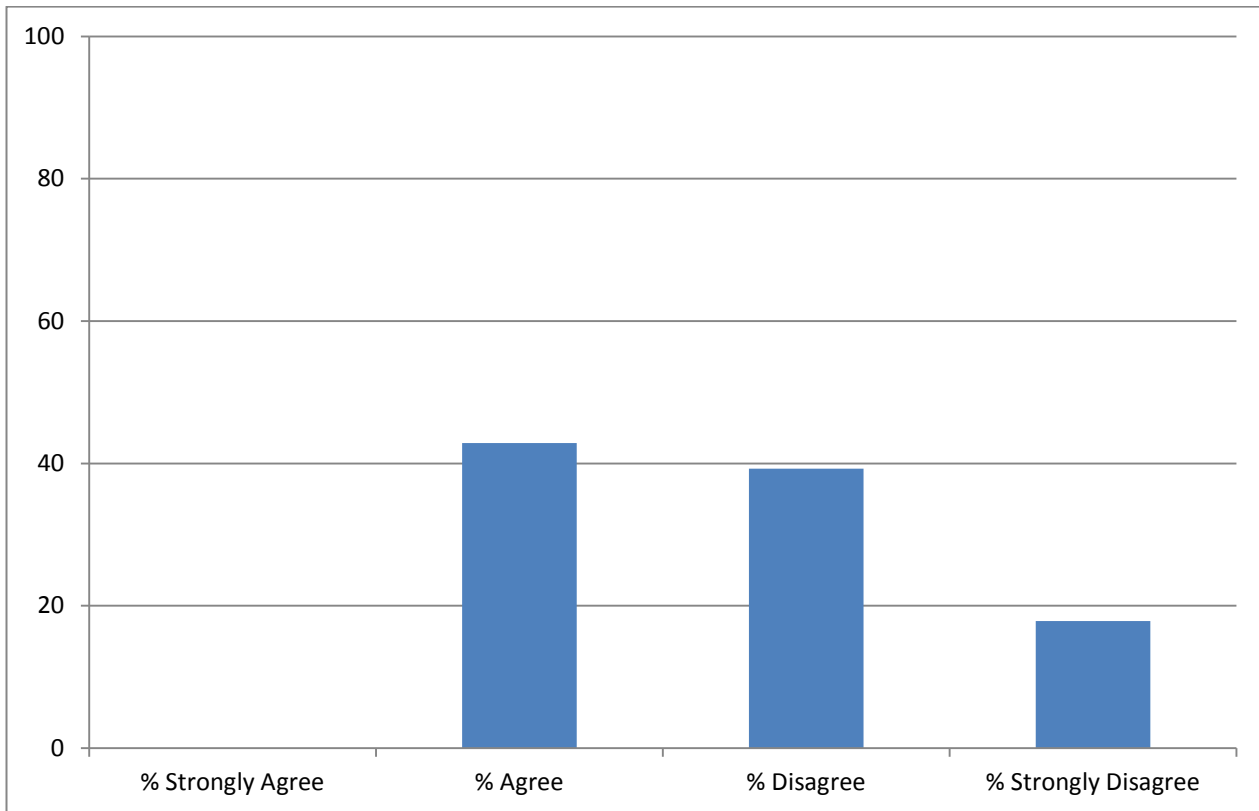


Figure 16: Response to Question 24. The content descriptions are specific about what is to be taught (n=26)

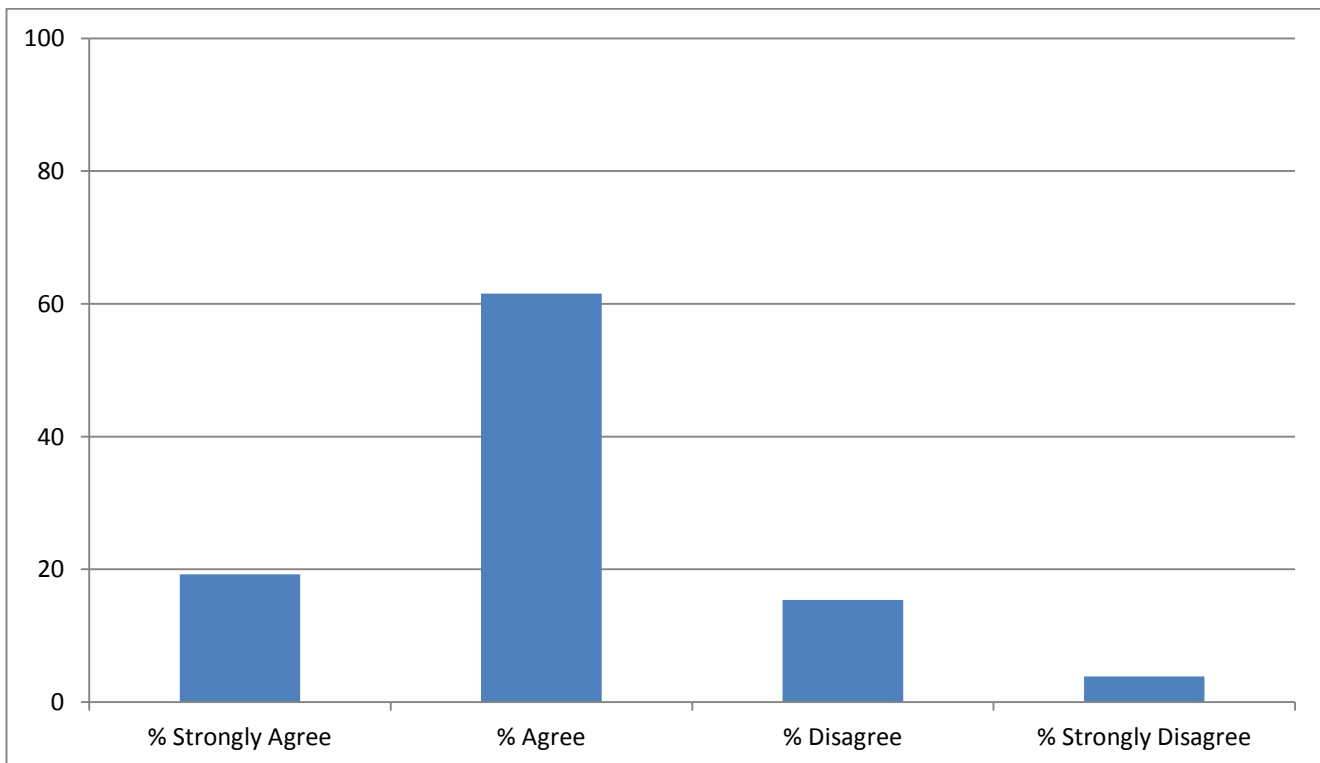


Figure 17: Response to Question 25. Achievement standards for Units 1 and 2: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=24)

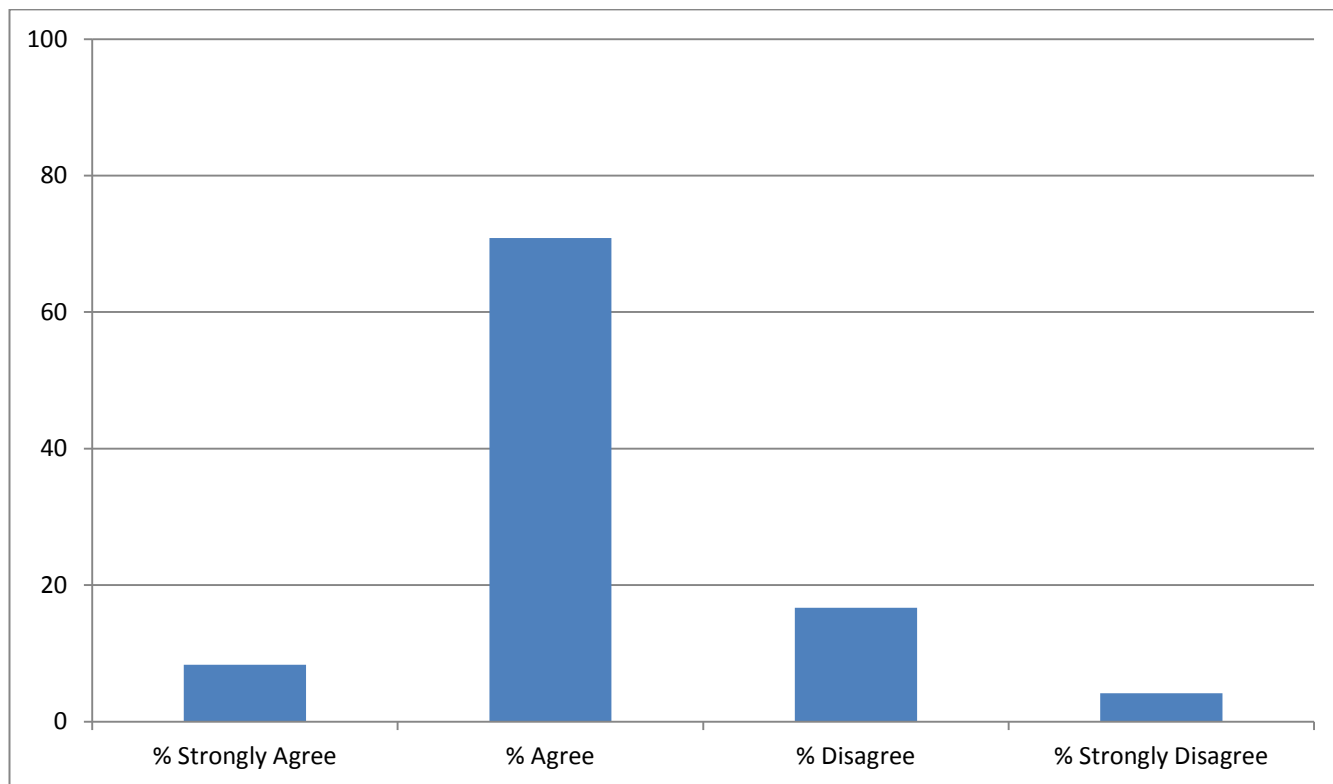


Figure 18: Response to Question 26. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=23)

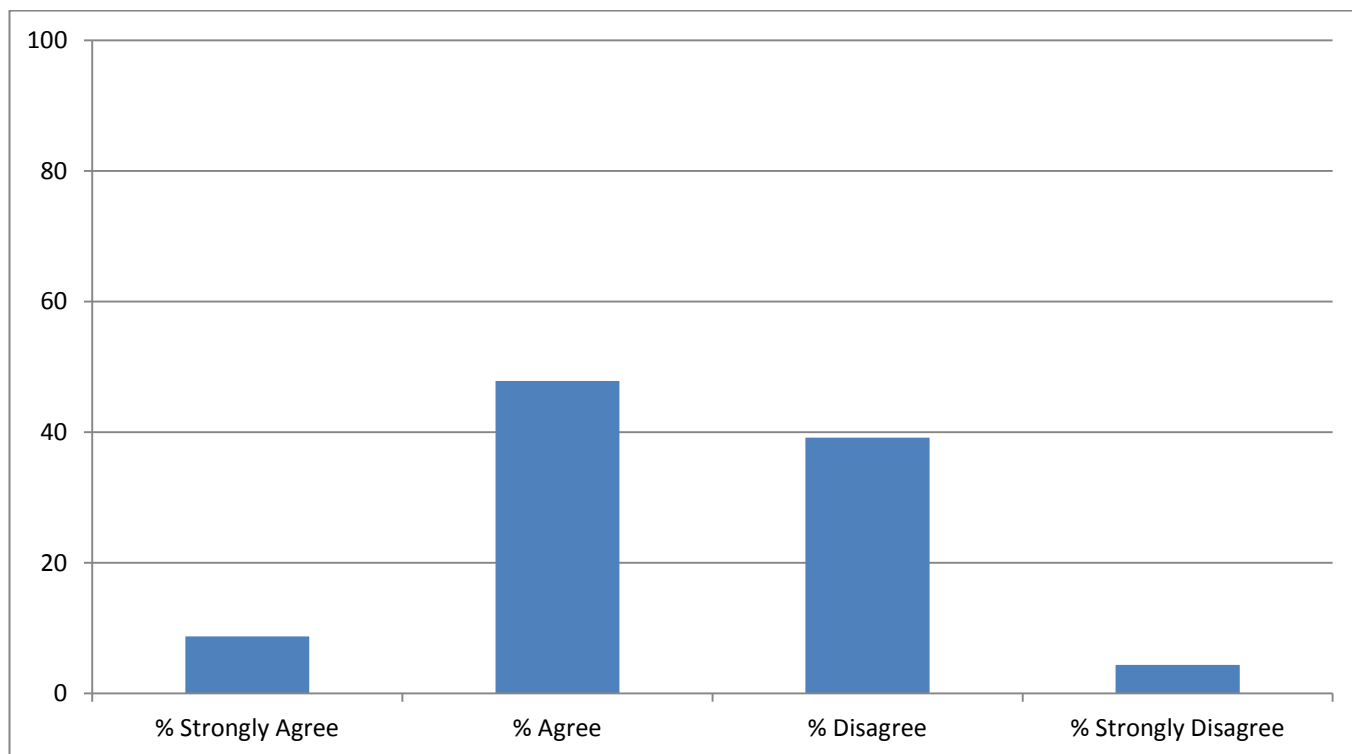


Figure 19: Response to Question 27. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units (n=24)

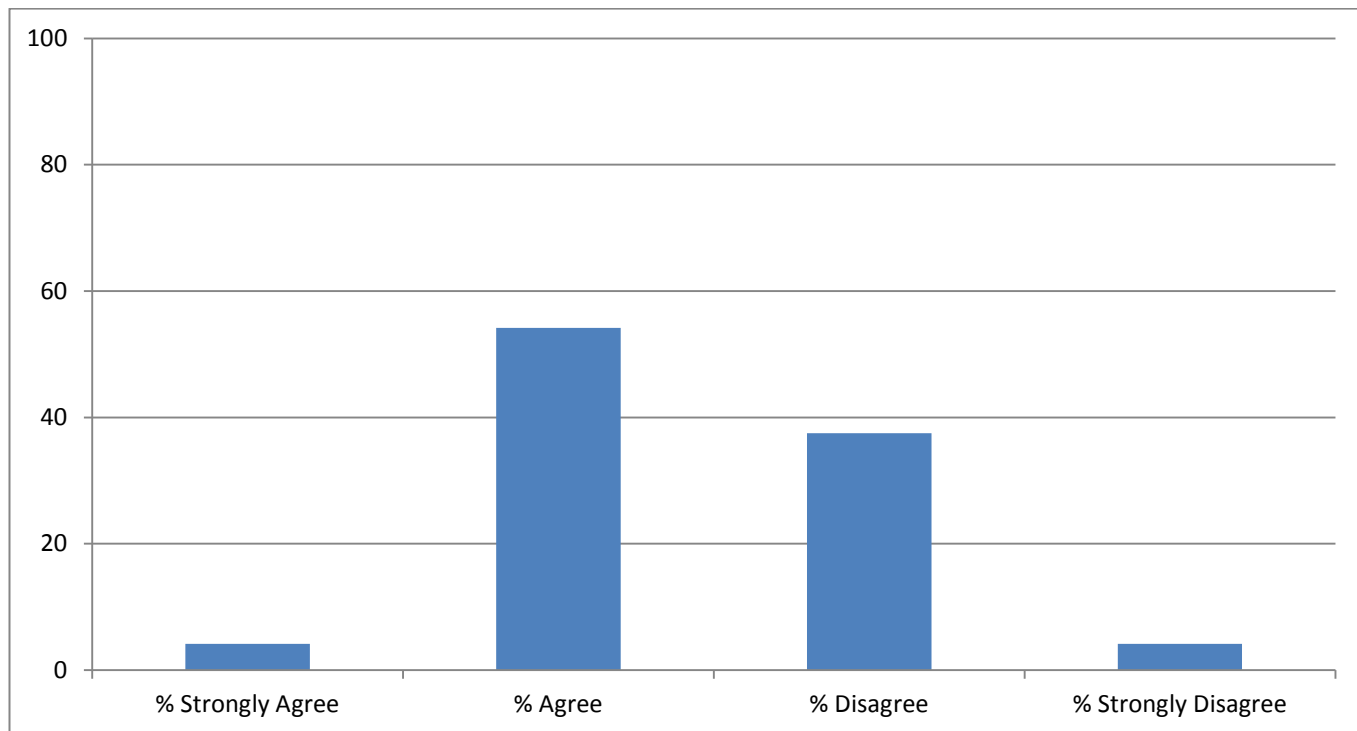


Figure 20: Response to Question 28. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=24)

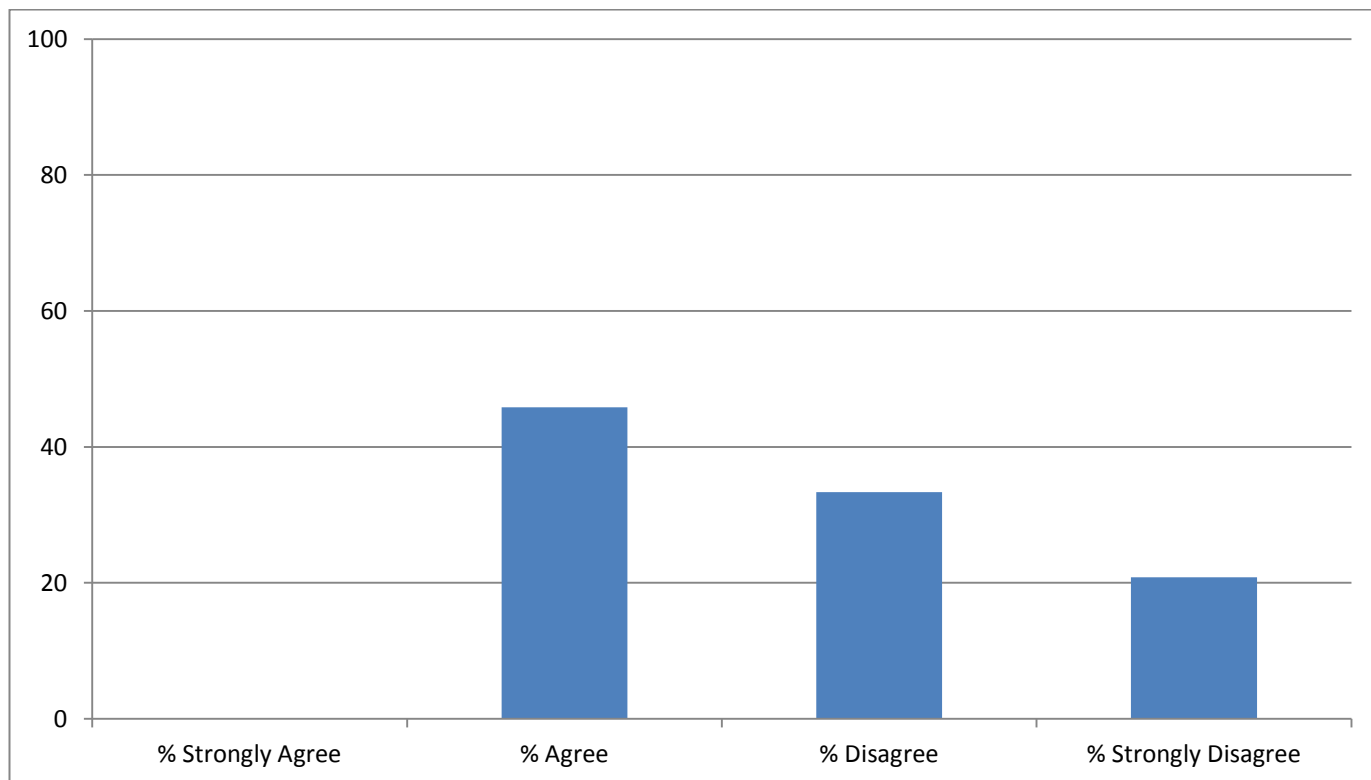




Figure 21: Response to Question 29. Unit 3: the unit description clearly describes the focus and scope for this unit (n=24)

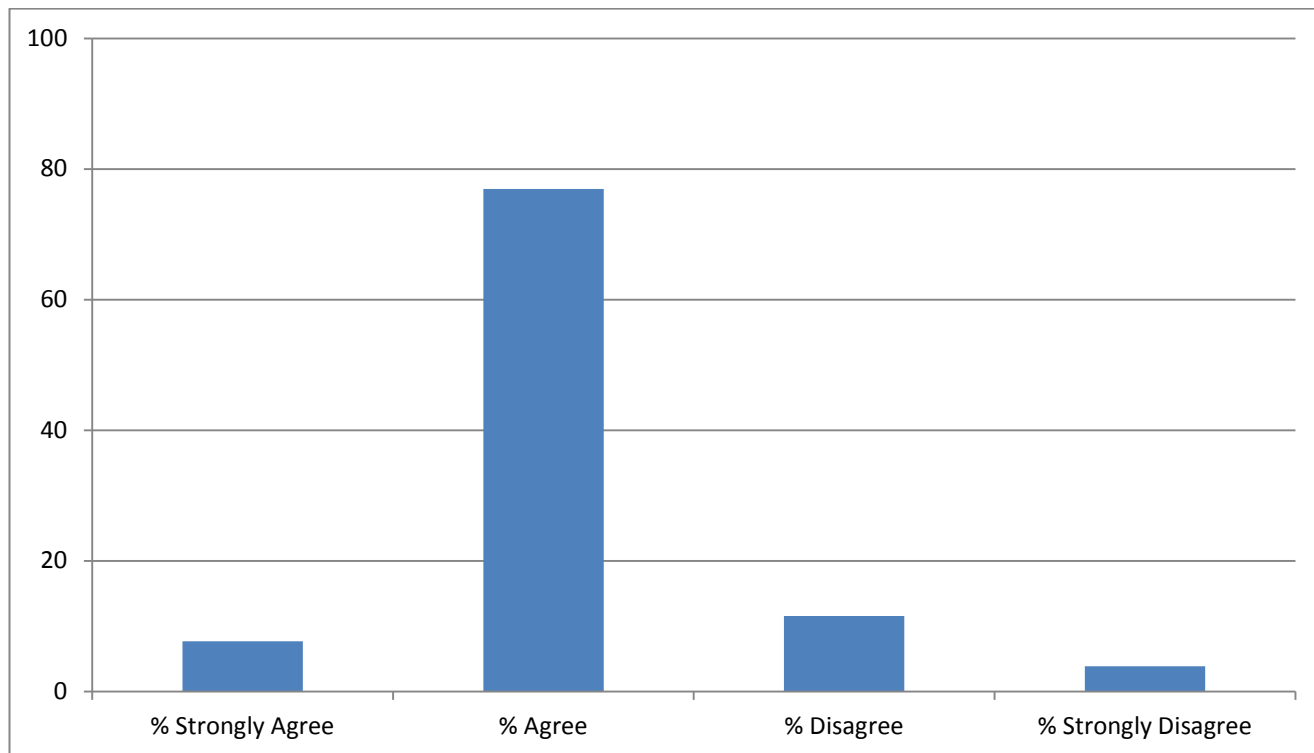


Figure 22: Response to Question 30. The unit outcomes describe clearly the expected learning for this unit (n=26)

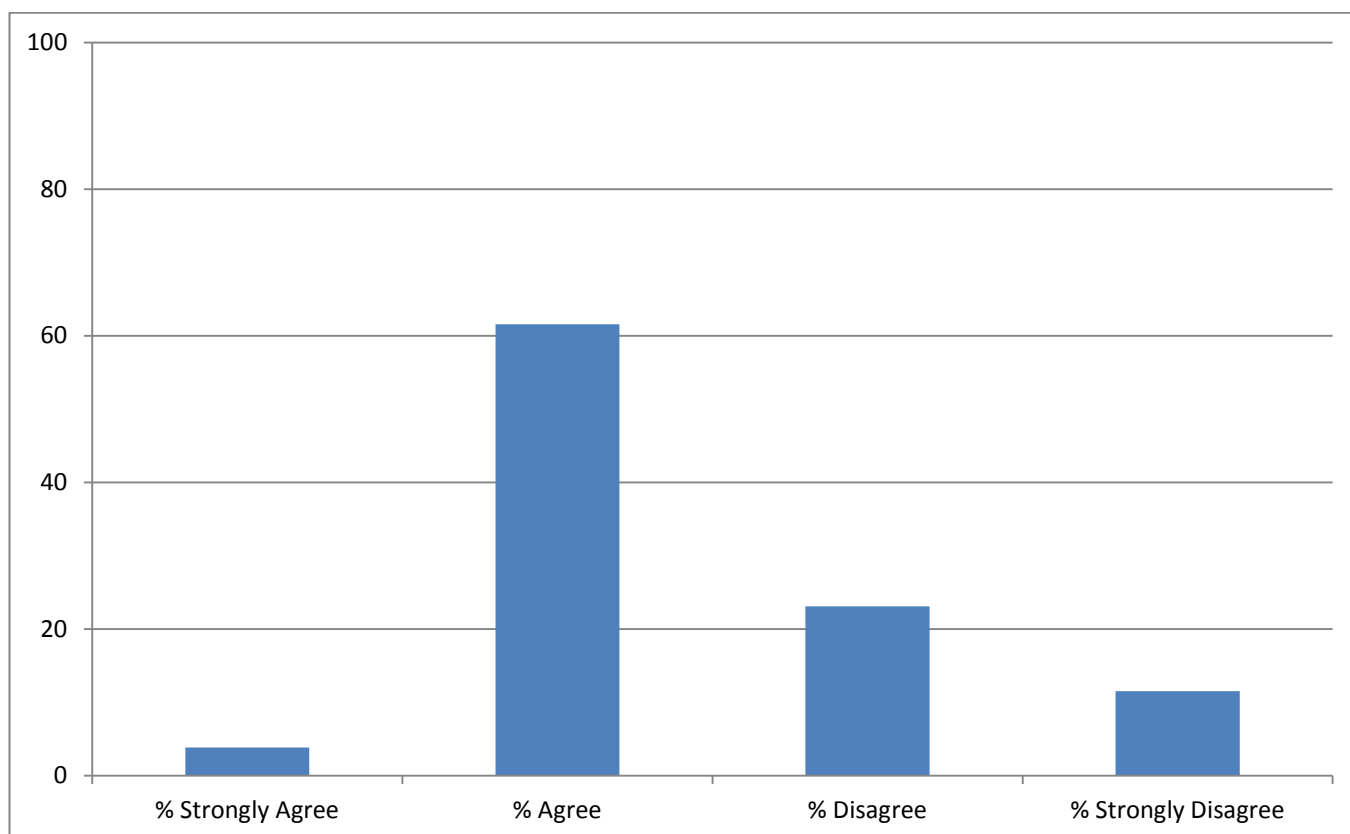


Figure 23: Response to Question 31. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=26)

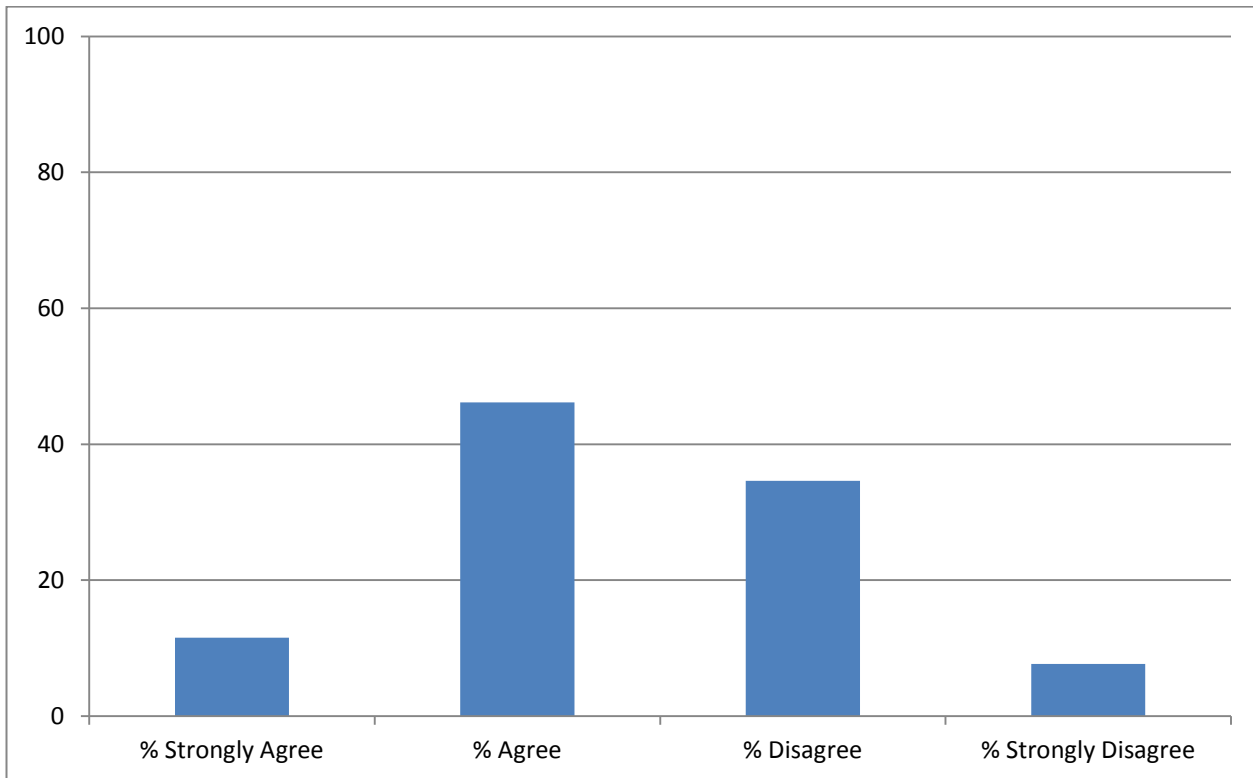


Figure 24: Response to Question 32. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=27)

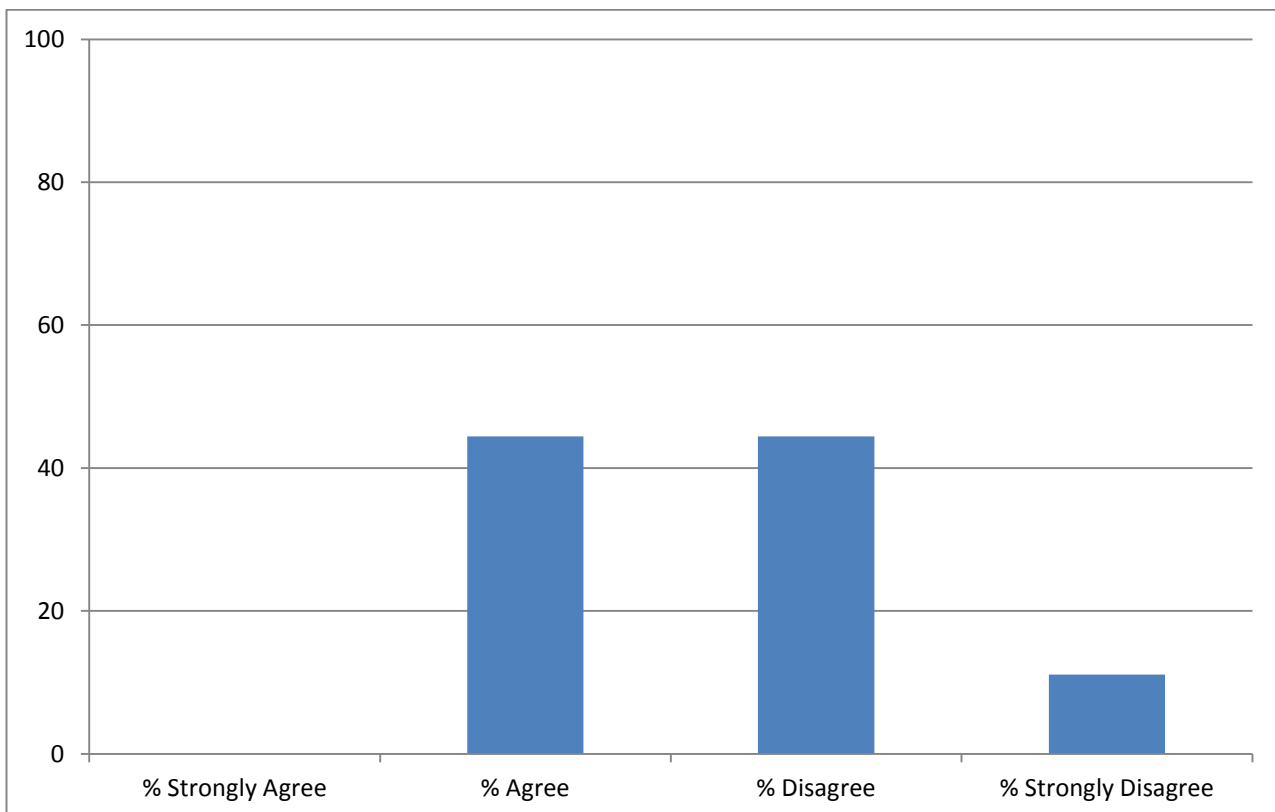


Figure 25: Response to Question 33. The content descriptions are specific about what is to be taught (n=26)

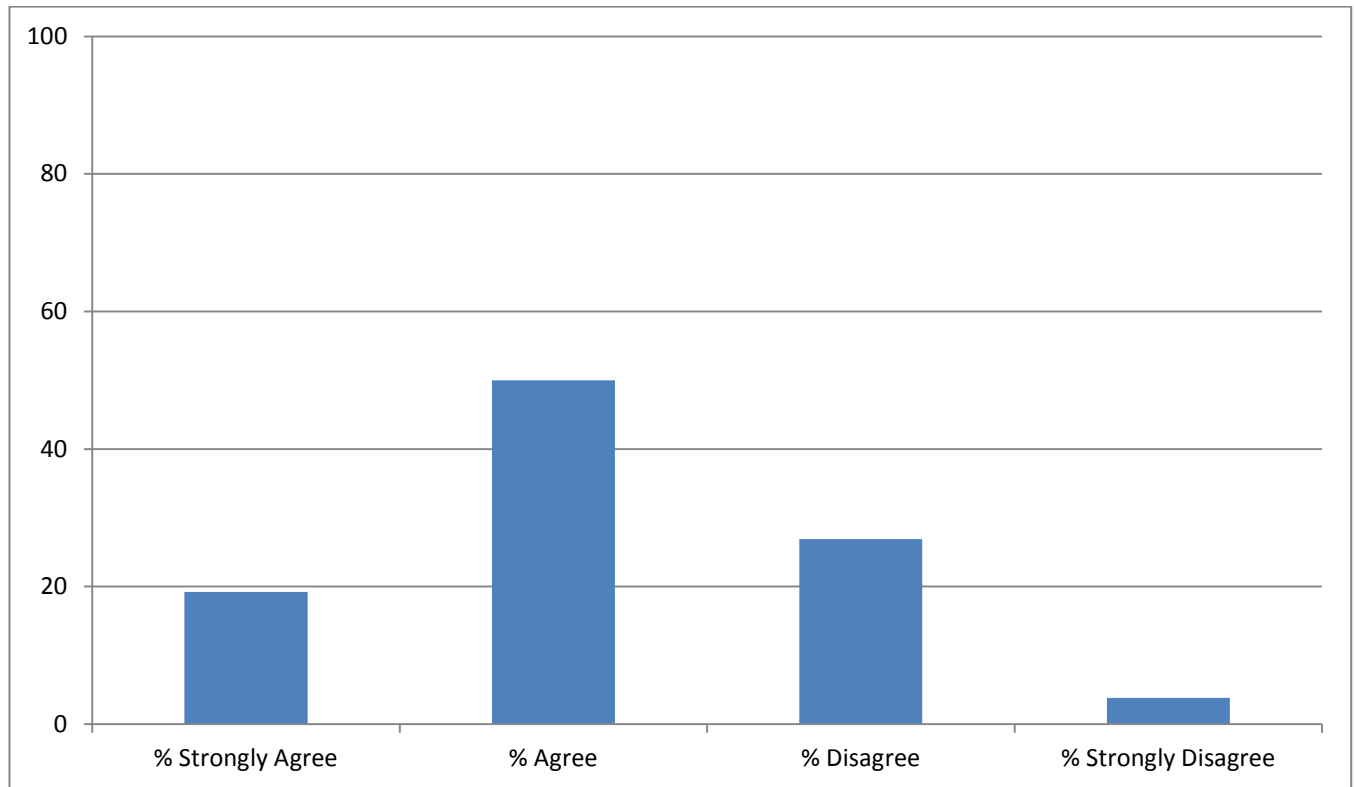


Figure 26: Response to Question 34. Unit 4: The unit description clearly describes the focus and scope for this unit (n=26)

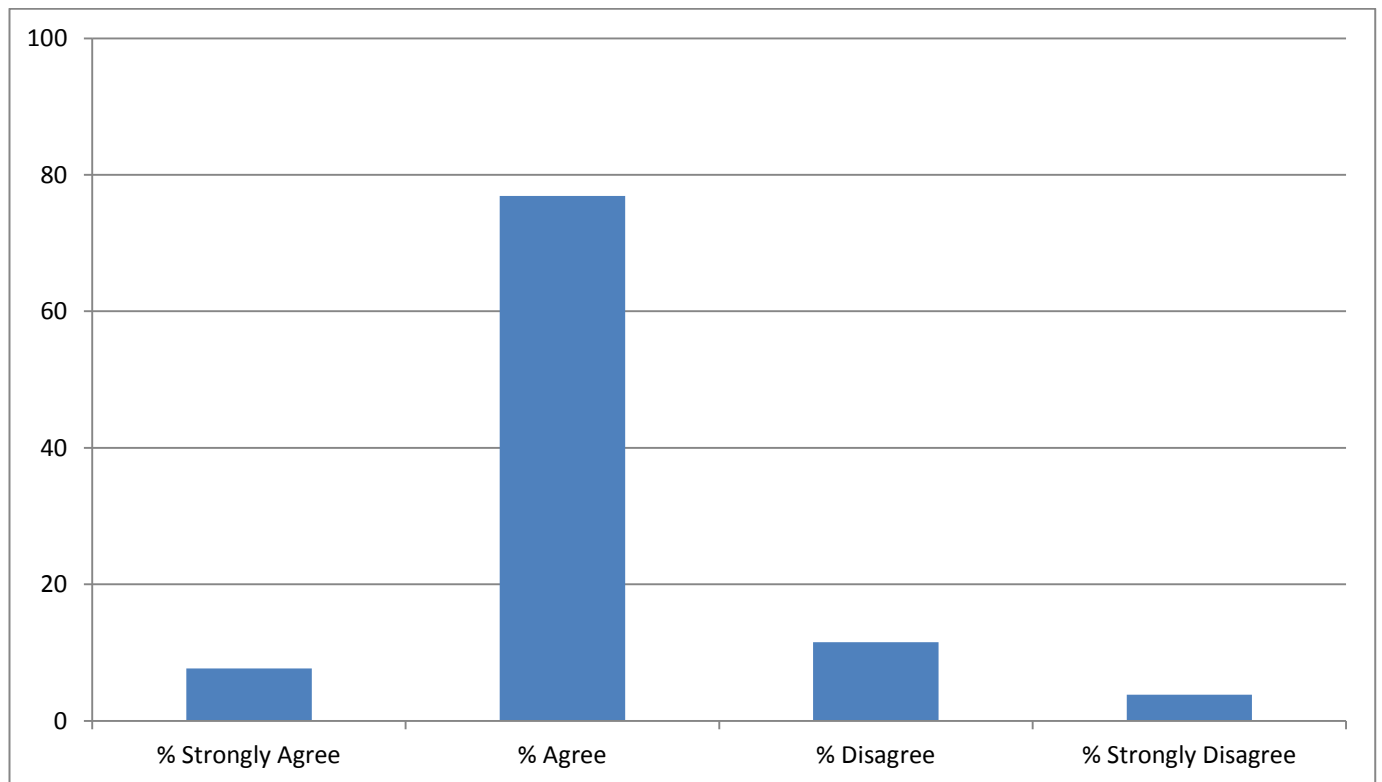


Figure 27: Response to Question 35. The unit outcomes describe clearly the expected learning for this unit (n=26)

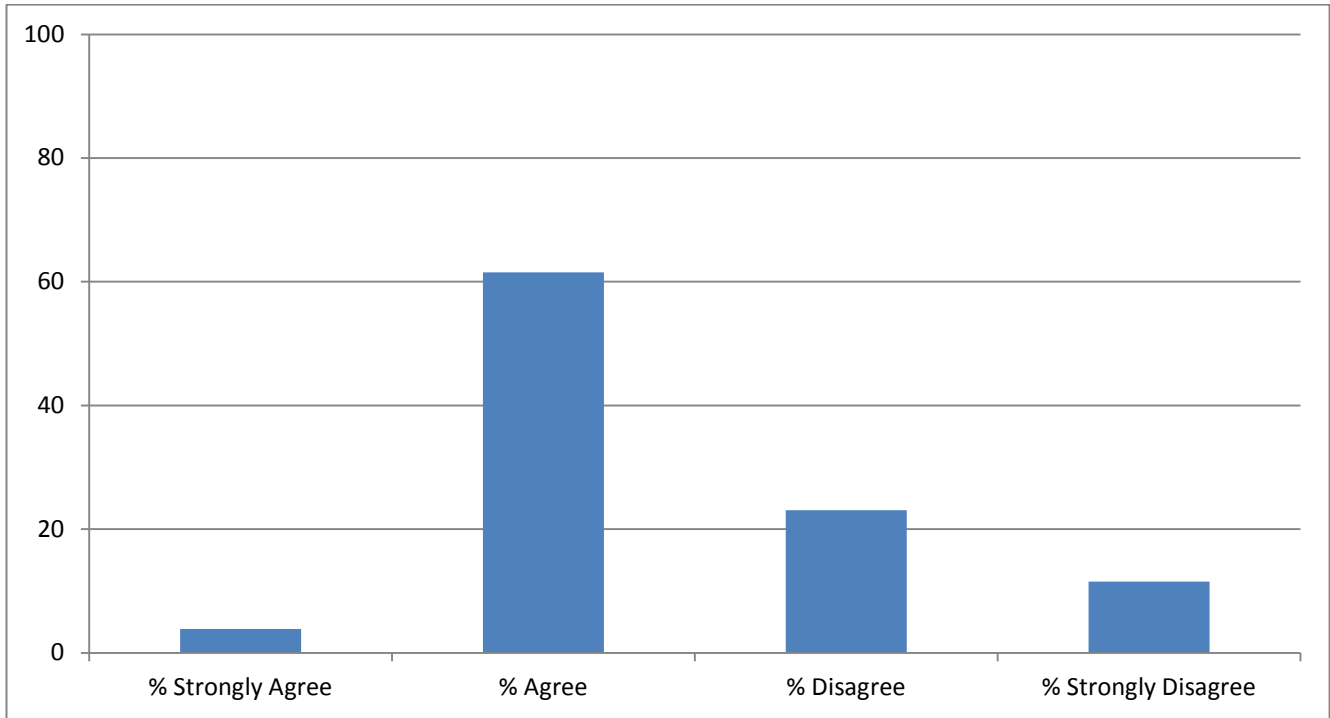


Figure 28: Response to Question 36. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=26)

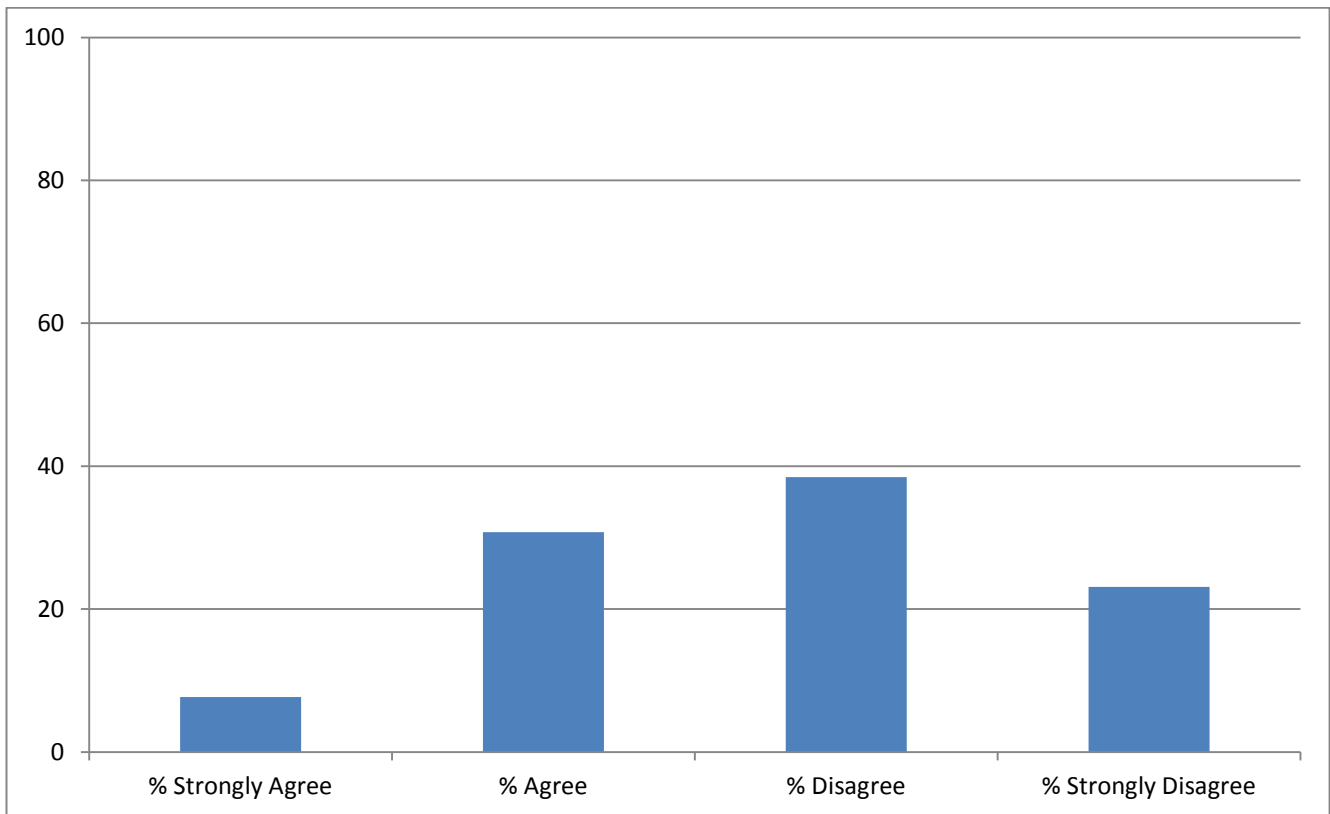


Figure 29: Response to Question 37. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=28)

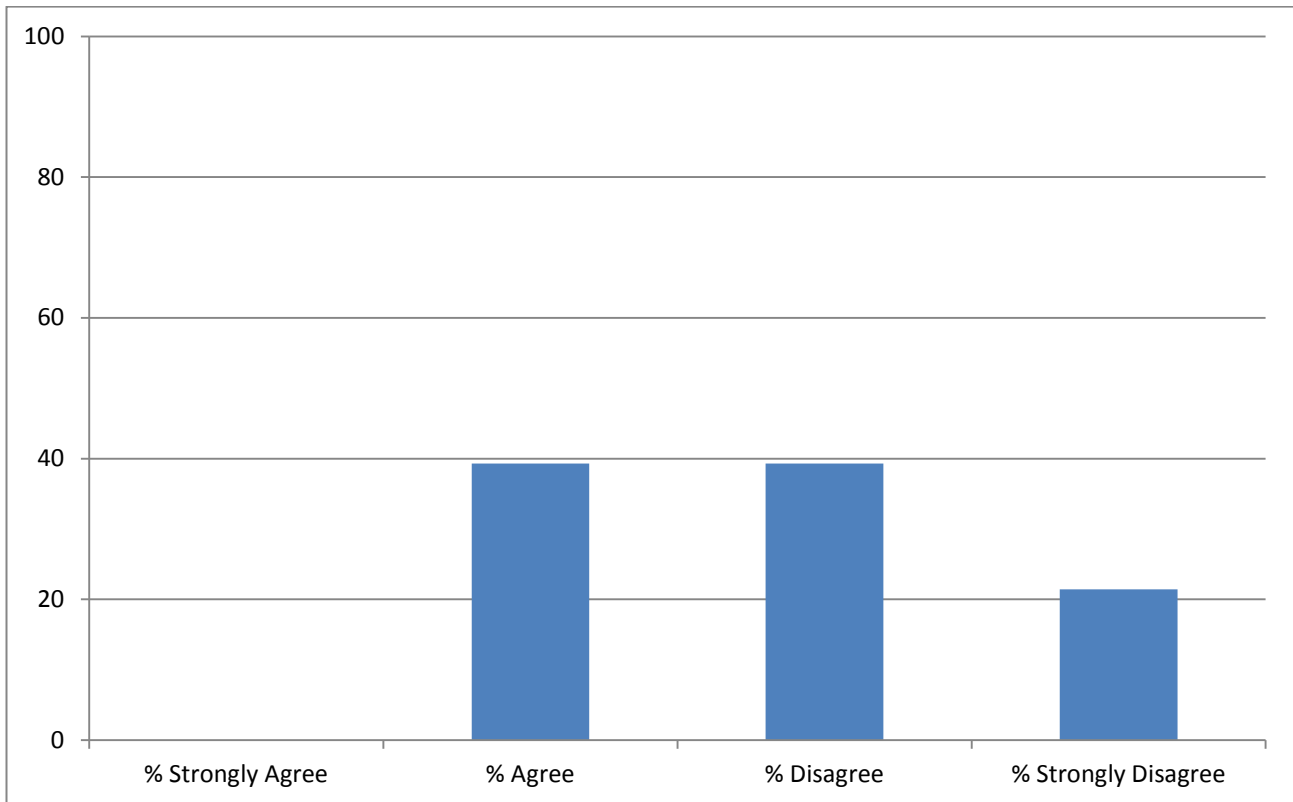


Figure 30: Response to Question 38. The content descriptions are specific about what is to be taught (n=28)

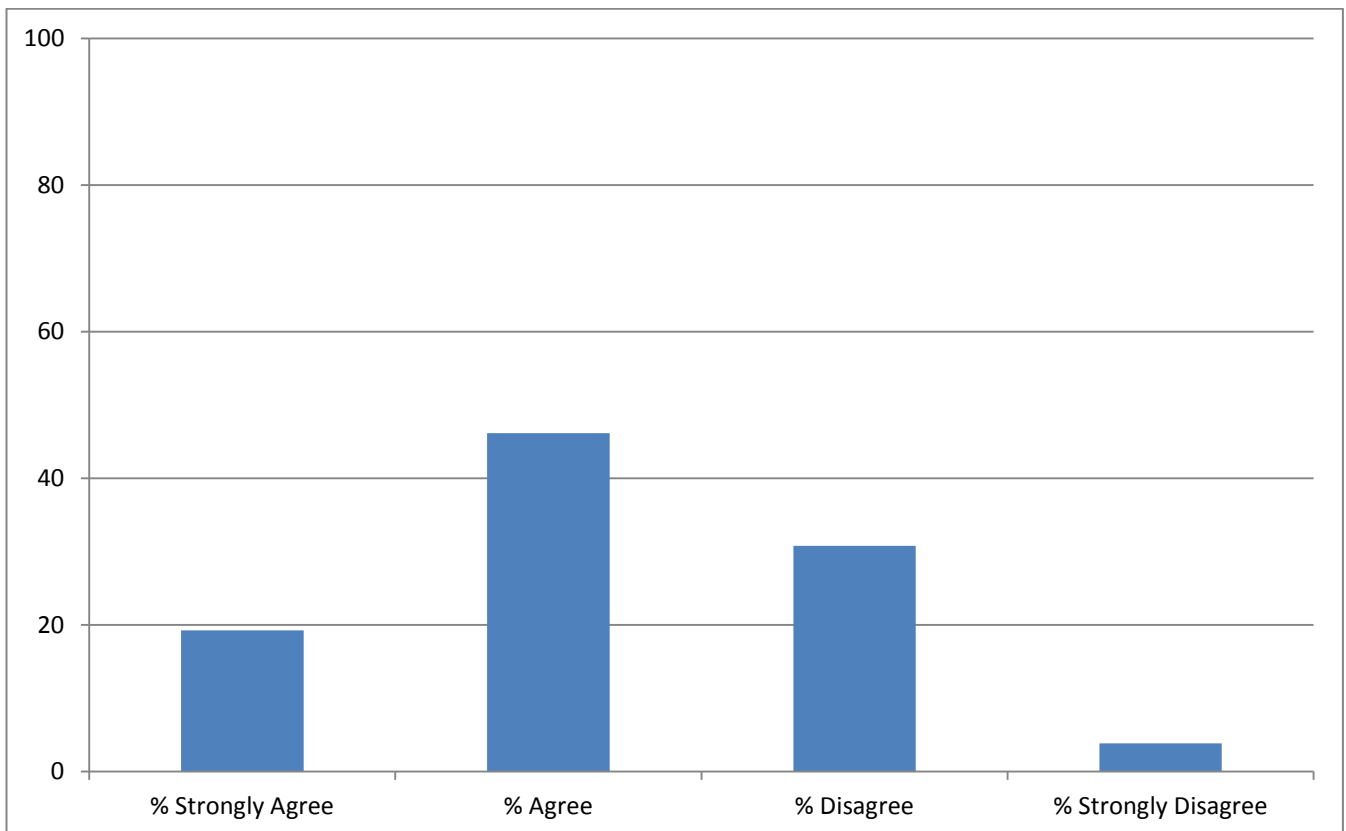


Figure 31: Response to Question 39. Achievement standards for Units 3 and 4: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=24)

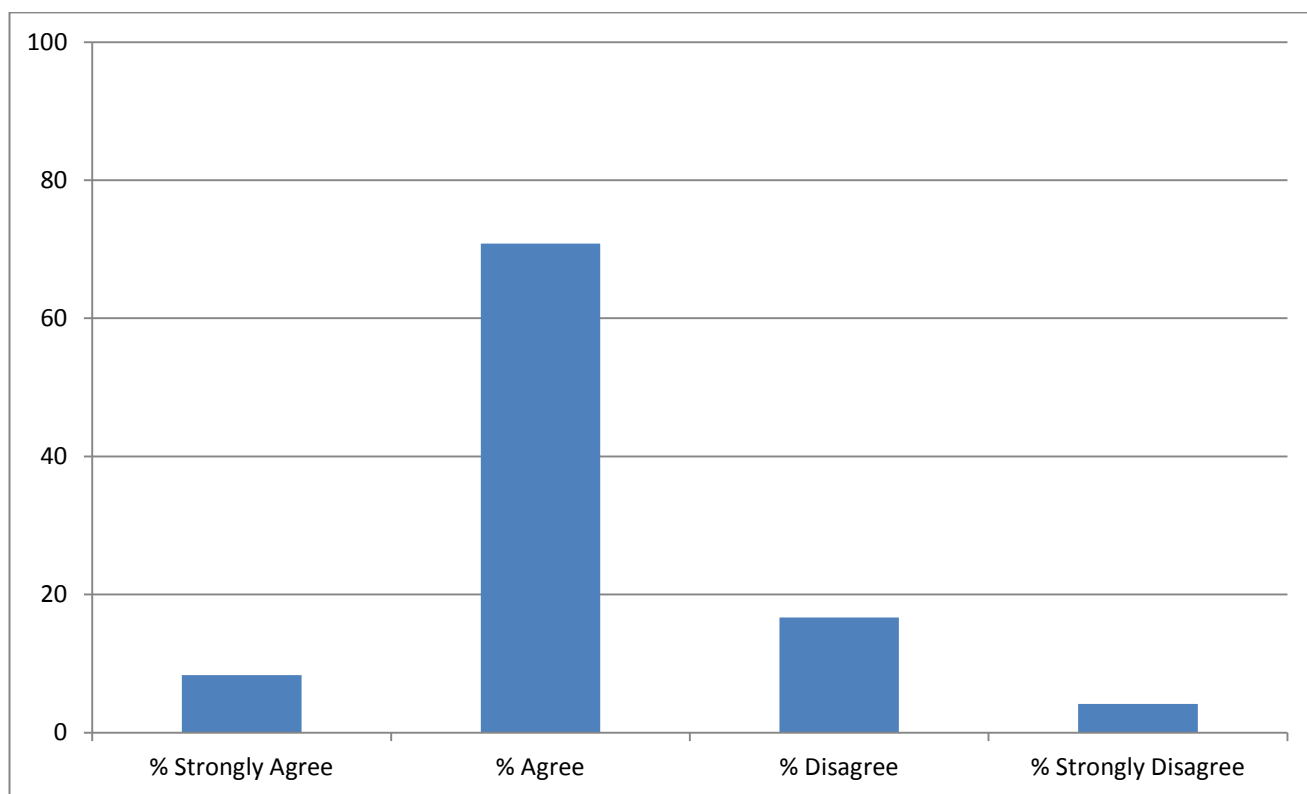


Figure 32: Response to Question 40. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=23)

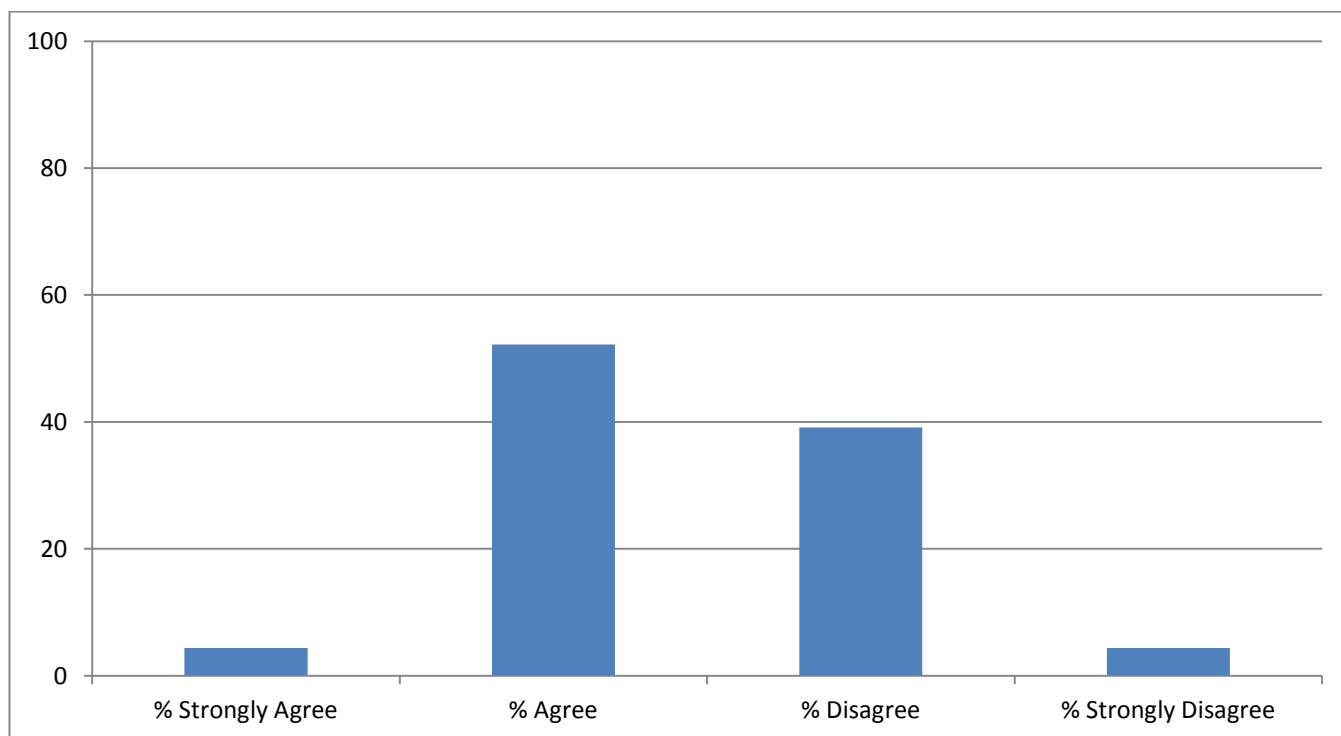


Figure 33: Response to Question 41. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units (n=24)

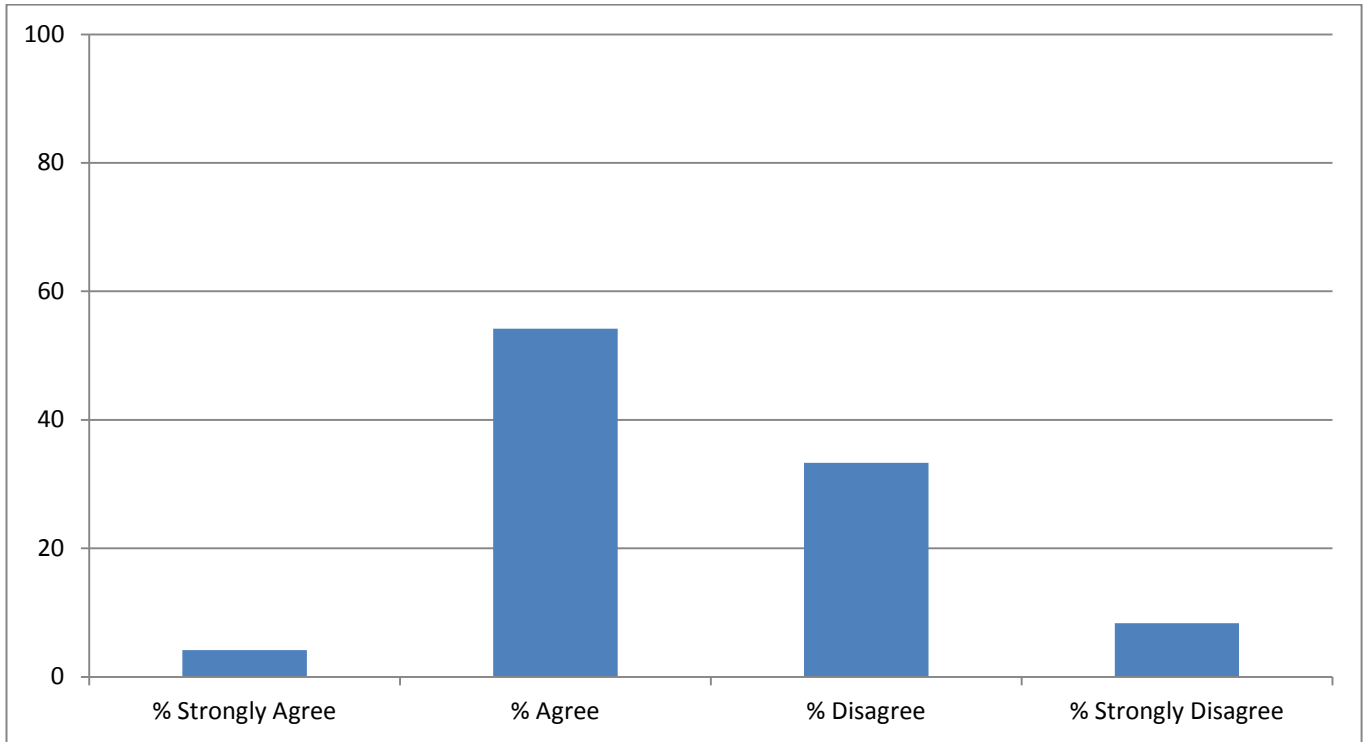


Figure 34: Response to Question 42. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=24)

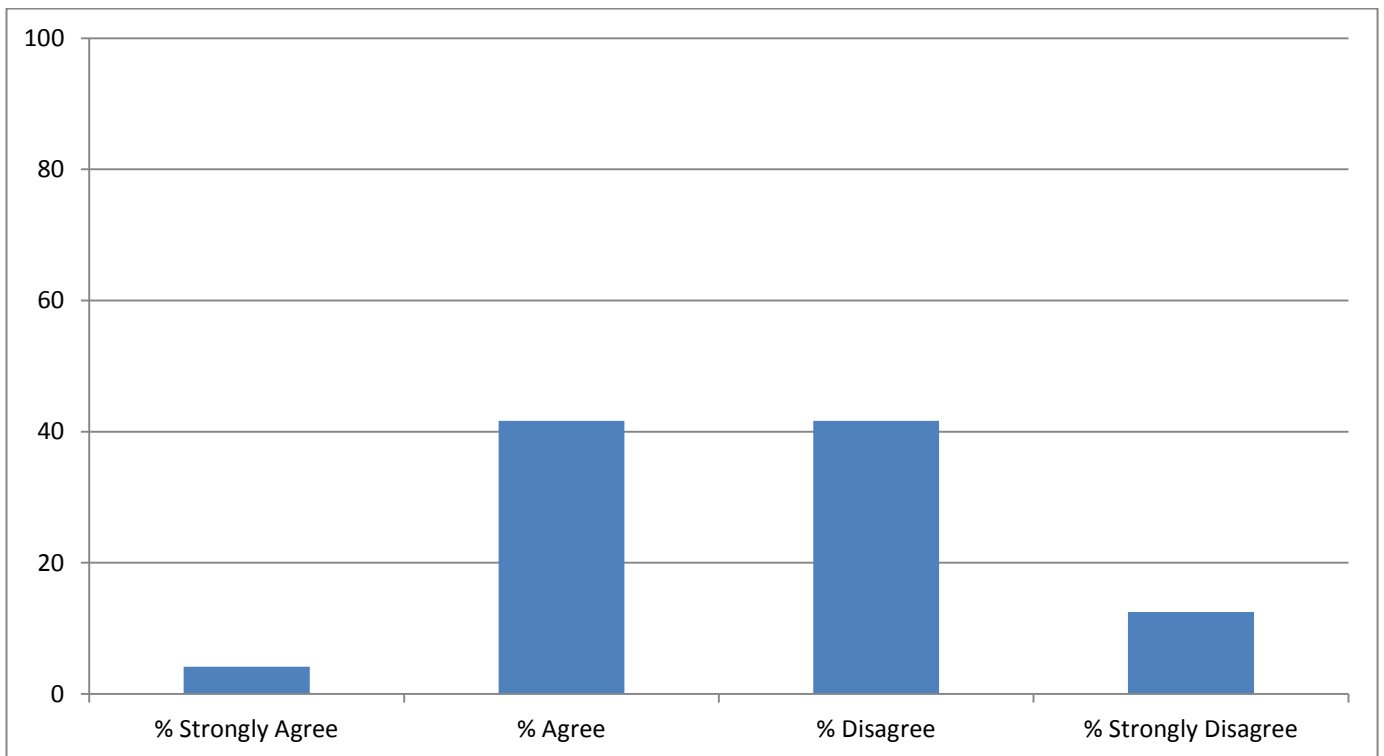


Figure 35: Response to Question 43. The general capabilities that naturally fit with this subject are appropriately represented (n=22)

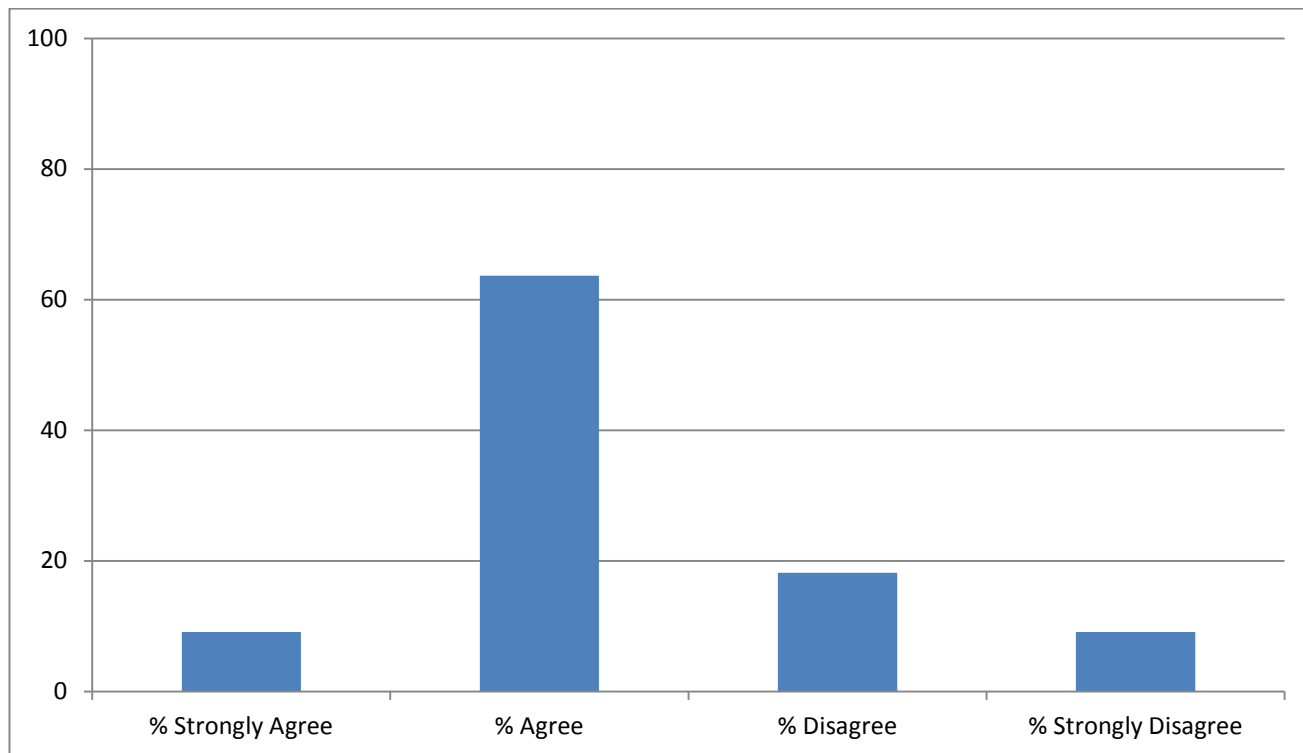


Figure 36: Response to Question 44. The cross-curriculum priorities that naturally fit with this subject are appropriately represented (n=20)

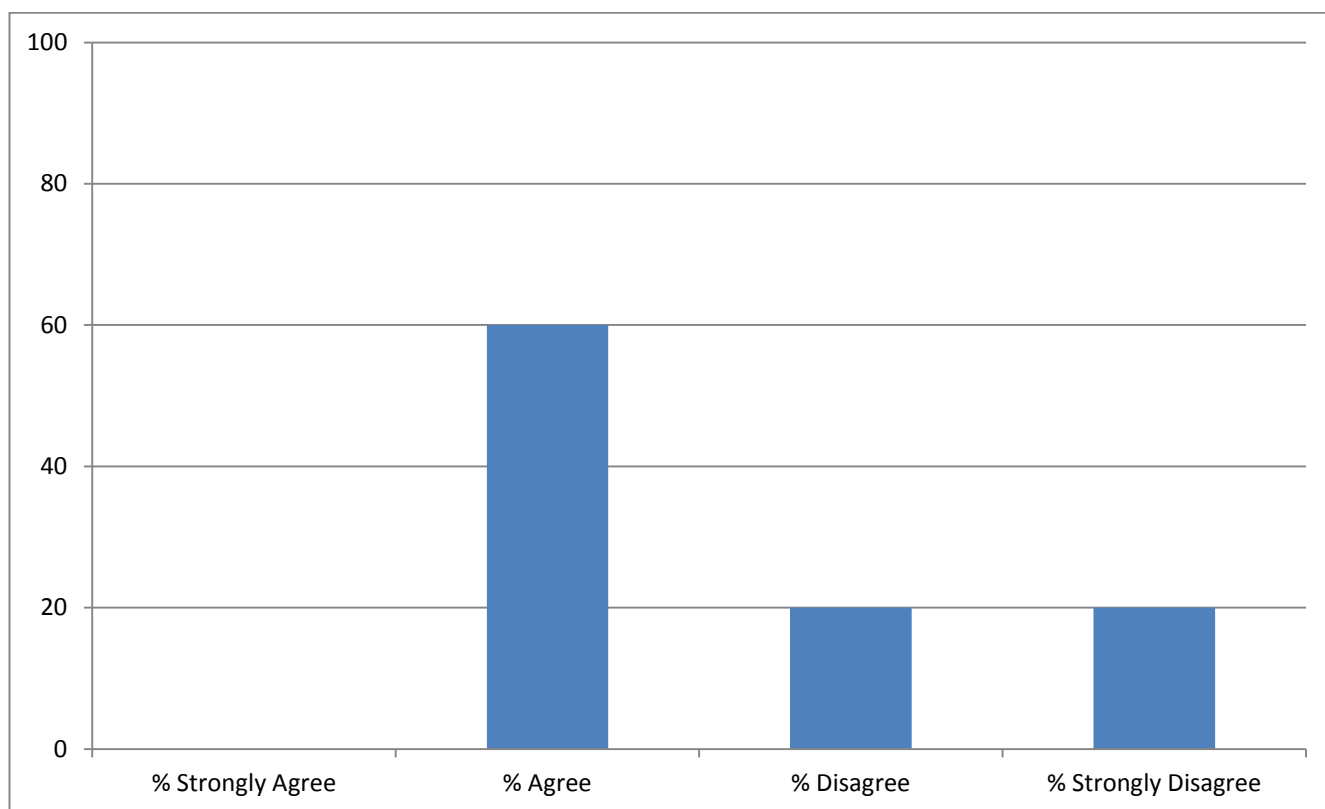
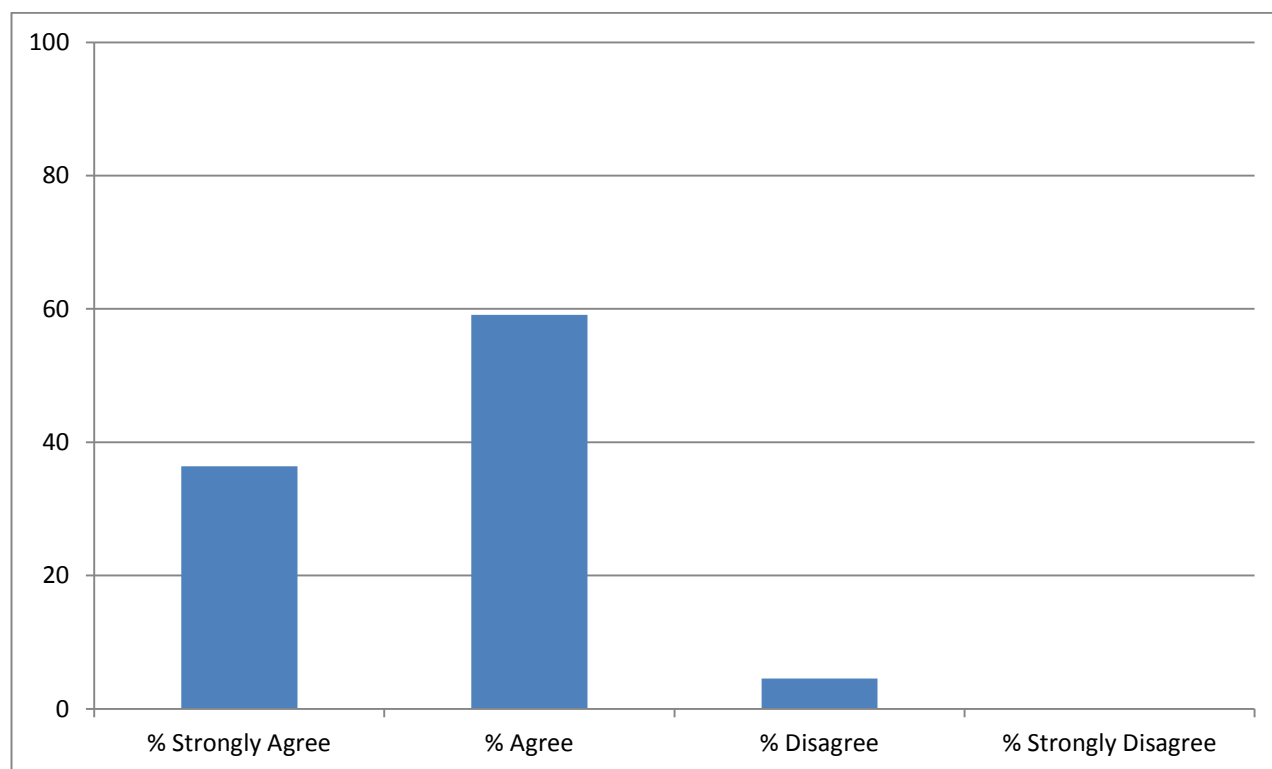




Figure 37: Response to Question 45. The glossary is comprehensive (n=22)



## Specialist Mathematics

Figure 1: Response to Question 9. The rationale provides clarity about the subject's broad scope, distinctive nature and importance (n=15)

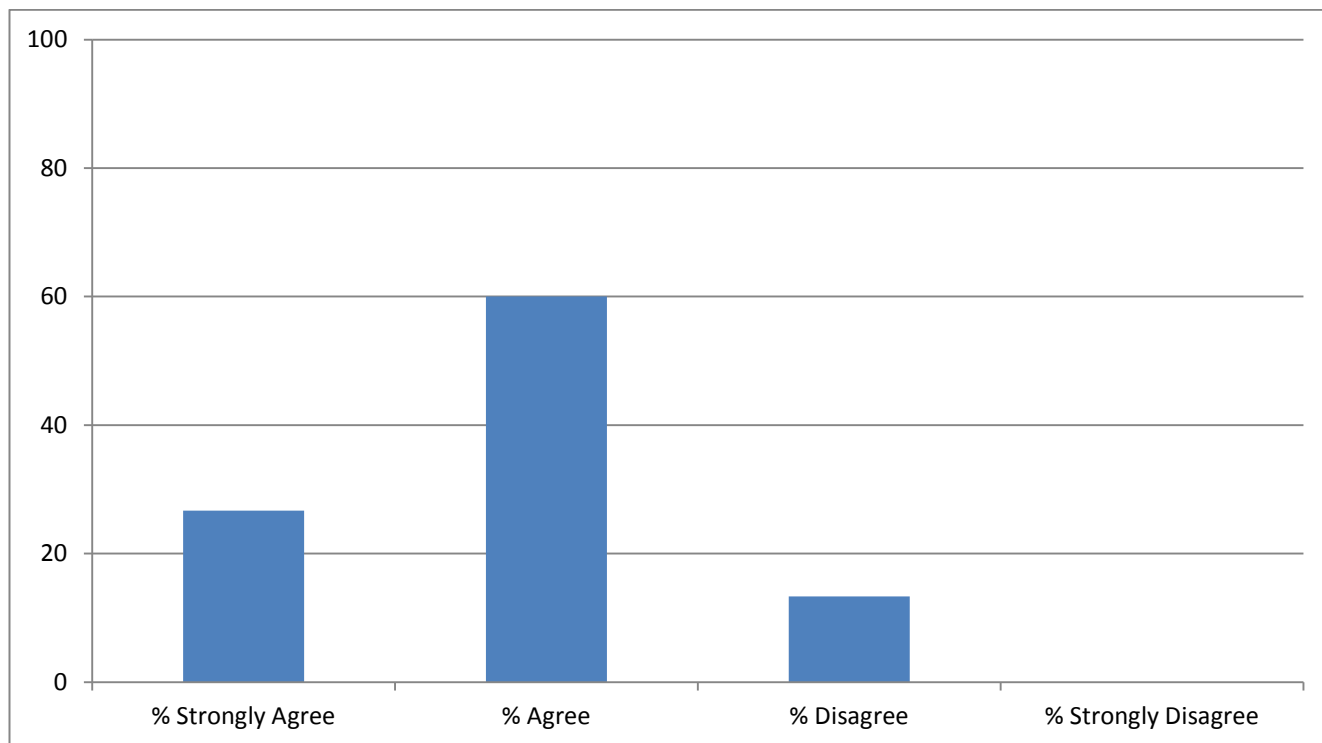


Figure 2: Response to Question 10. The aims comprehensively describe the intended learning as a result of studying the subject (n=15)

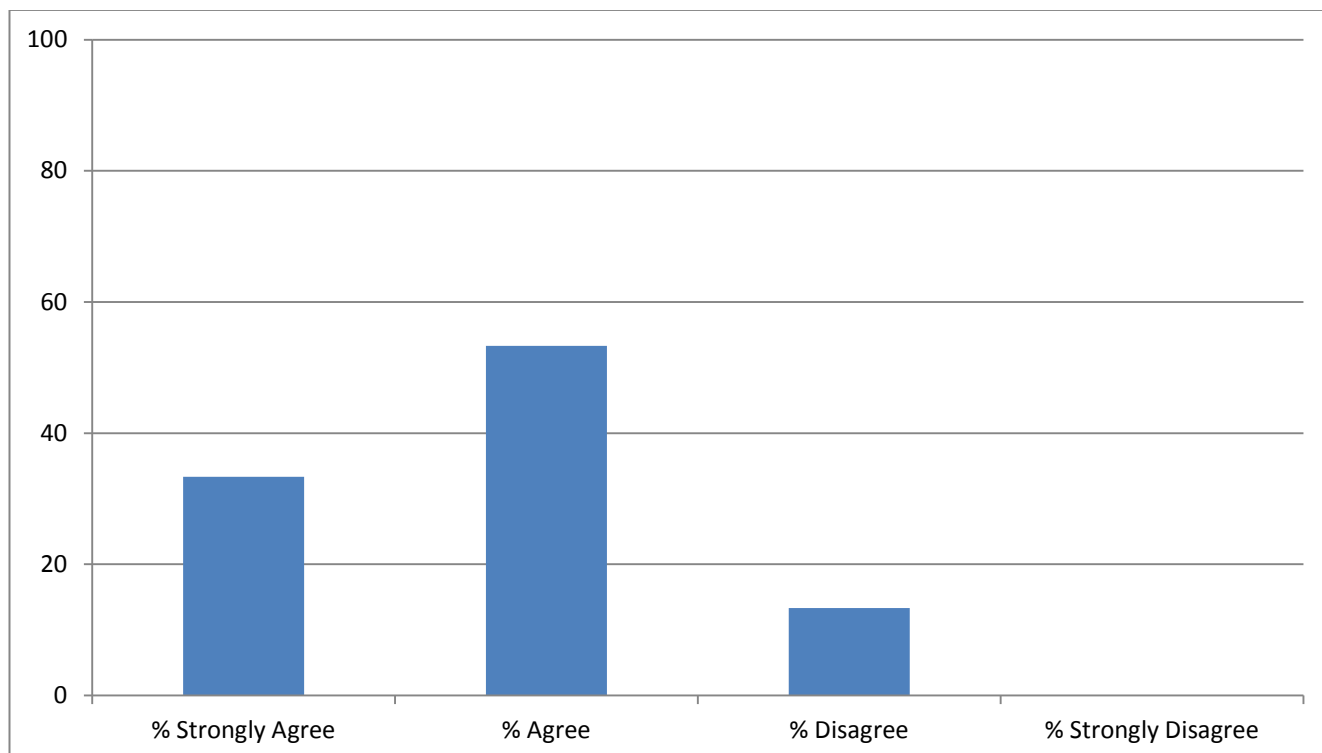


Figure 3: Response to Question 11. The four-unit structure has internal logic and coherence (n=23)

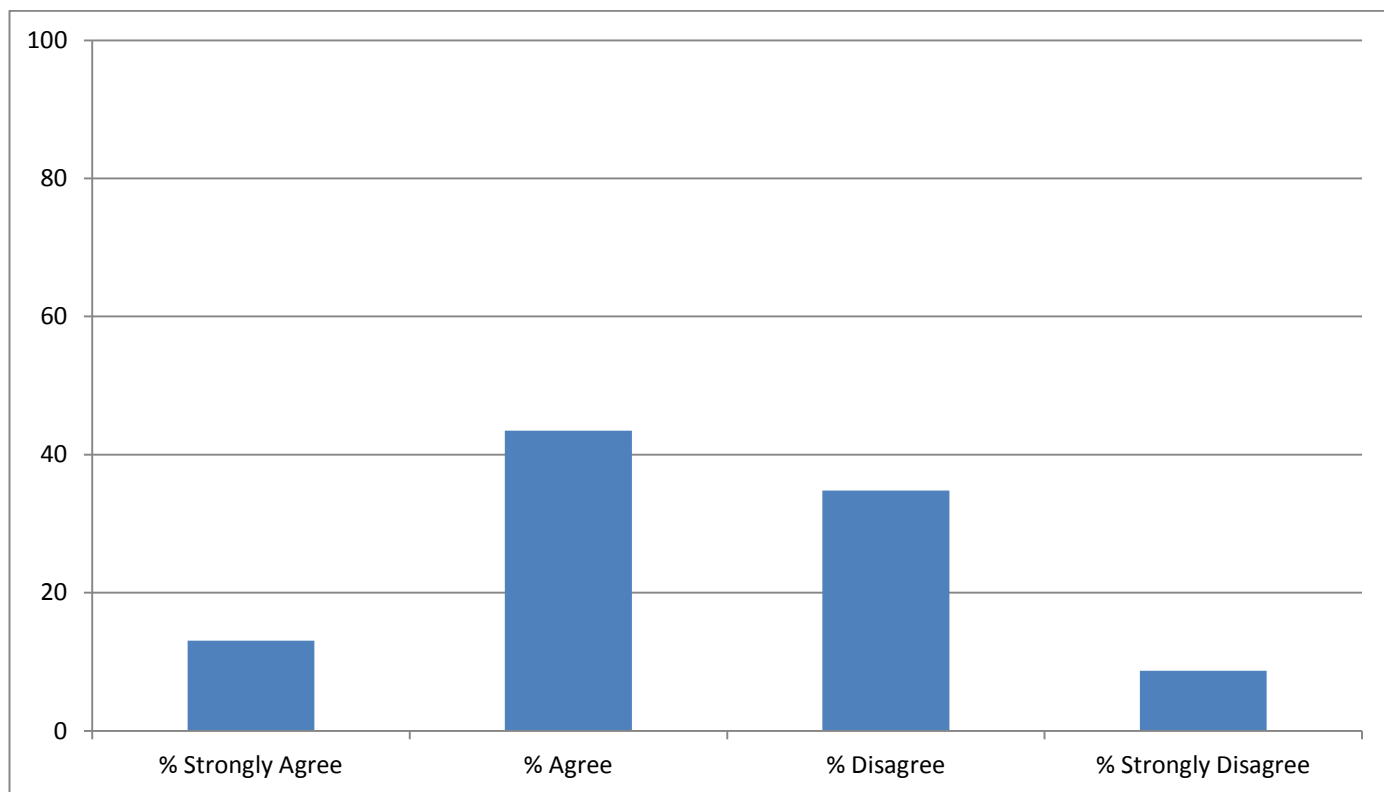


Figure 4: Response to Question 12. Units 3 and 4 are more cognitively demanding than Units 1 and 2 (n=23)

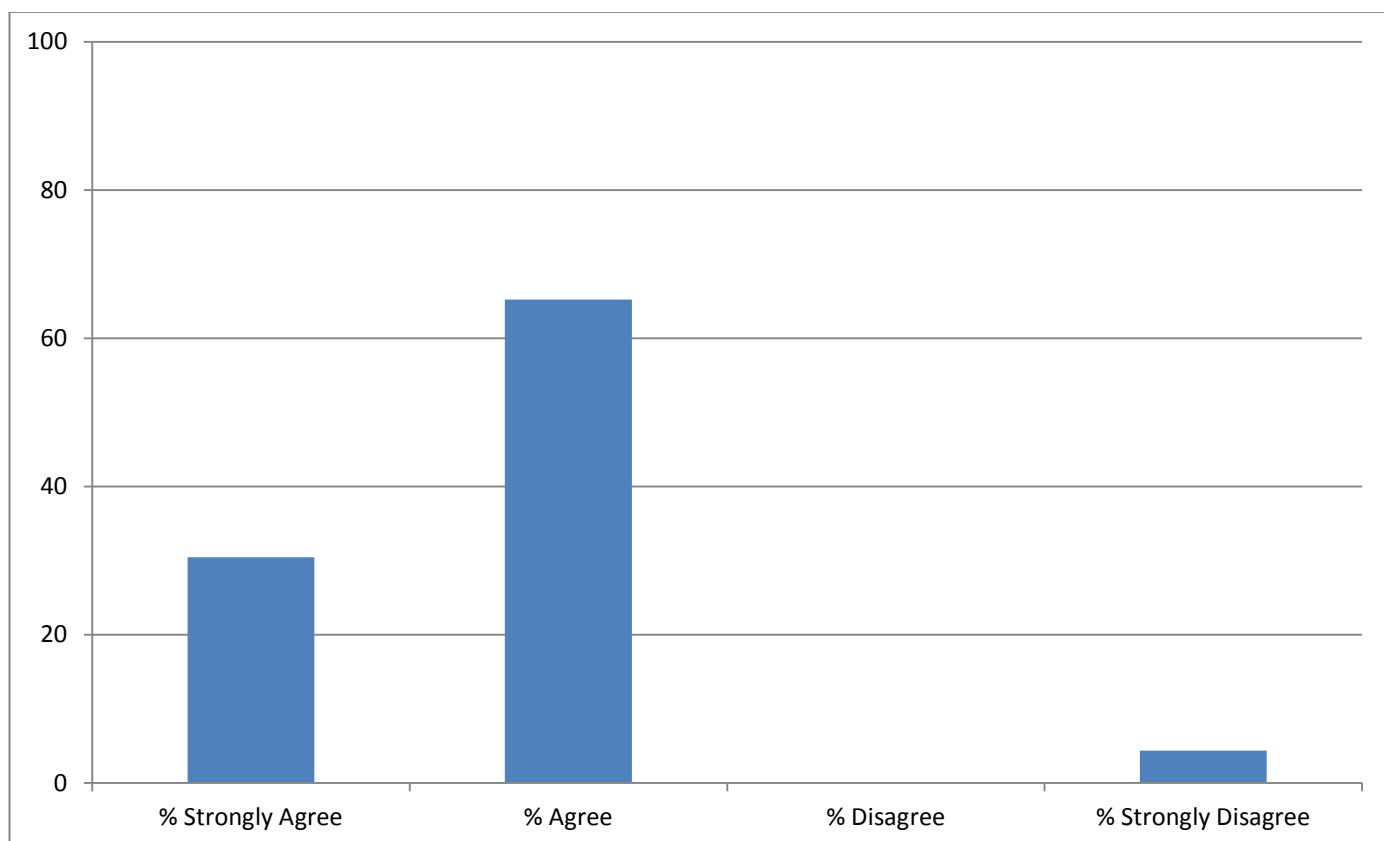


Figure 5: Response to Question 13. There is a clear link between this senior secondary curriculum and the relevant F–10 Australian Curriculum (n=21)

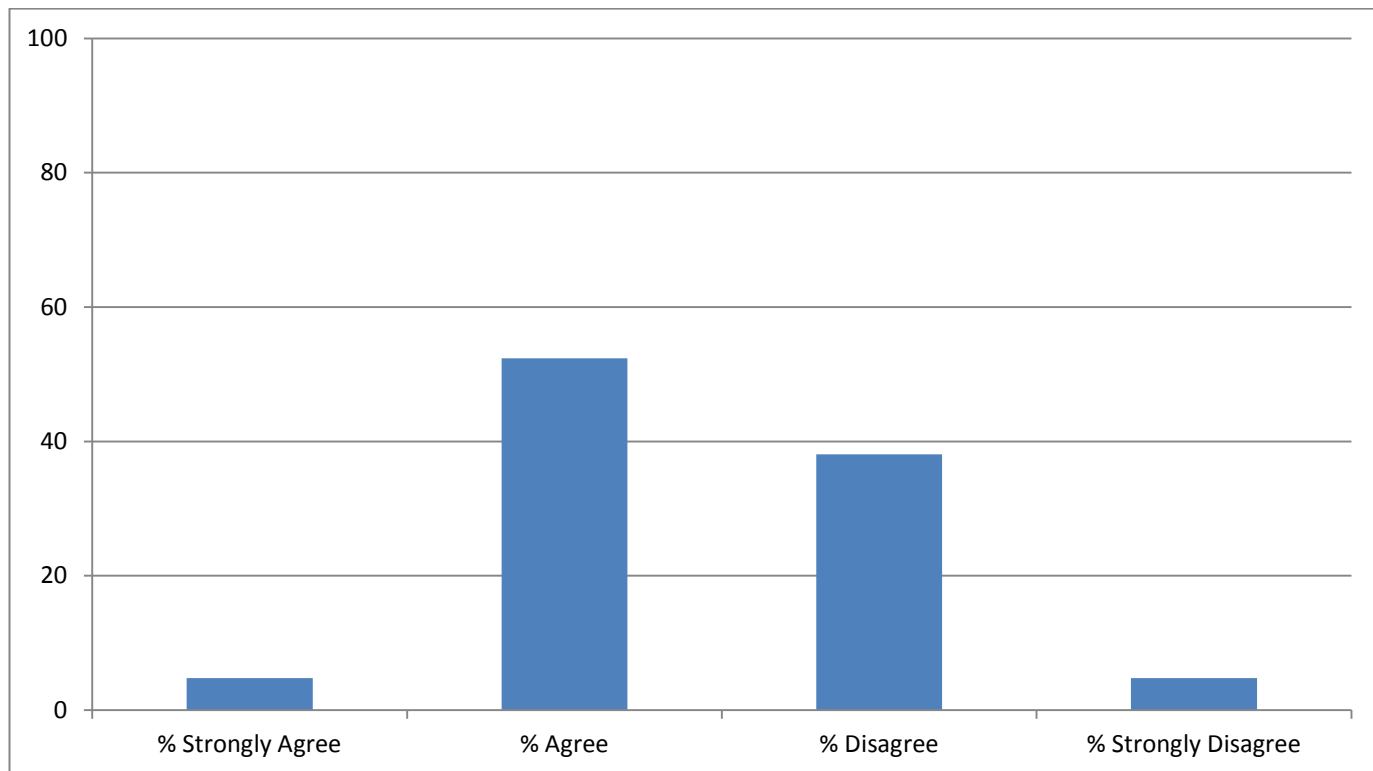


Figure 6: Response to Question 14. The achievement standards across Units 1 and 2 and Units 3 and 4 are organised in an order consistent with your experience (n=20)

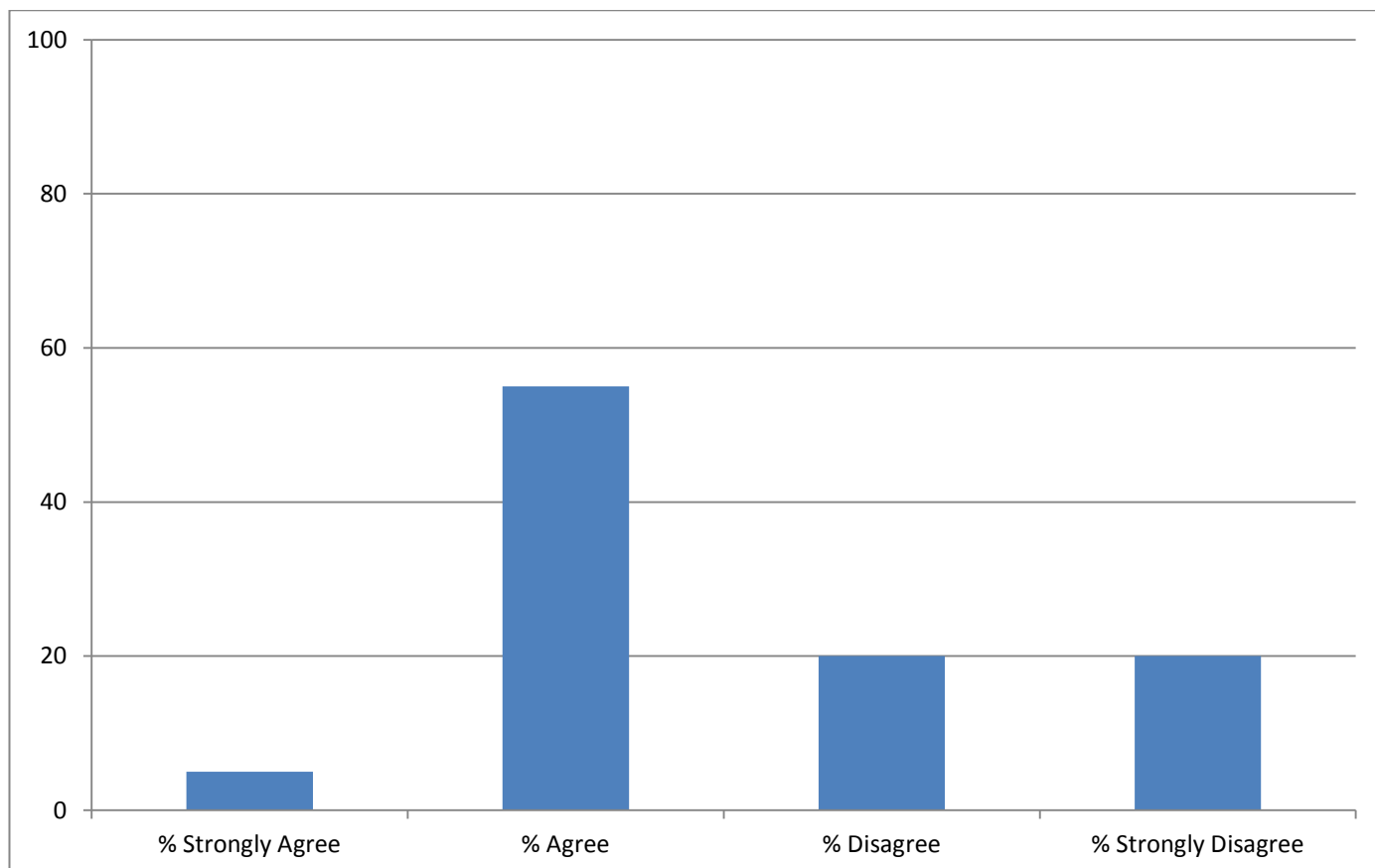


Figure 7: Response to Question 15. Unit 1: The unit description describes the focus and scope for this unit (n=20)

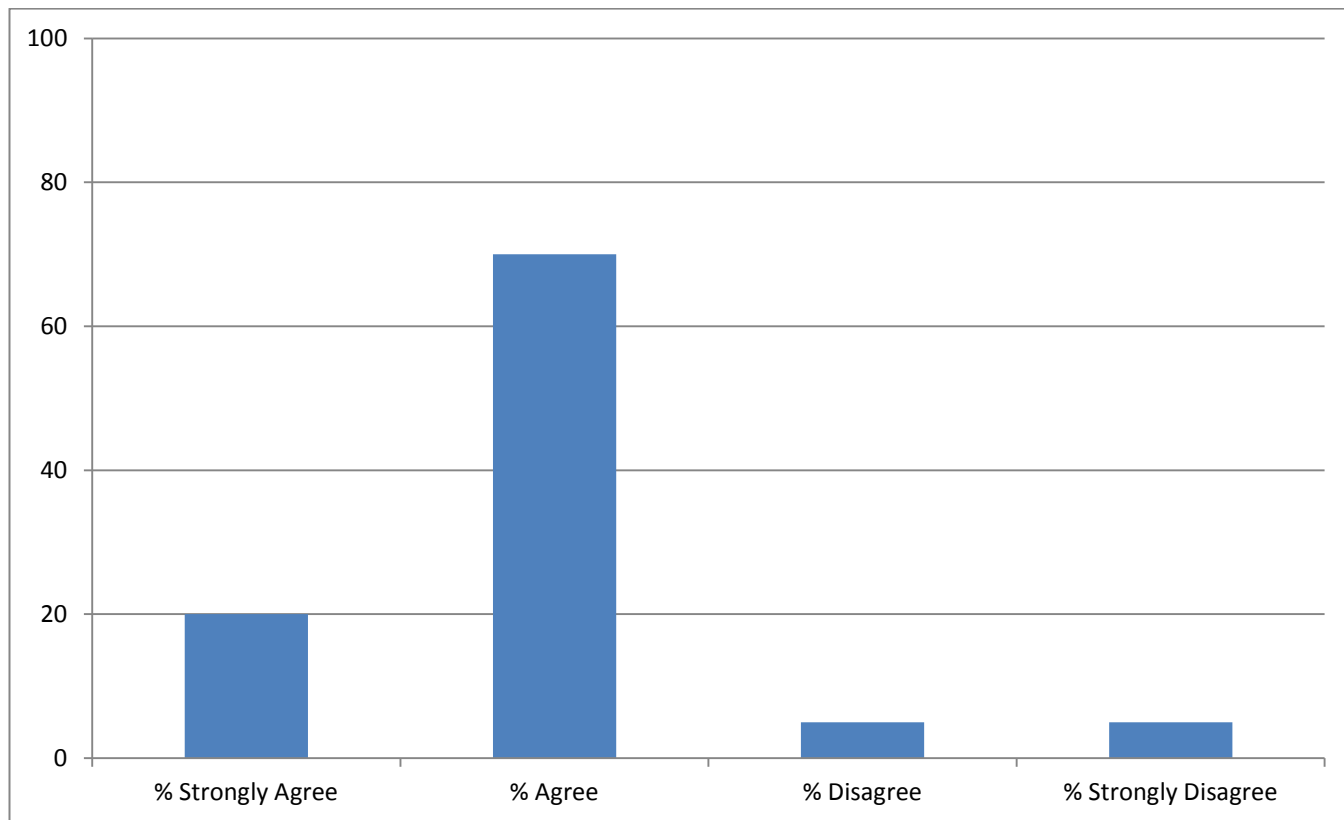


Figure 8: Response to Question 16. The outcomes describe clearly the expected learning for this unit (n=21)

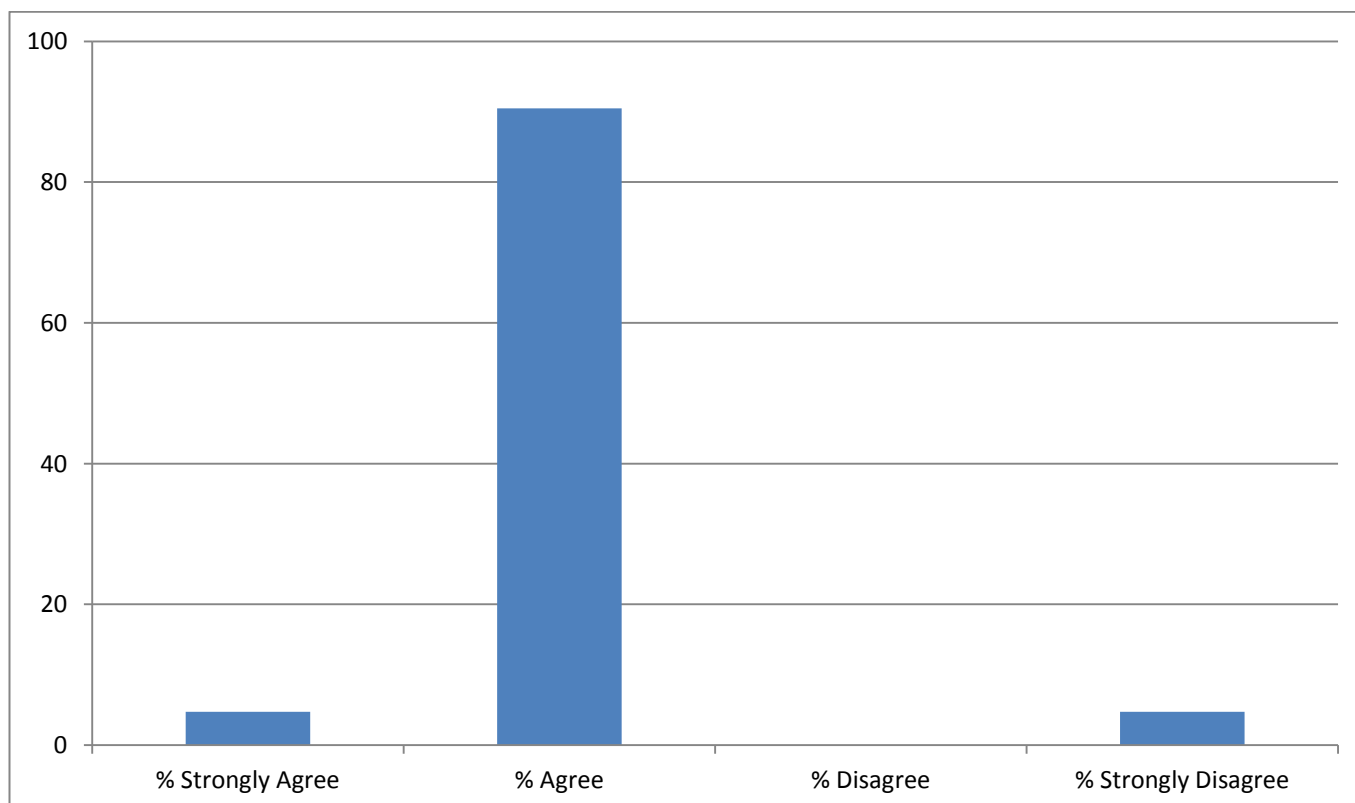


Figure 9: Response to Question 17. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=22)

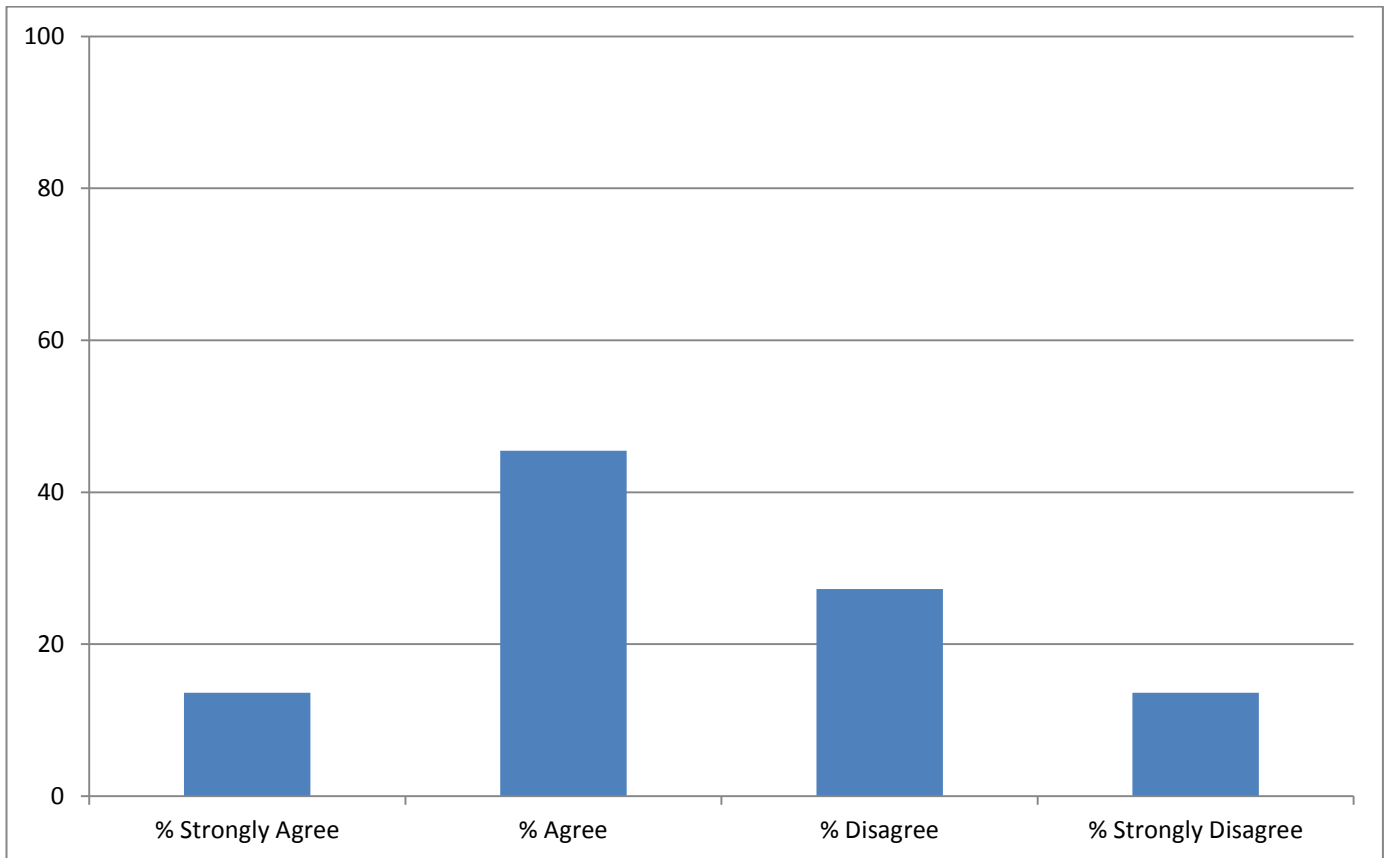


Figure 10: Response to Question 18. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=24)

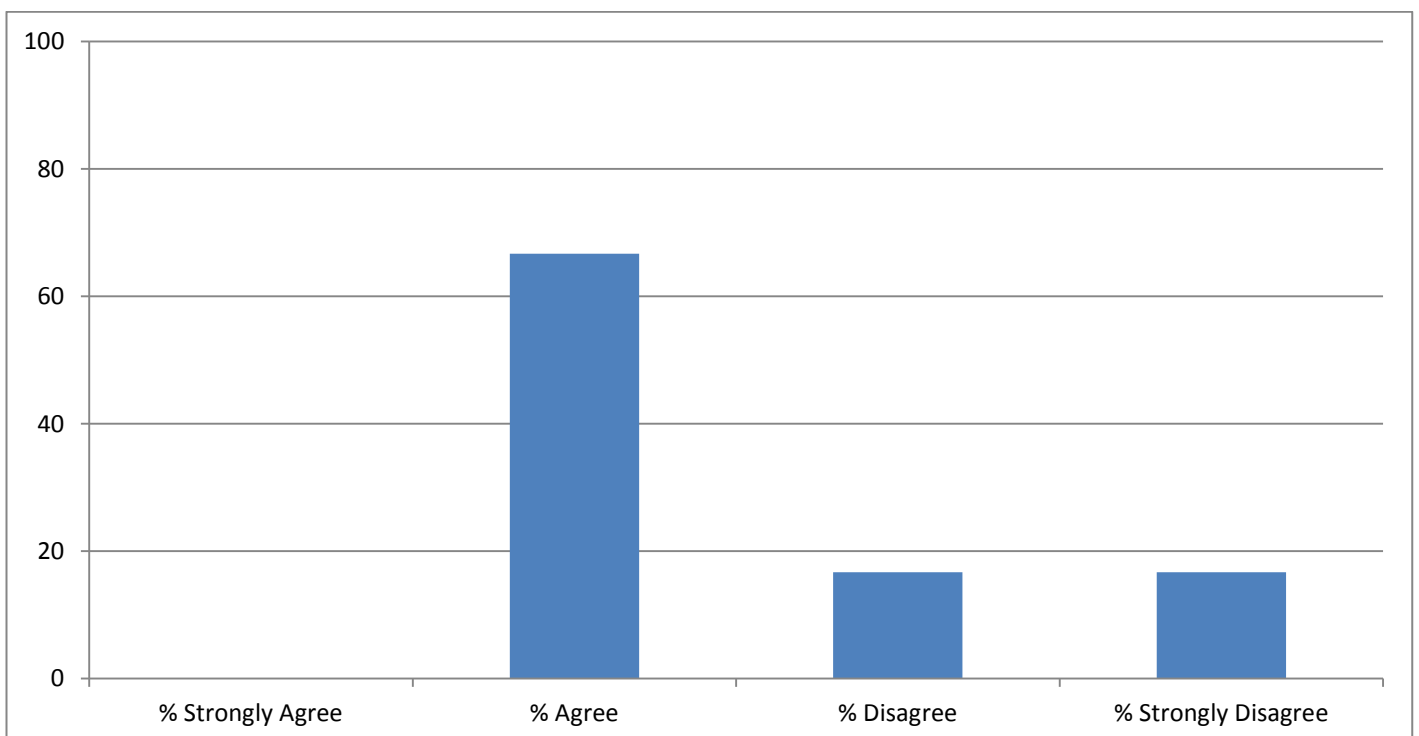


Figure 11: Response to Question 19. The content descriptions are specific about what is to be taught (n=21)

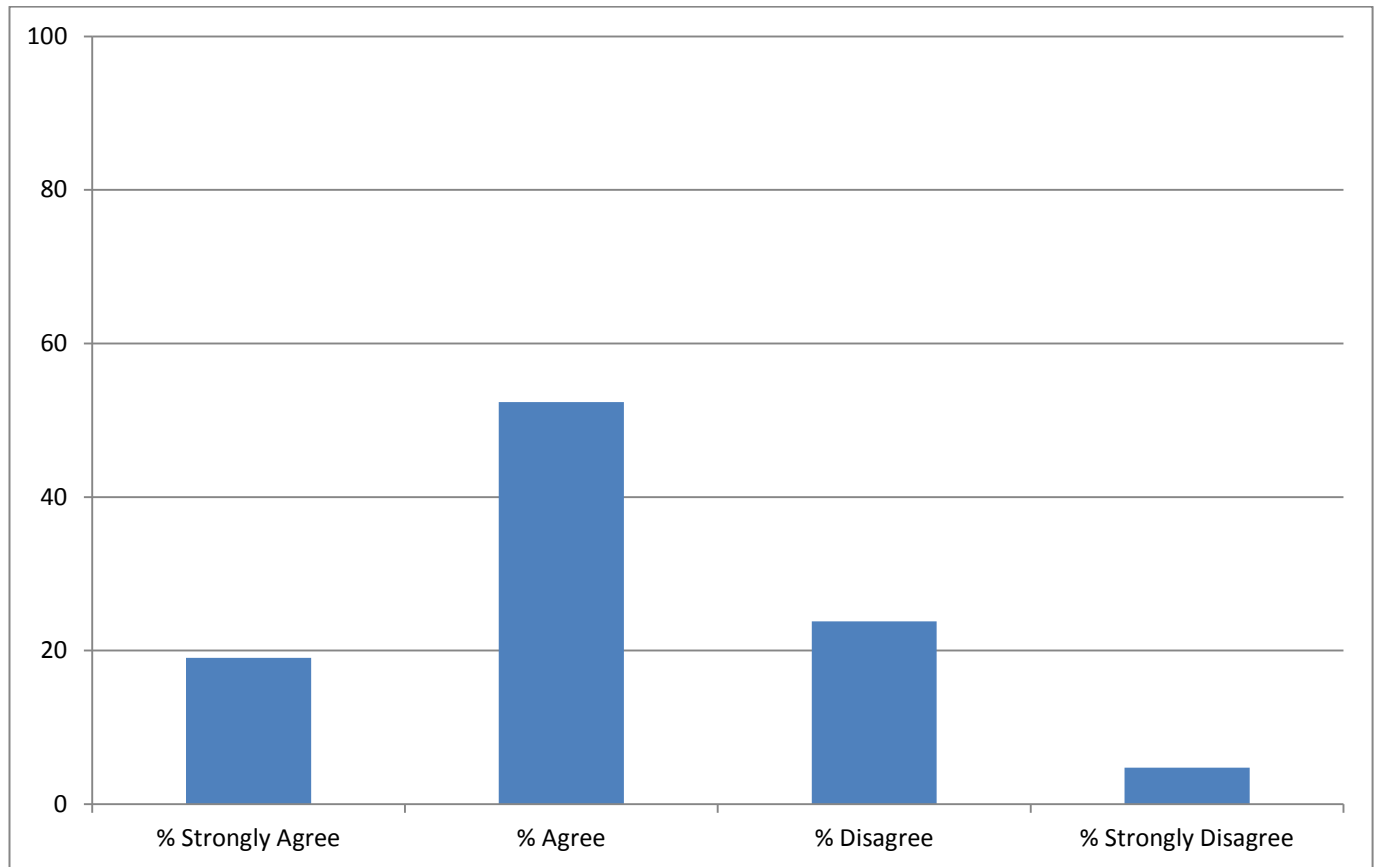


Figure 12: Response to Question 20. Unit 2: The unit description clearly describes the focus and scope for this unit (n=20)

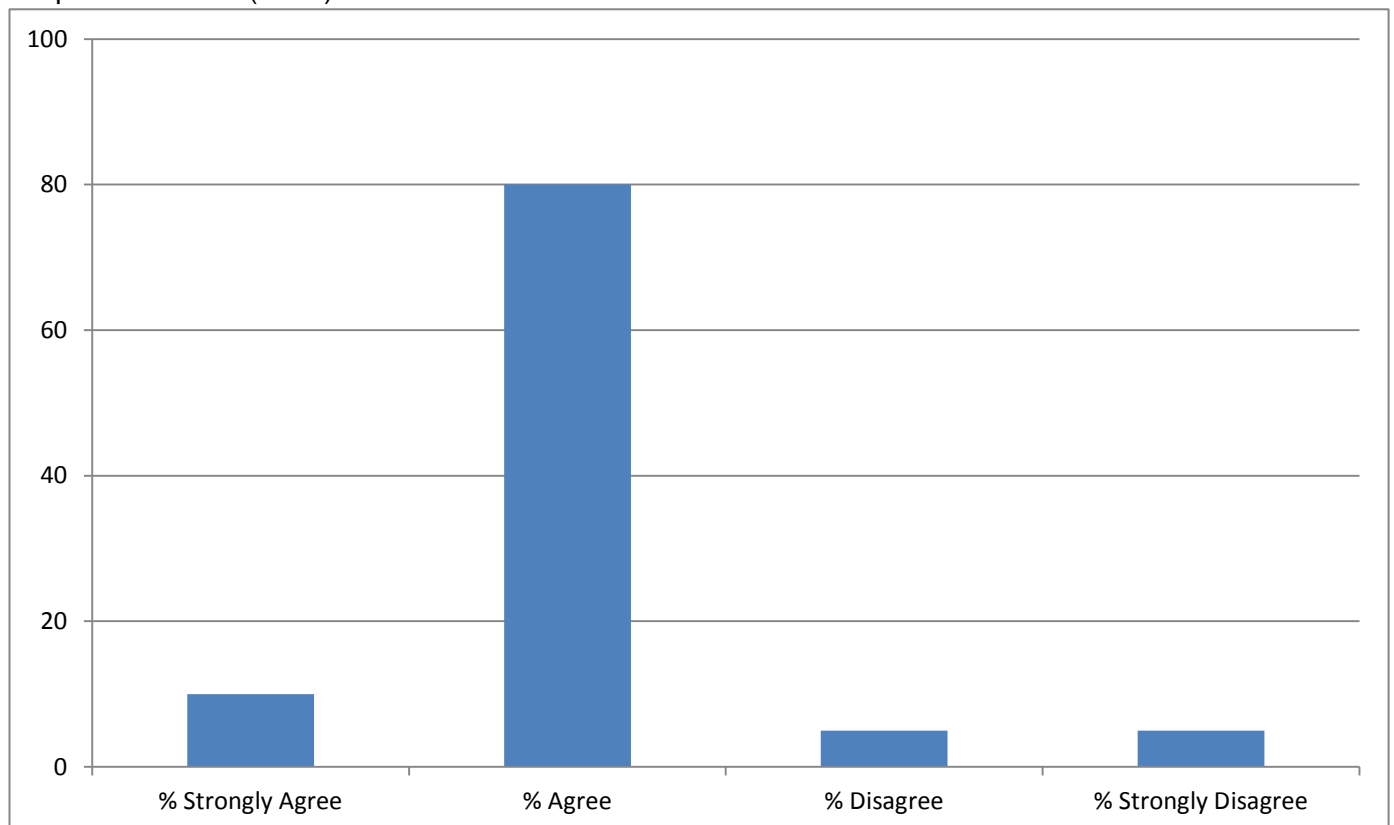


Figure 13: Response to Question 21. The unit outcomes describe clearly the expected learning for this unit (n=20)

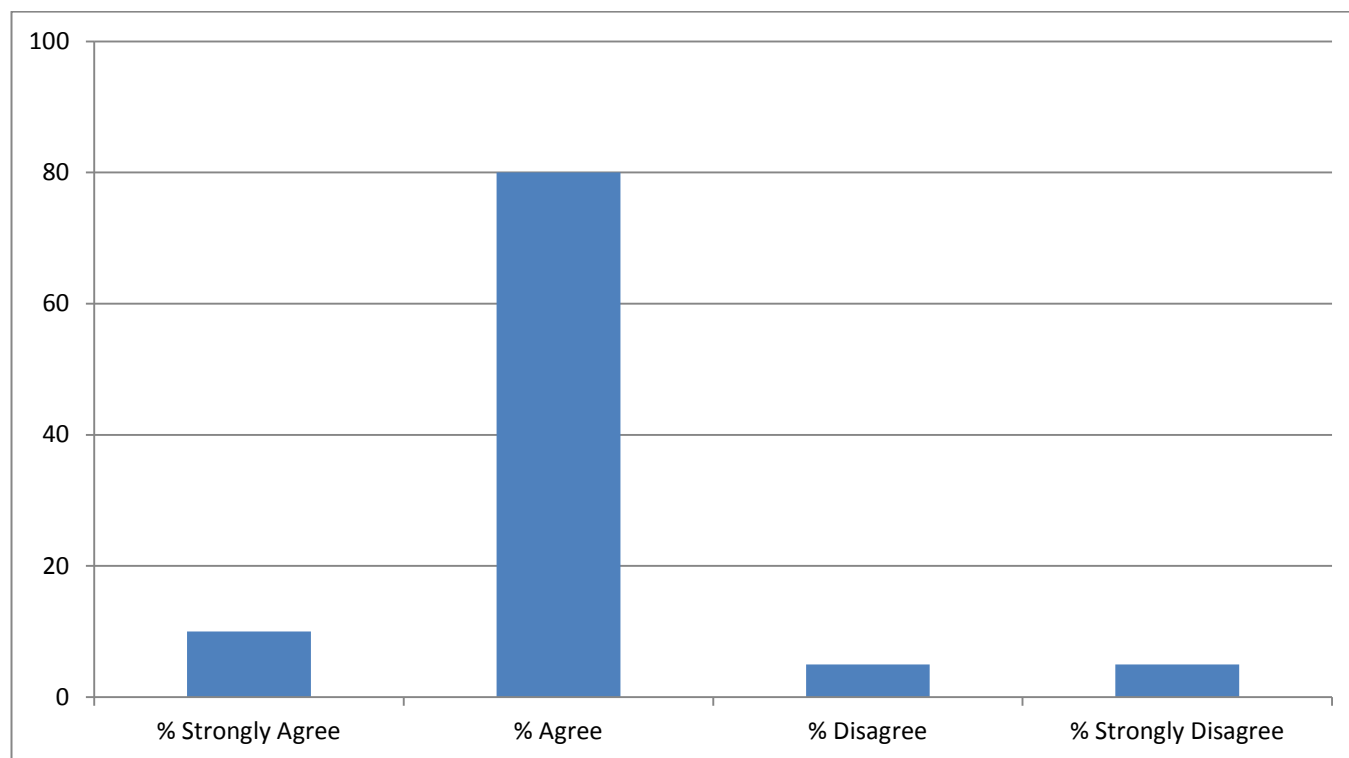


Figure 14: Response to Question 22. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=21)

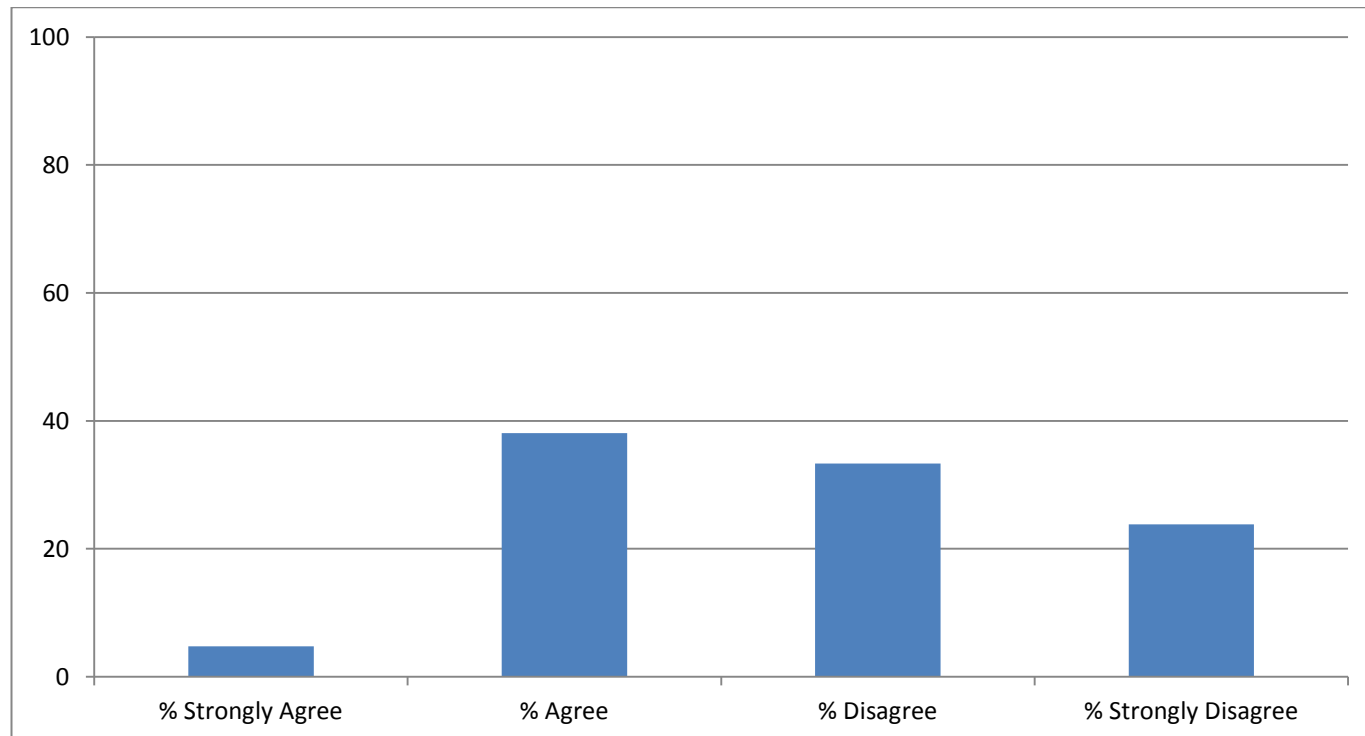




Figure 15: Response to Question 23. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=22)

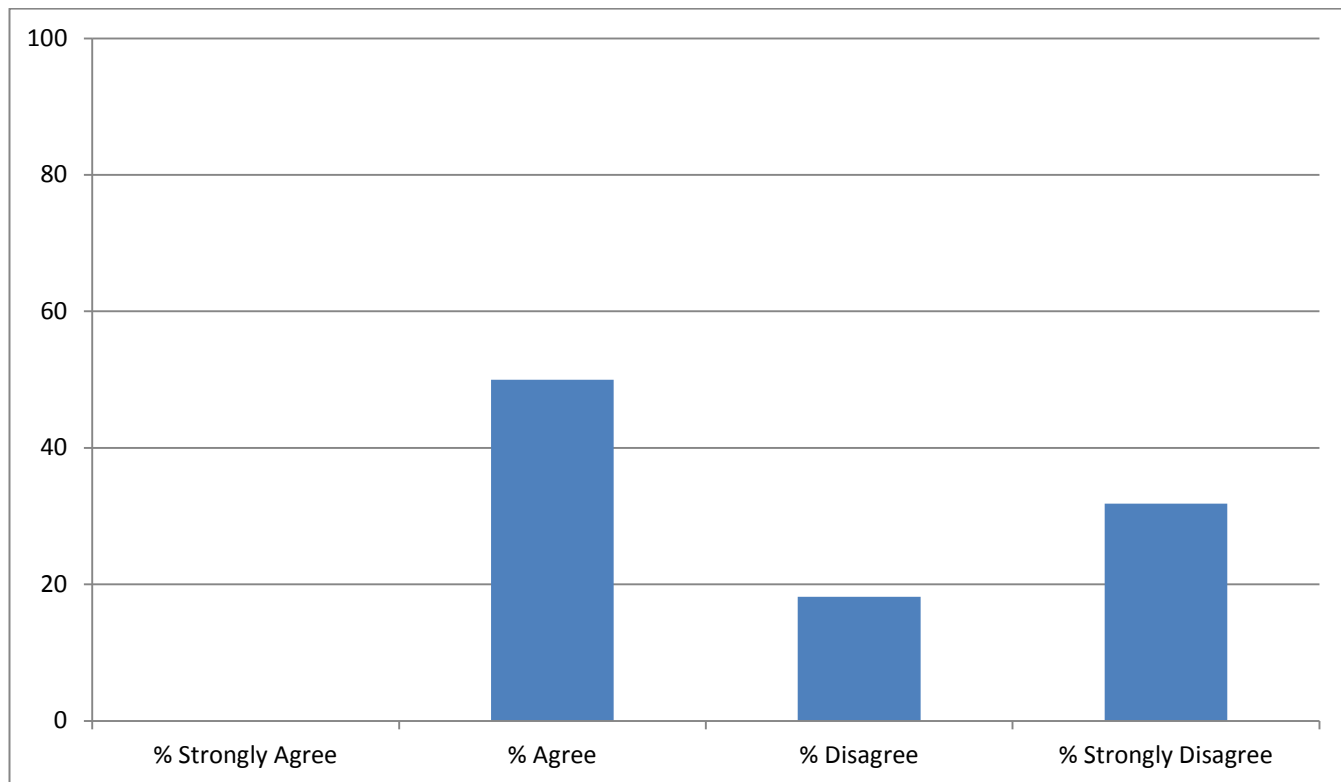


Figure 16: Response to Question 24. The content descriptions are specific about what is to be taught (n=20)

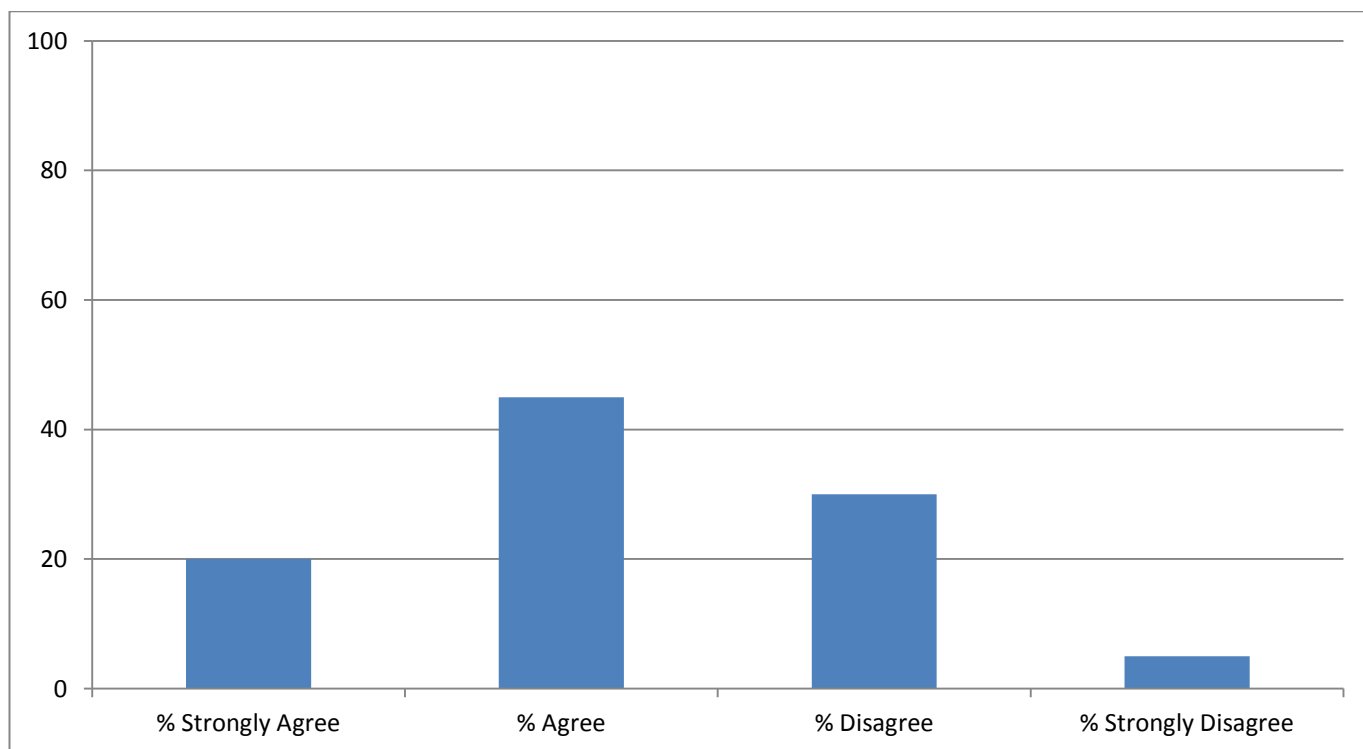


Figure 17: Response to Question 25. Achievement standards for Units 1 and 2: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=20)

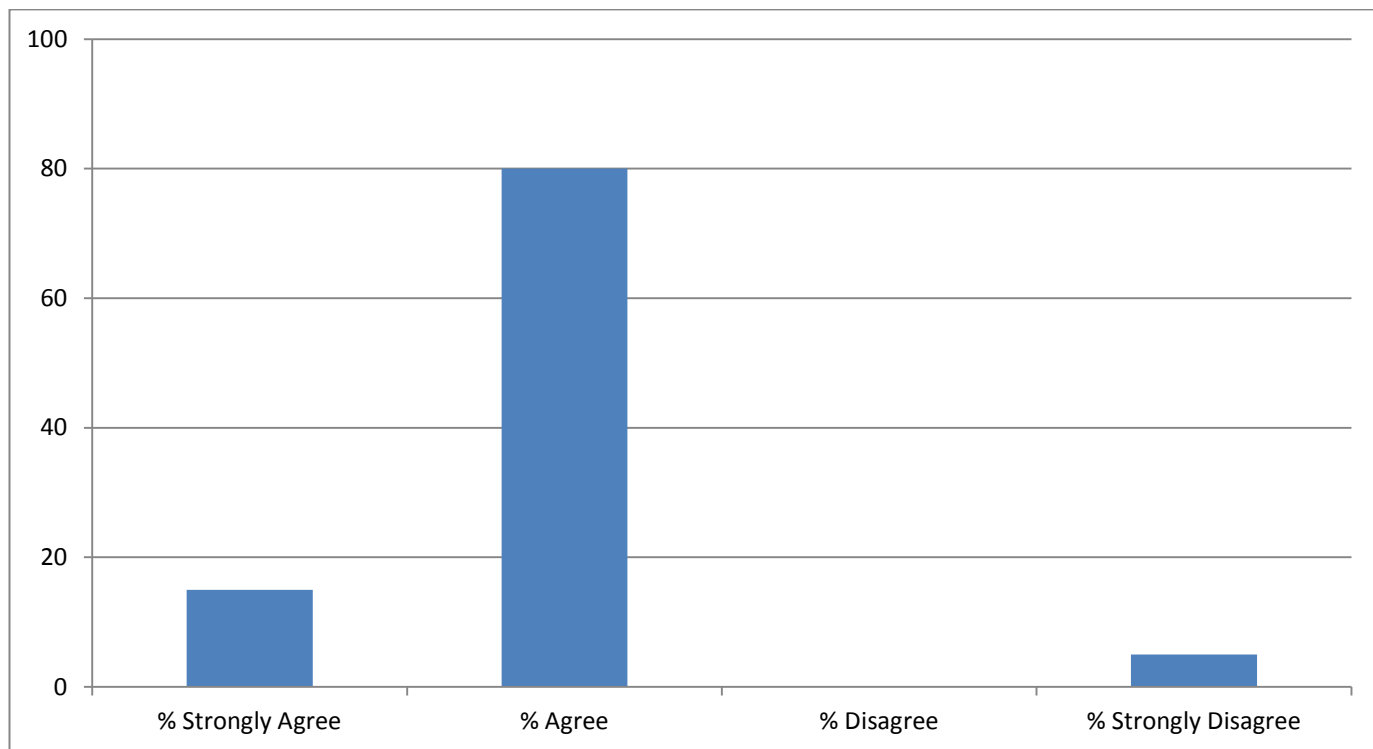


Figure 18: Response to Question 26. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=20)

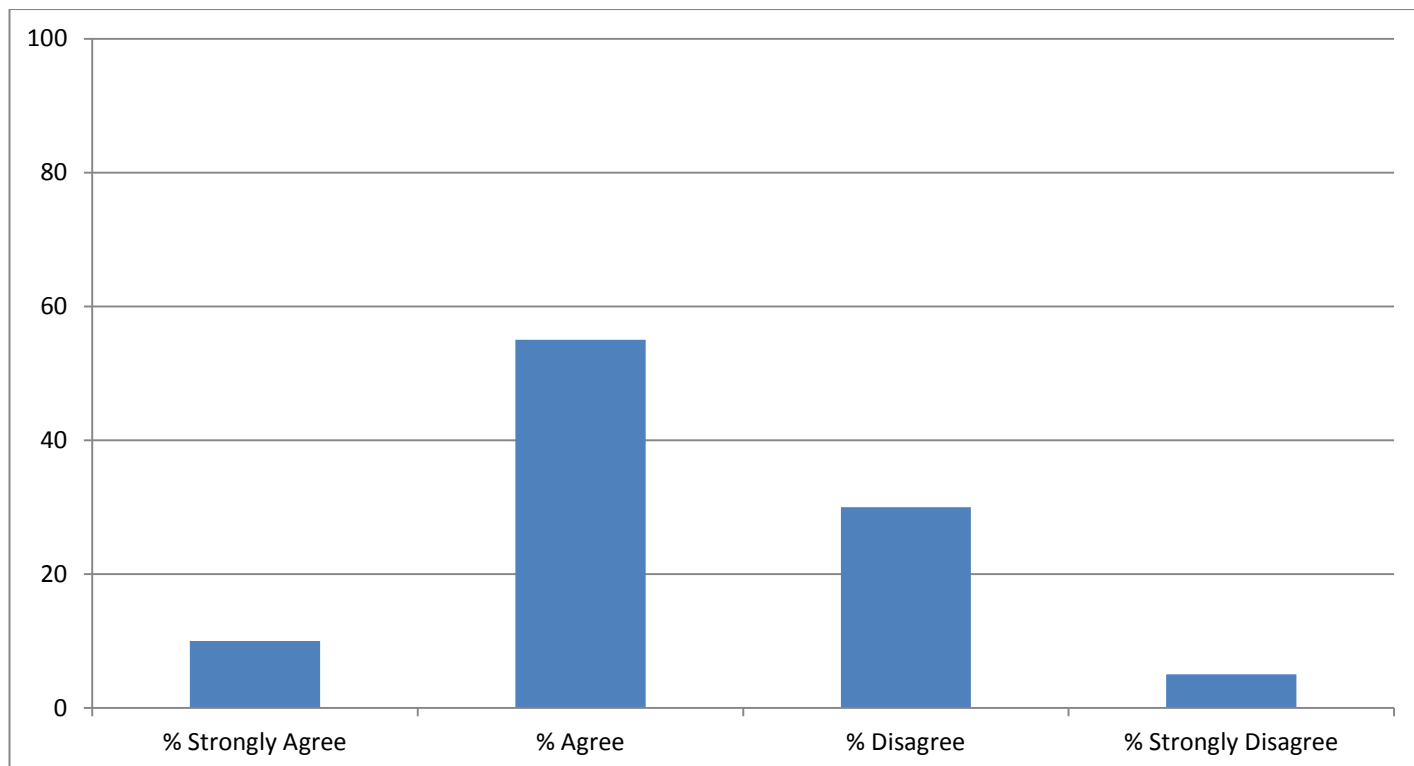


Figure 19: Response to Question 27. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units (n=20)

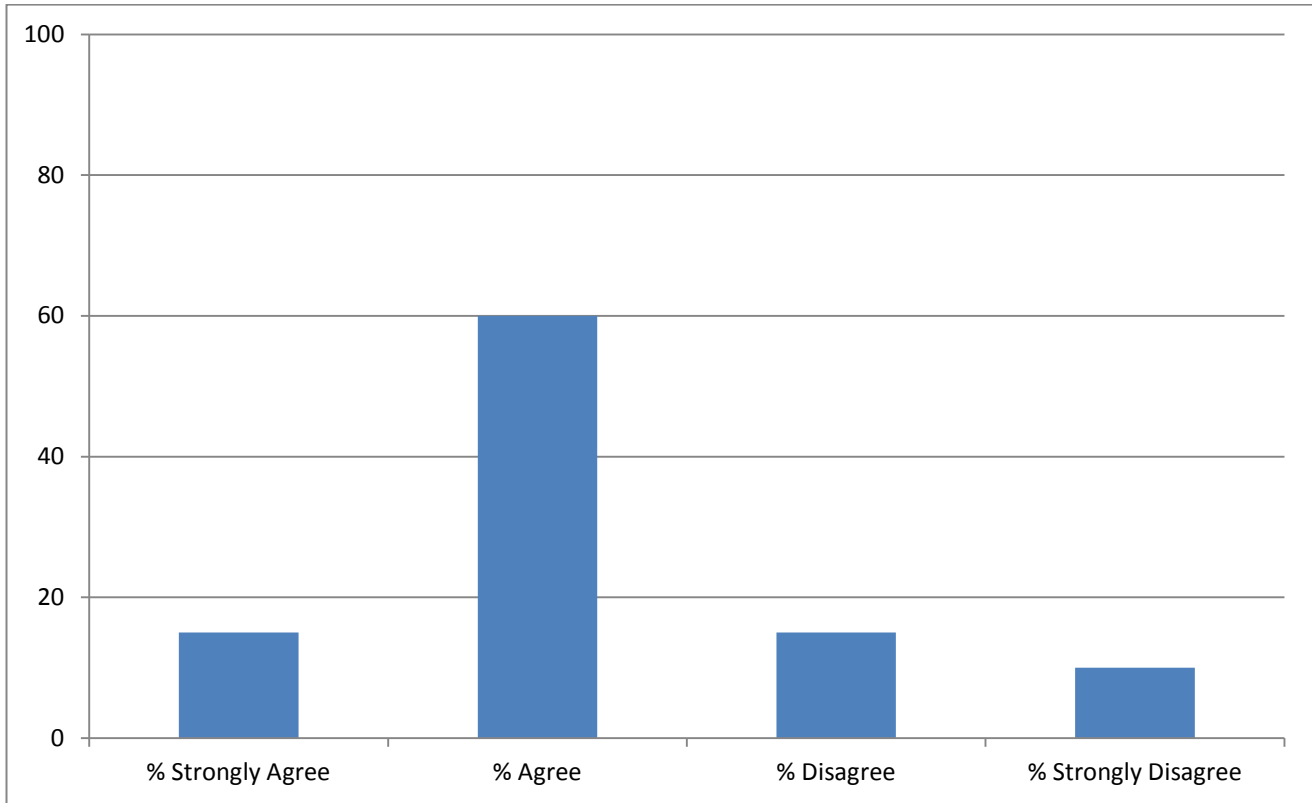


Figure 20: Response to Question 28. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=20)

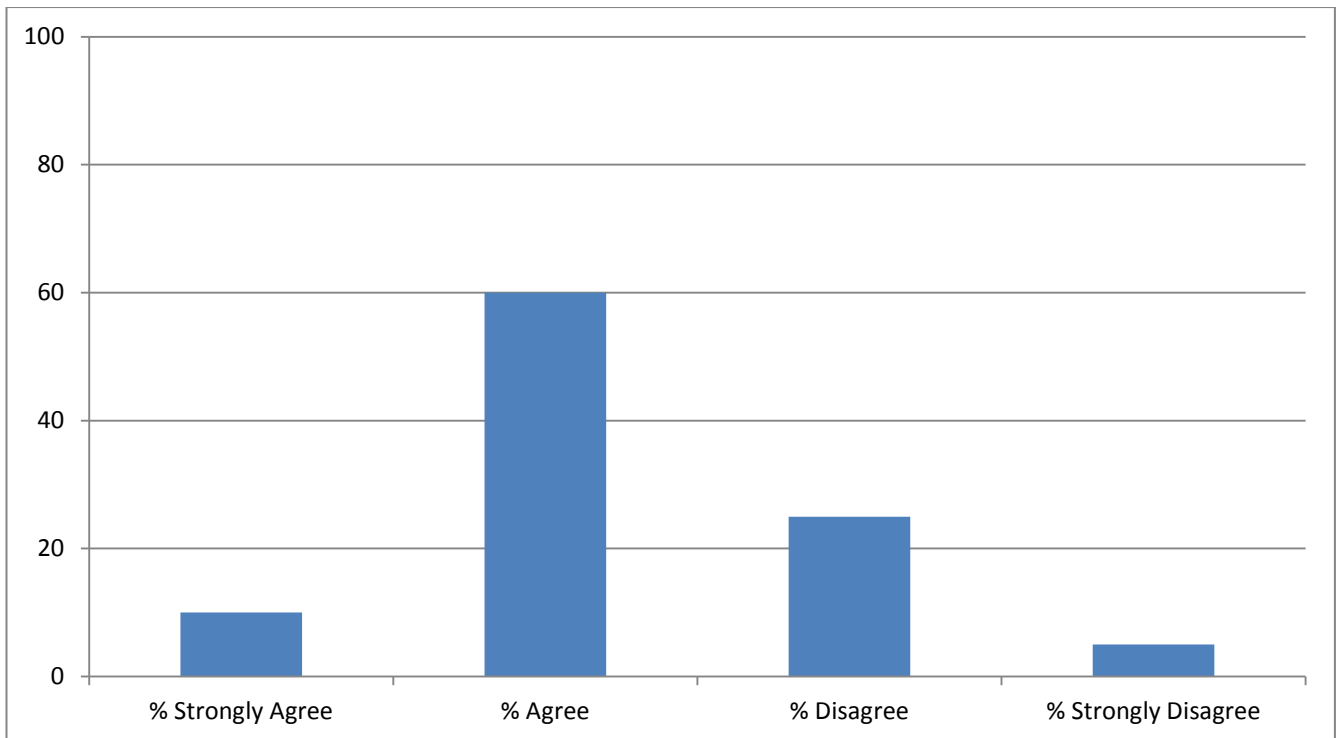


Figure 21: Response to Question 29. Unit 3: The unit description clearly describes the focus and scope for this unit ( n=19)

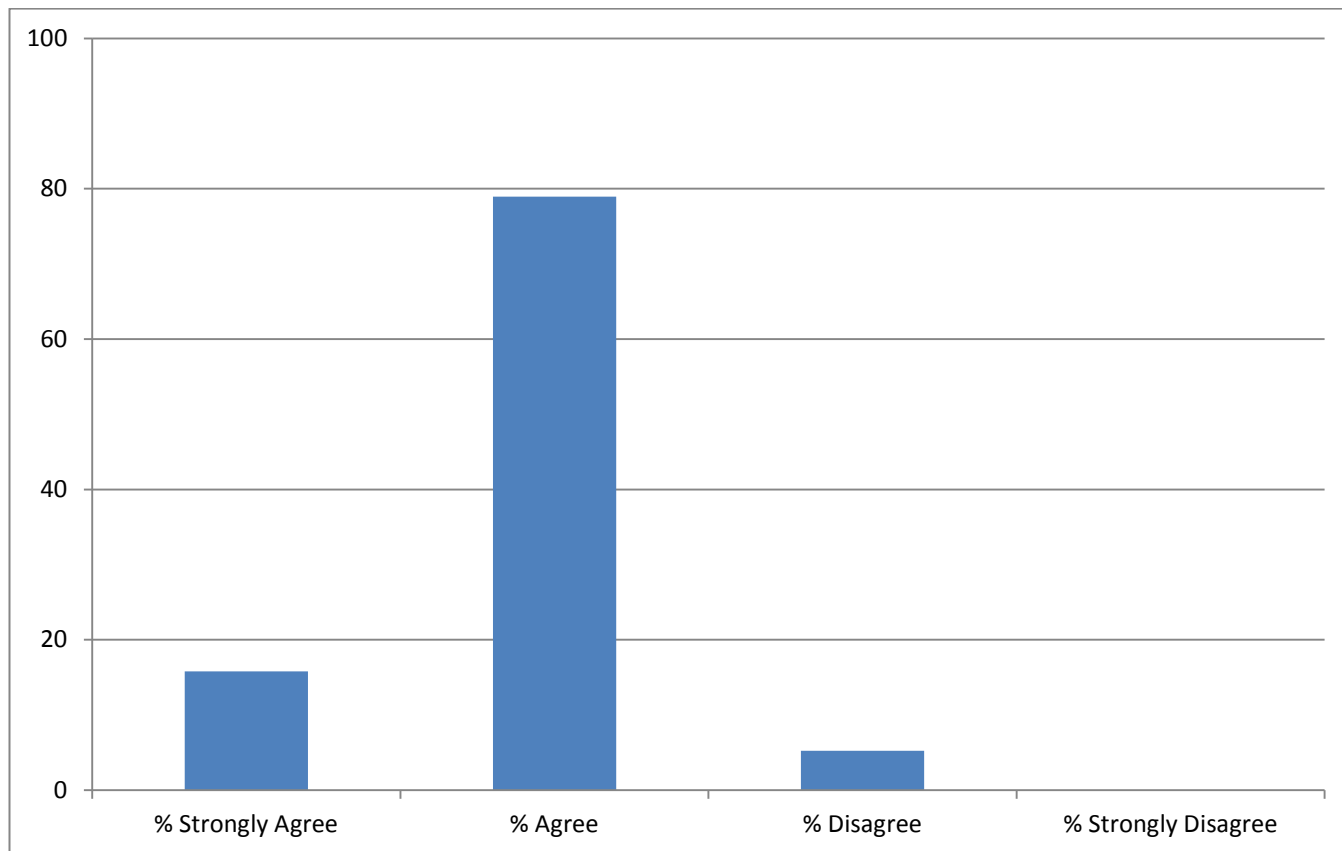


Figure 22: Response to Question 30. The unit outcomes describe clearly the expected learning for this unit (n=19)

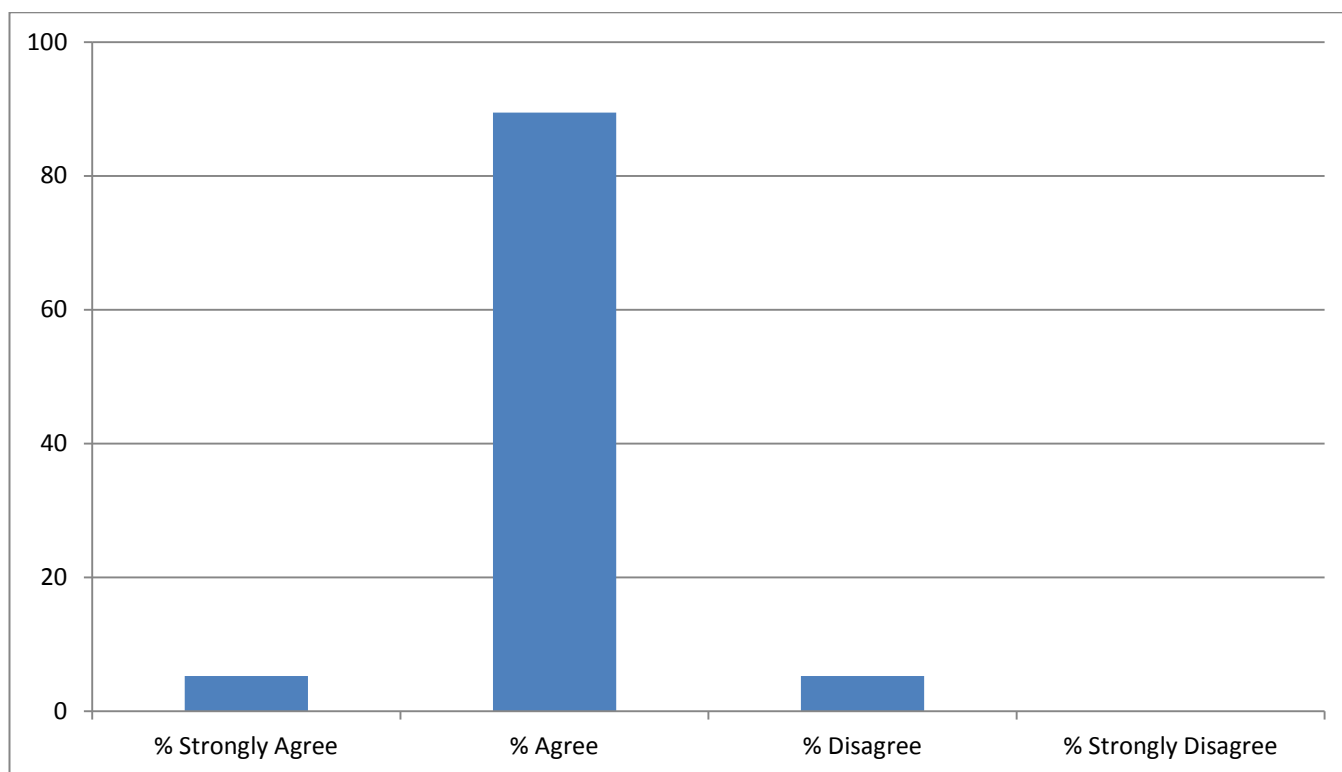


Figure 23: Response to Question 31. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=20)

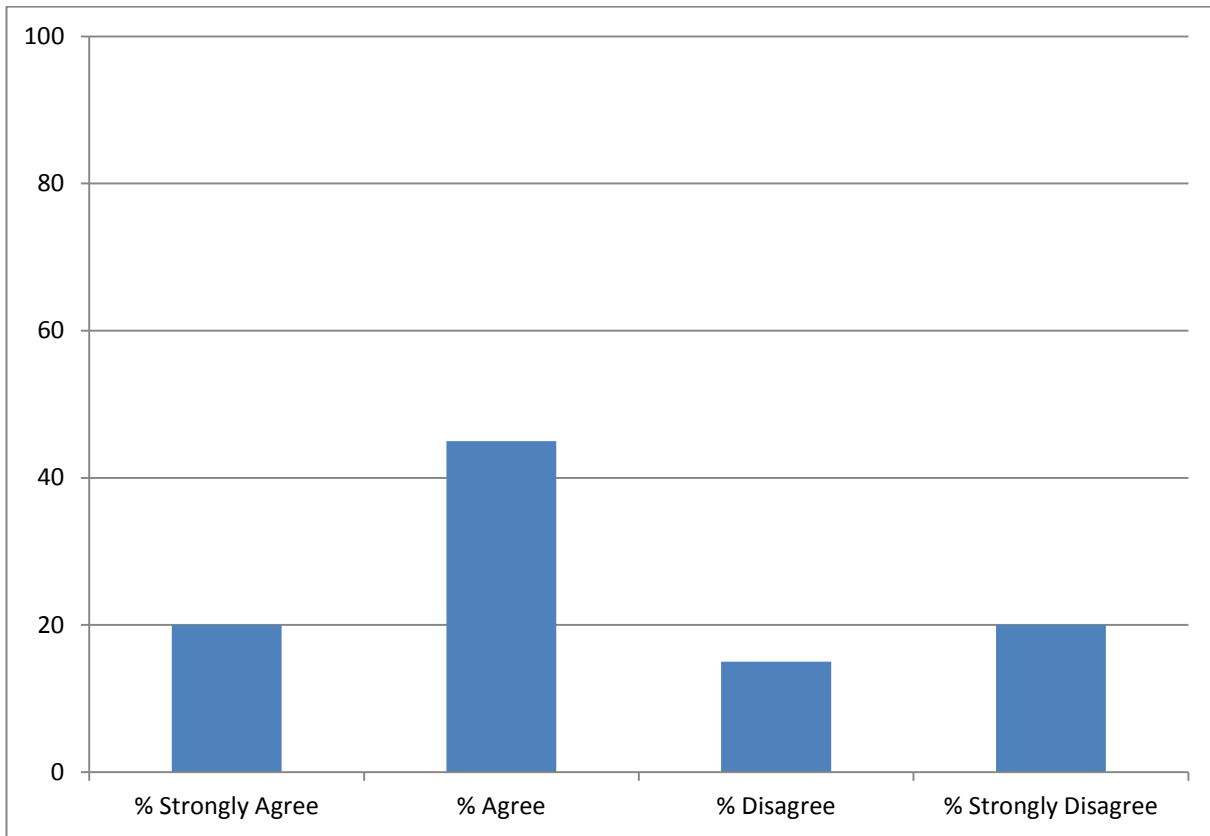


Figure 24: Response to Question 32. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=20)

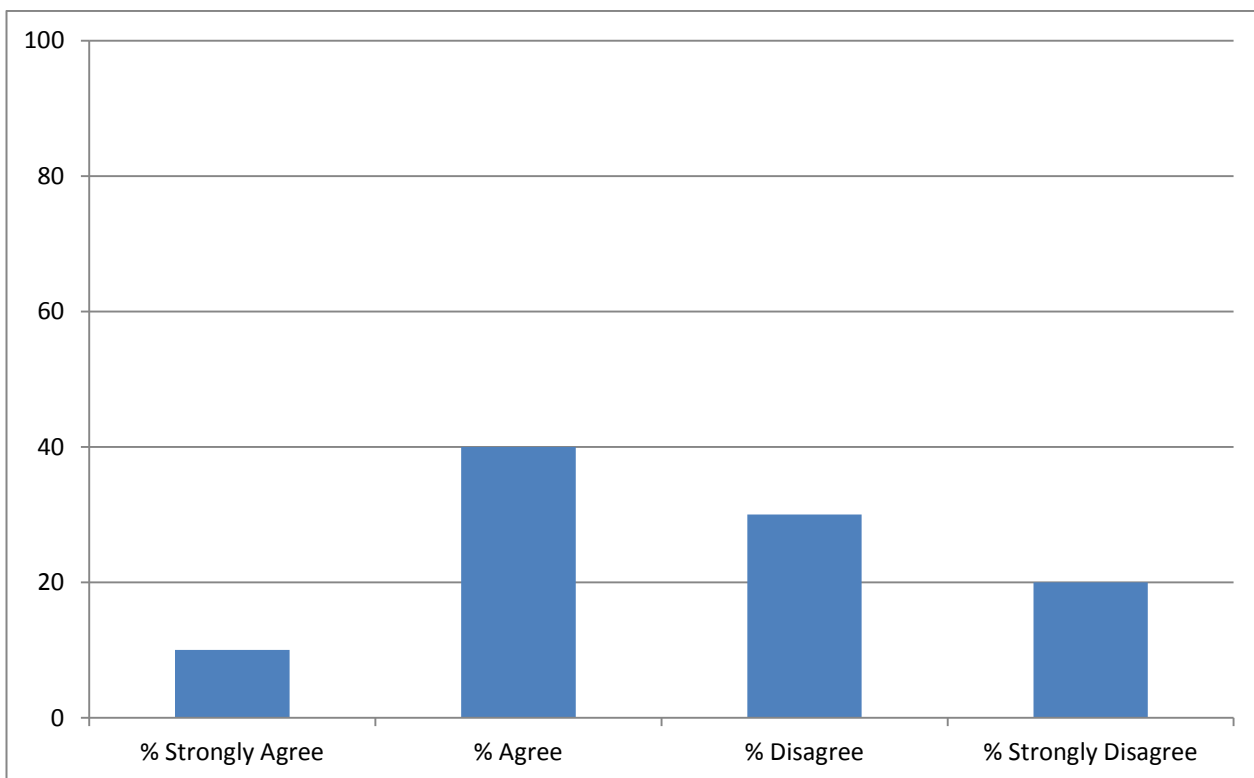


Figure 25: Response to Question 33. The content descriptions are specific about what is to be taught (n=18)

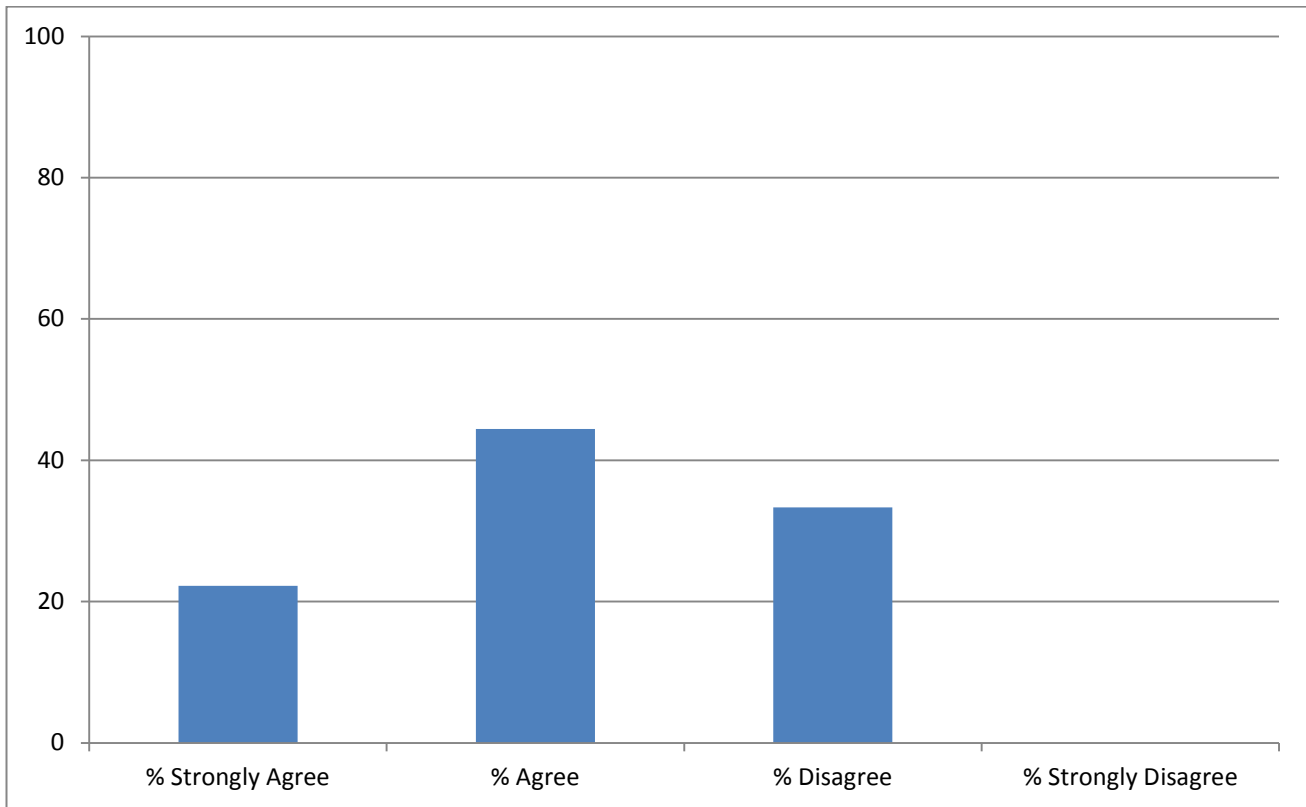


Figure 26: Response to Question 34. Unit 4: The unit description clearly describes the focus and scope for this unit (n=20)

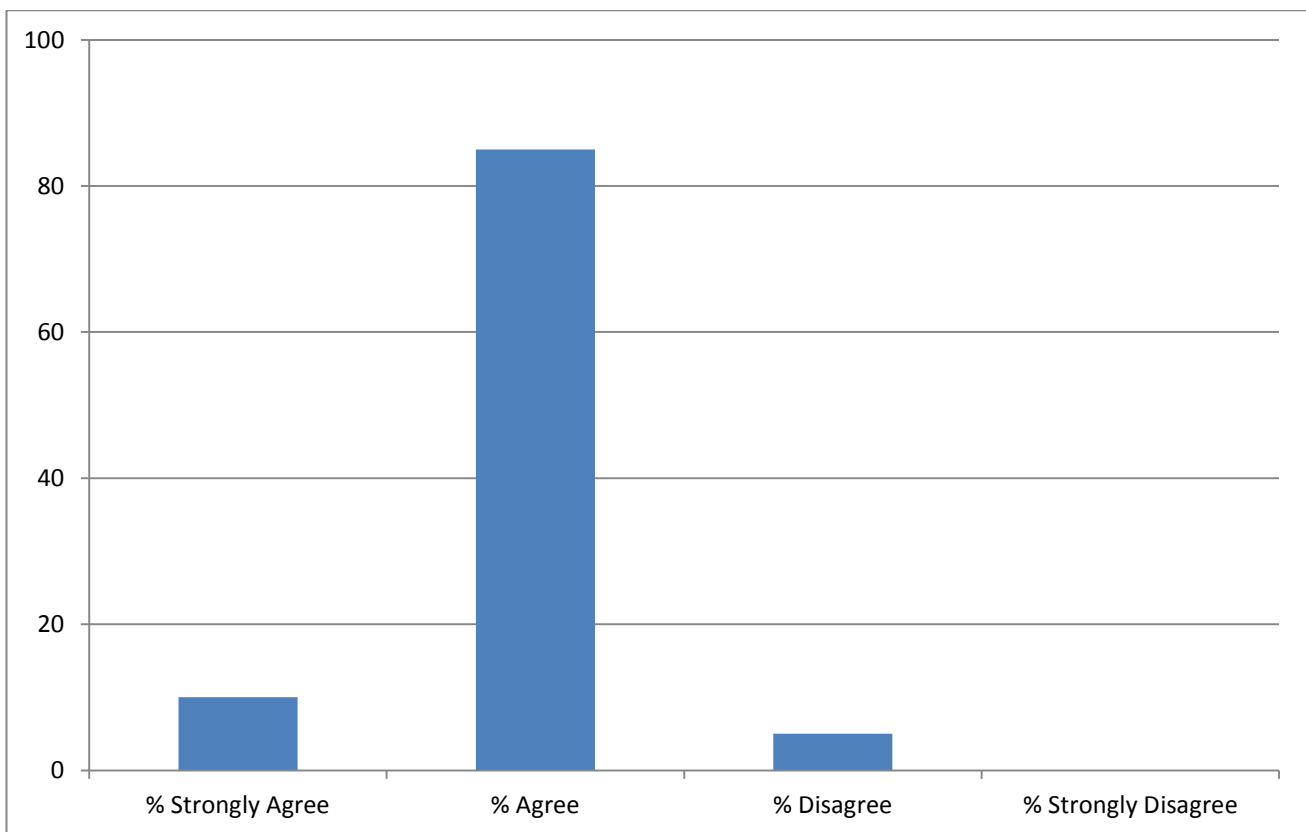


Figure 27: Response to Question 35. The unit outcomes describe clearly the expected learning for this unit (n=20)

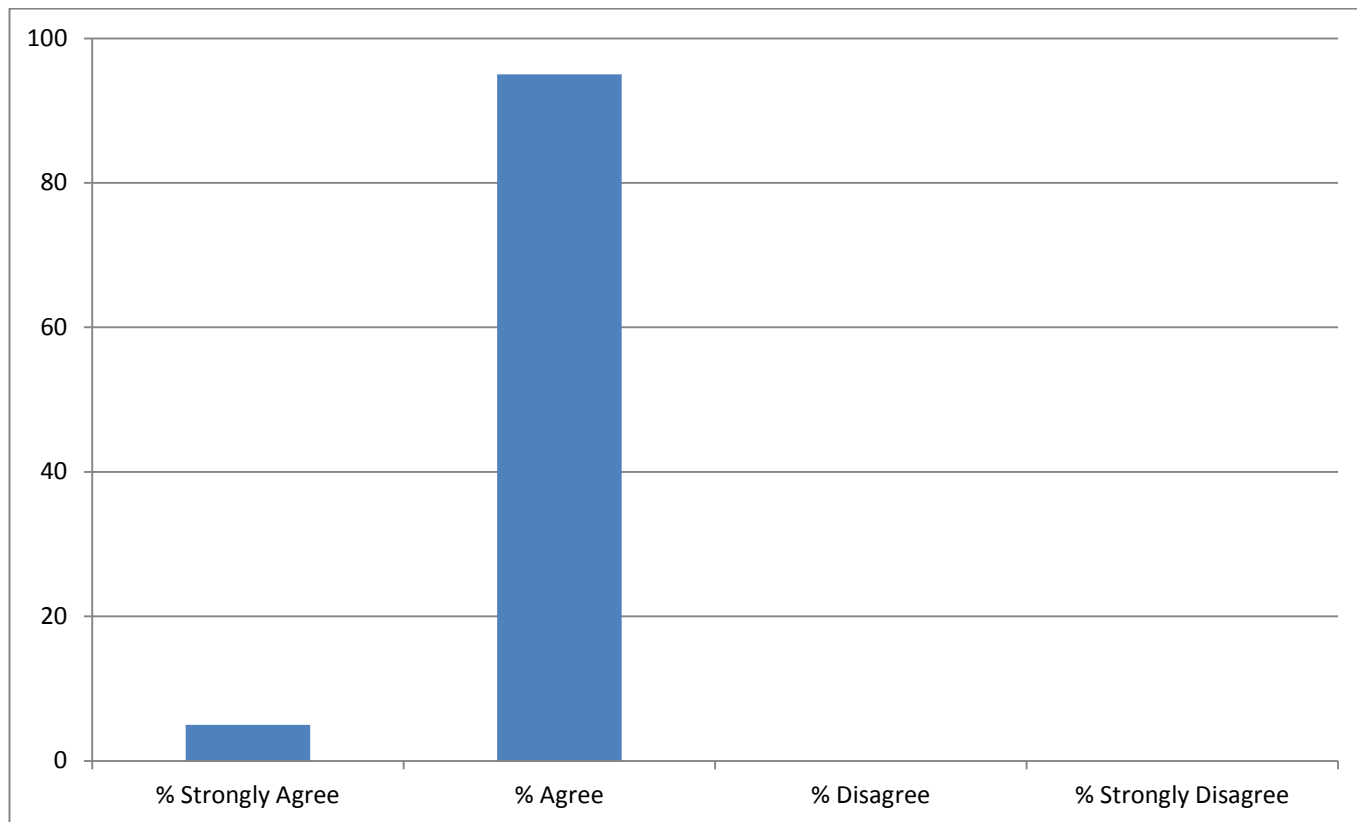


Figure 28: Response to Question 36. The unit contains relevant and appropriate content (knowledge, understanding and skills) (n=21)

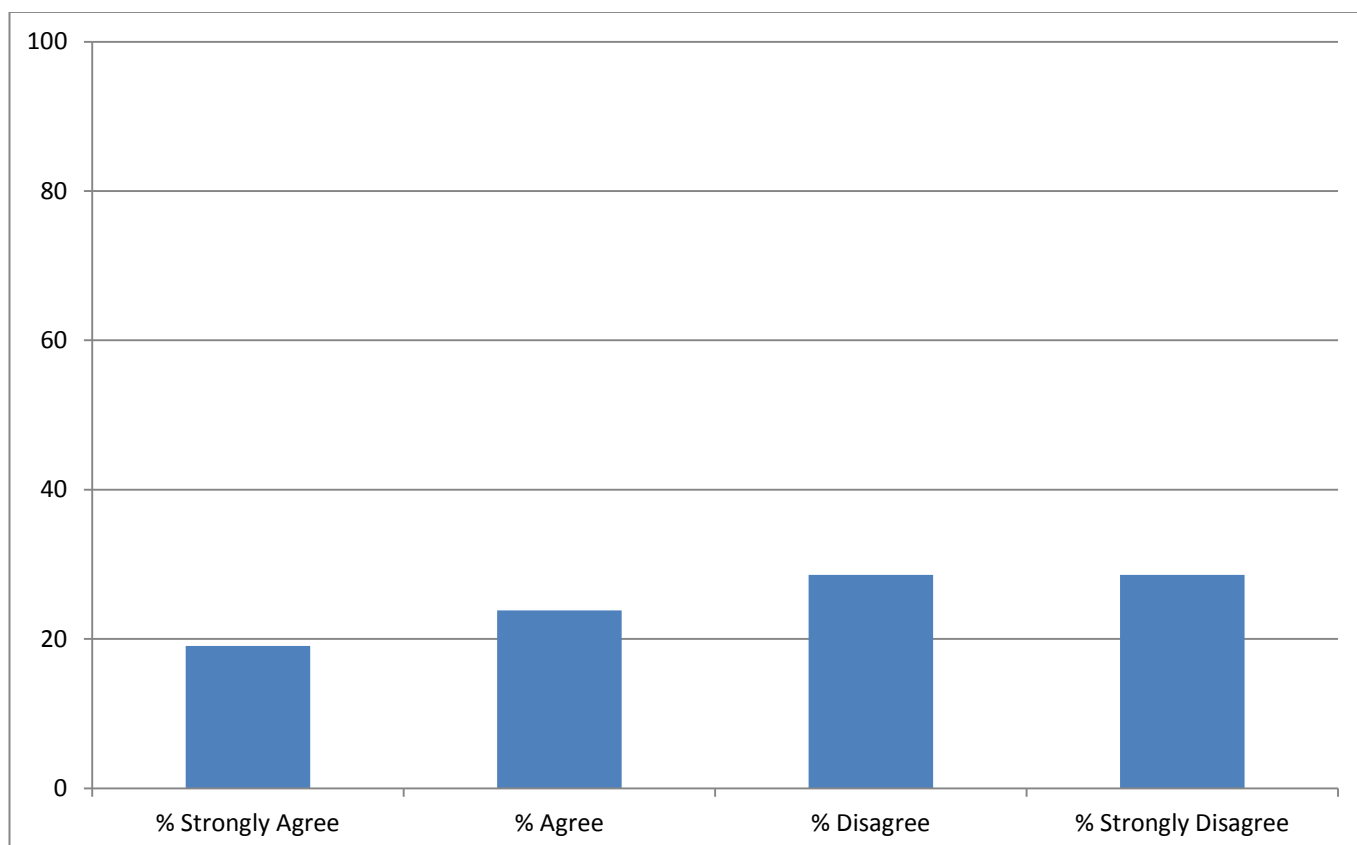


Figure 29: Response to Question 37. The unit contains an appropriate amount of content; that is, it can be taught within 50–60 hours (n=22)

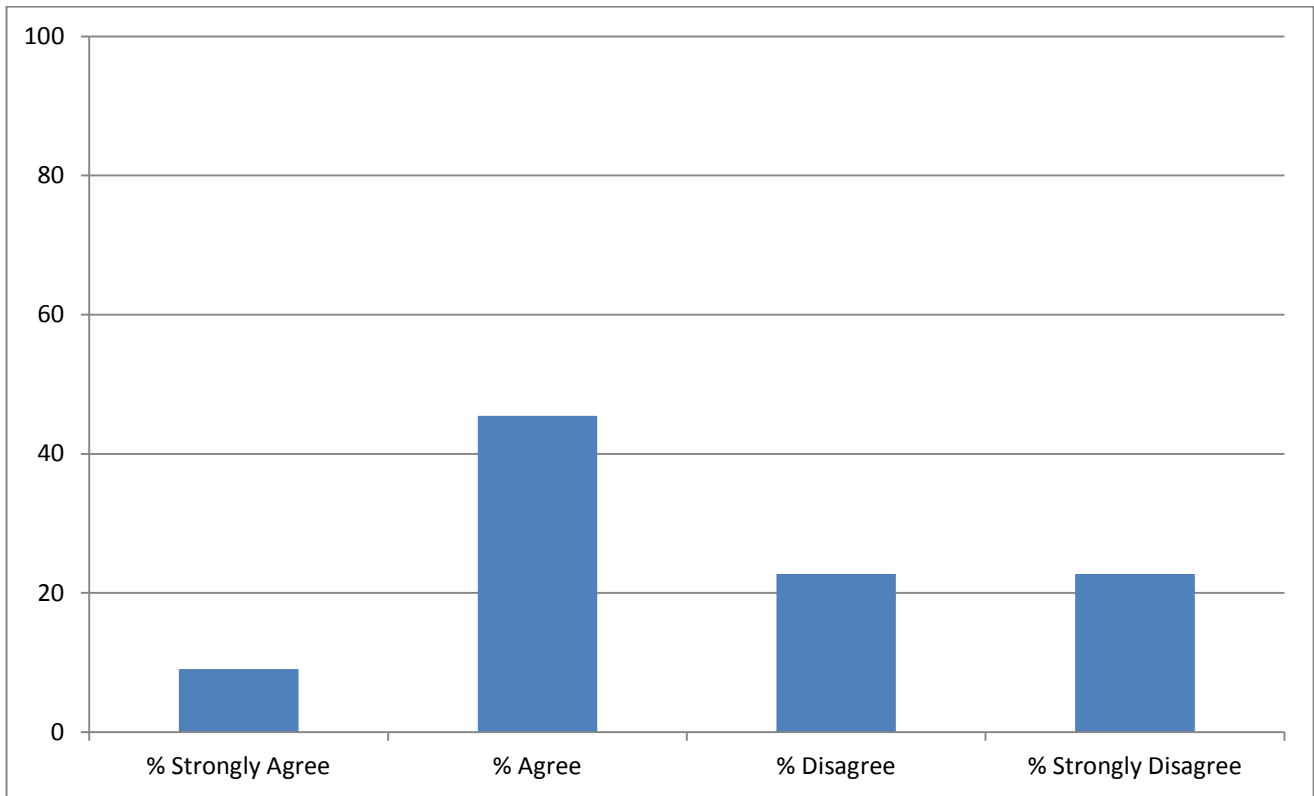


Figure 30: Response to Question 38. The content descriptions are specific about what is to be taught (n=20)

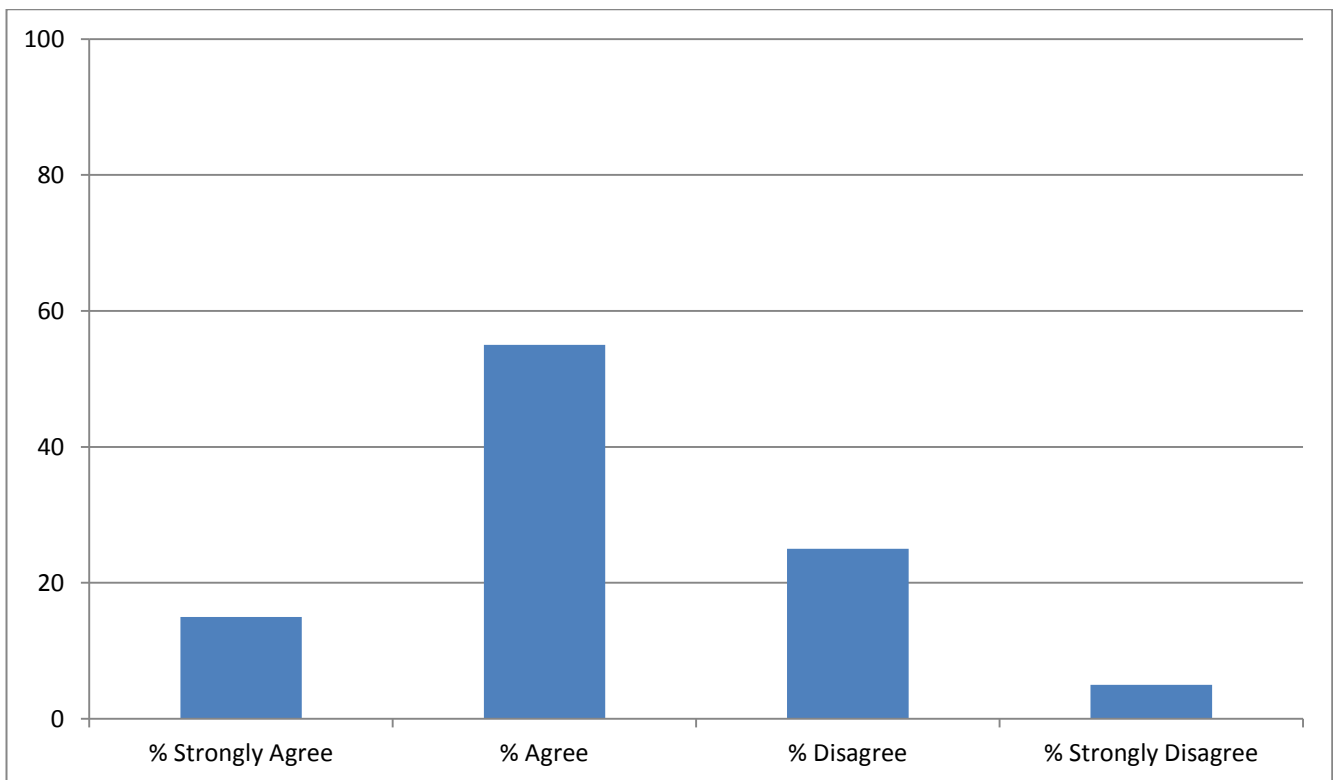




Figure 31: Response to Question 39. Achievement standards for Units 3 and 4: there is clear alignment between the understanding and skills dimensions of the achievement standards, and the unit learning outcomes and content descriptions (n=19)

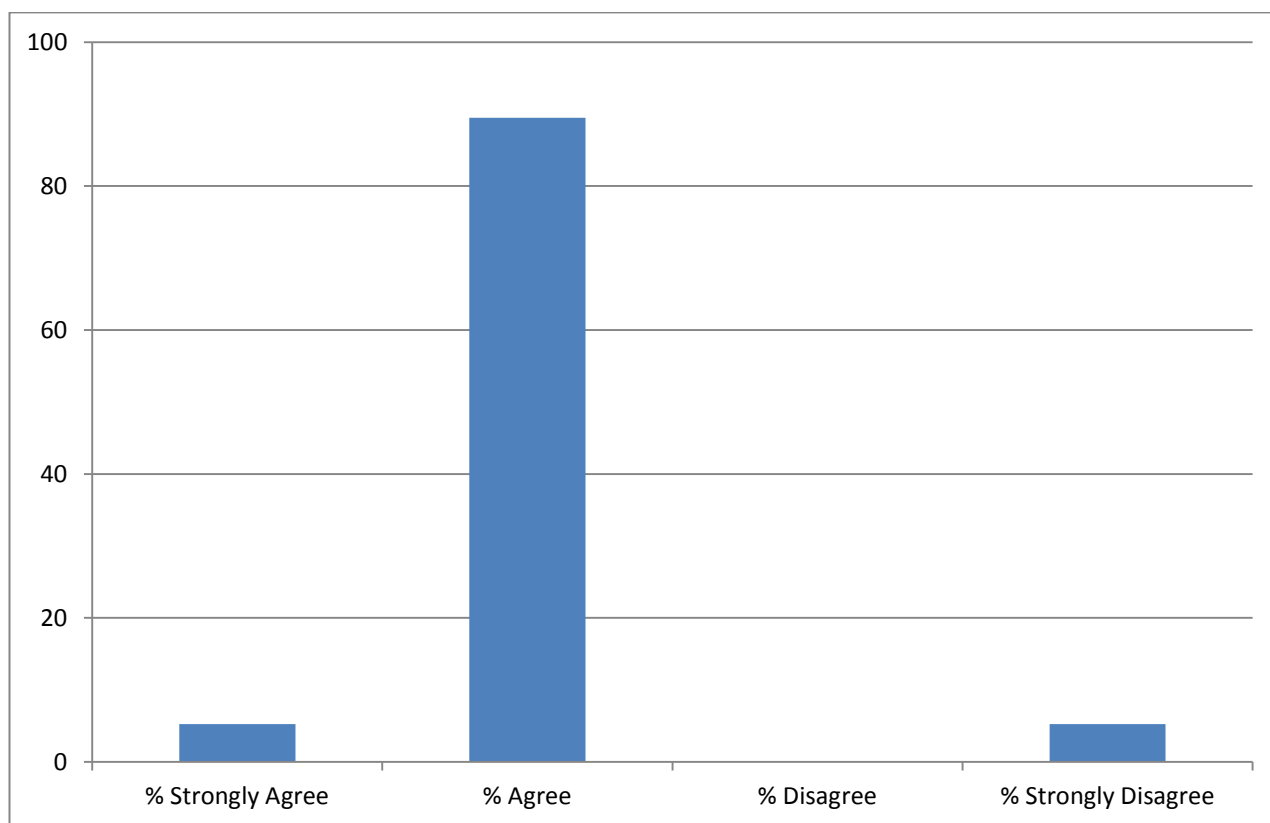


Figure 32: Response to Question 40. The achievement standards are clear and comprehensive descriptions of the increasing complexity of understanding and sophistication of skills (n=19)

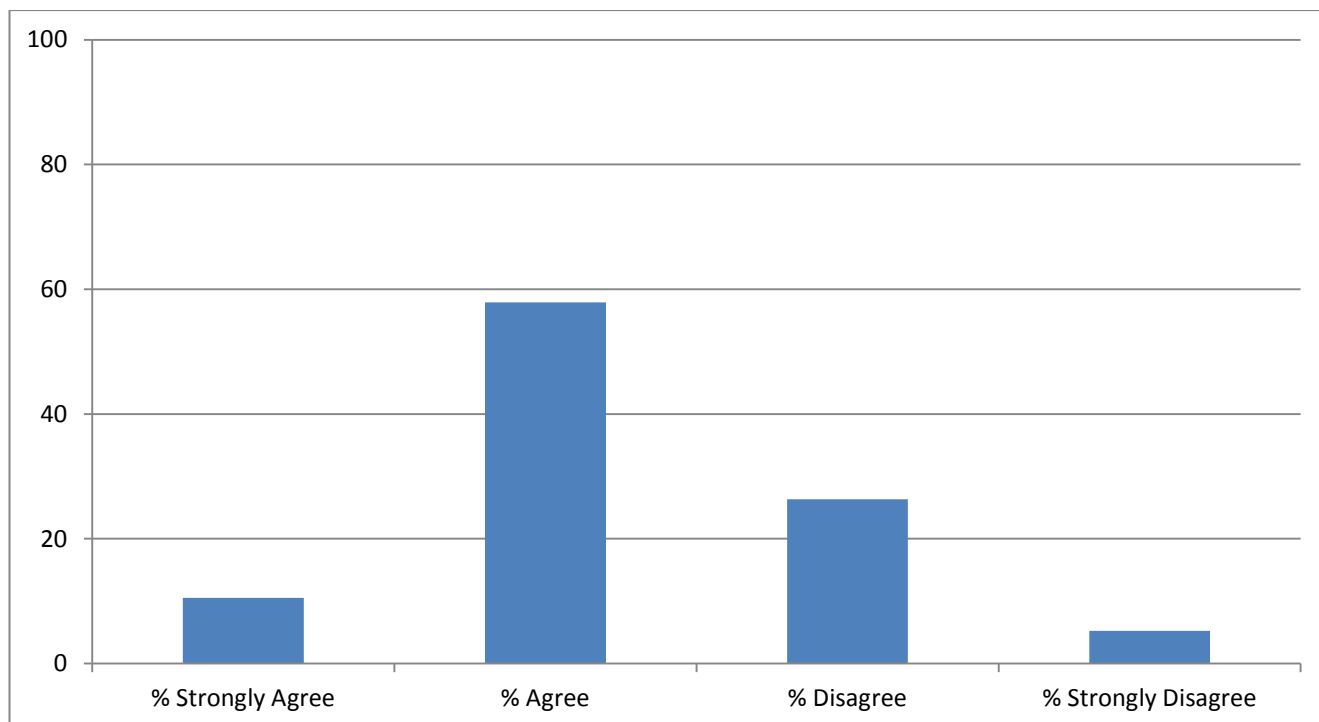


Figure 33: Response to Question 41. The achievement standards are pitched appropriately; that is, they are realistic yet sufficiently challenging for students undertaking these units (n=19)

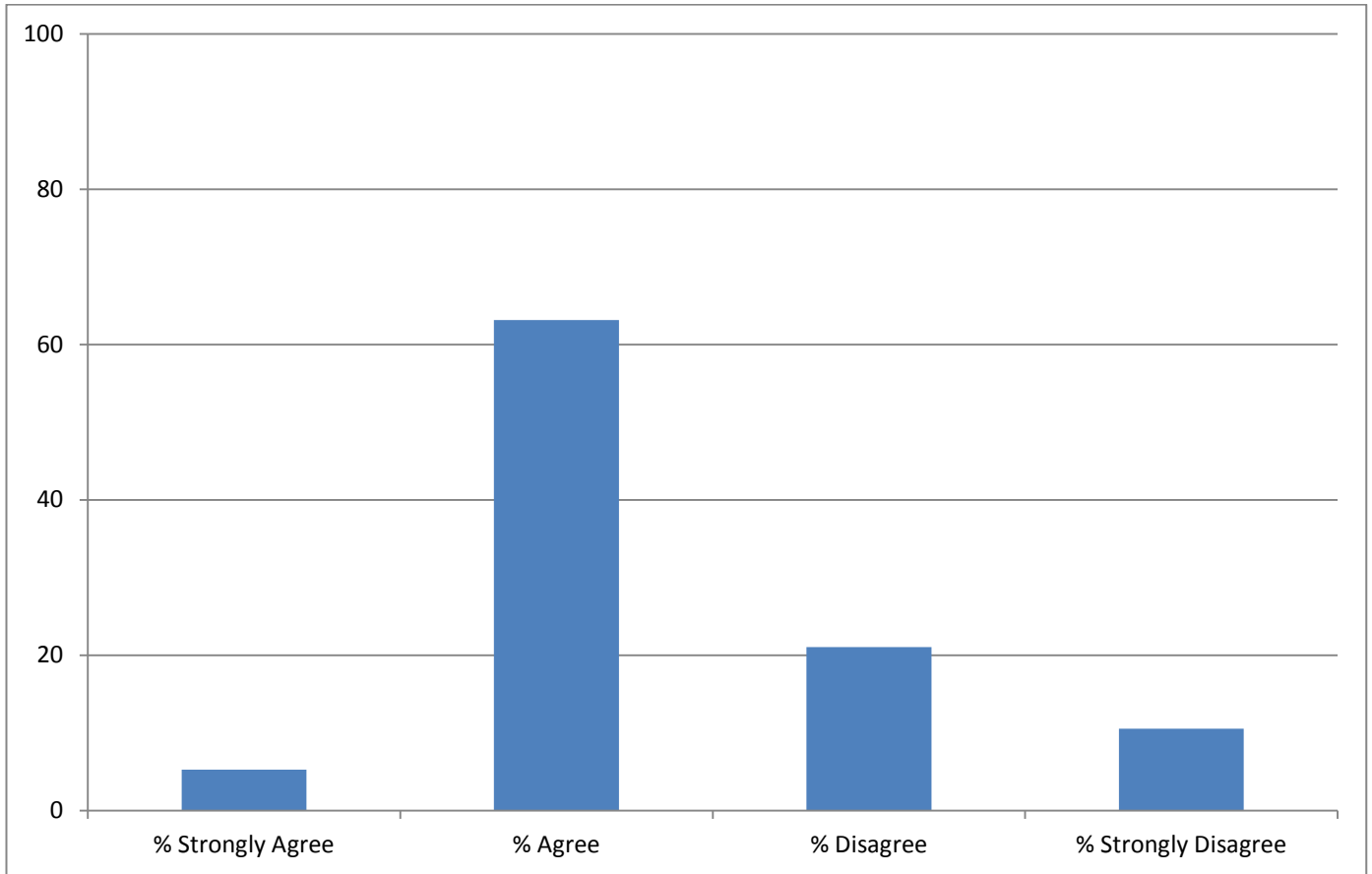


Figure 34: Response to Question 42. The five levels of achievement standard clearly and appropriately distinguish performance; that is, they describe distinctive characteristics of achievement for understanding and skill in this subject at this level (n=19)

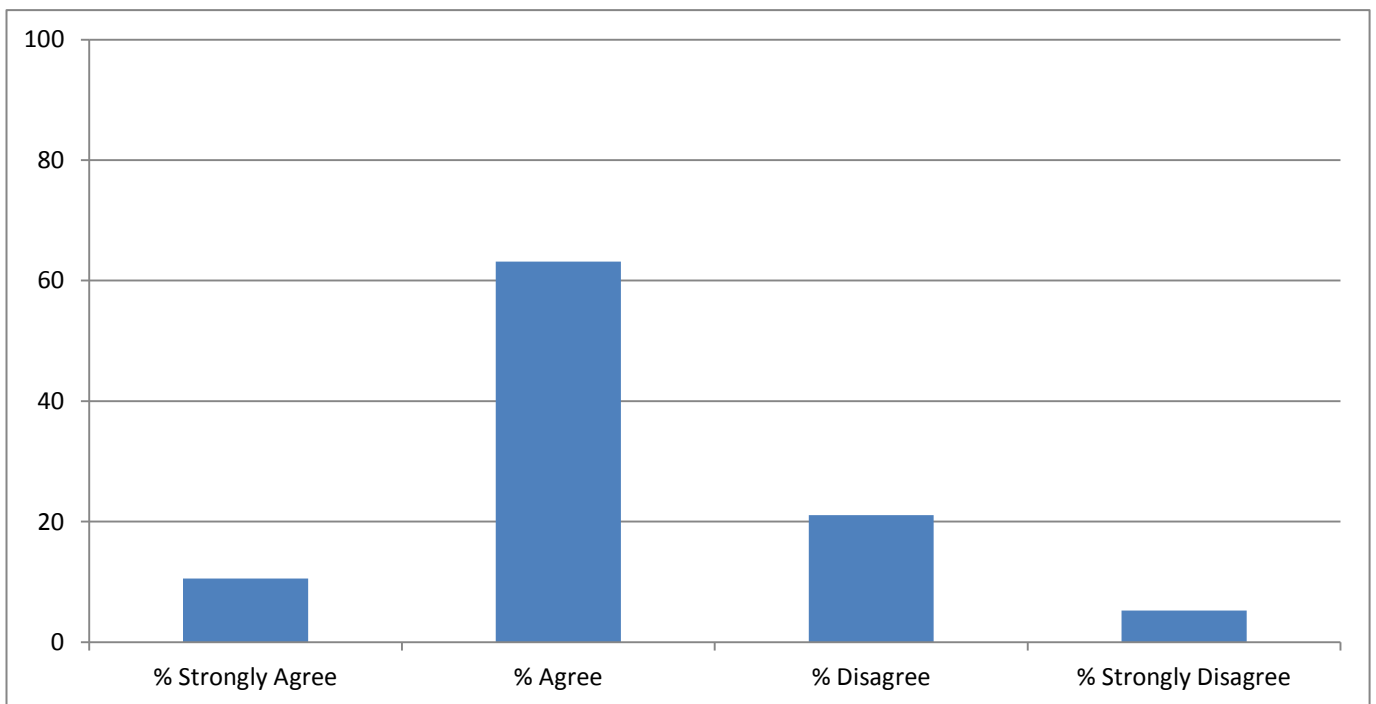


Figure 35: Response to Question 43. The general capabilities that naturally fit with this subject are appropriately represented (n=19)

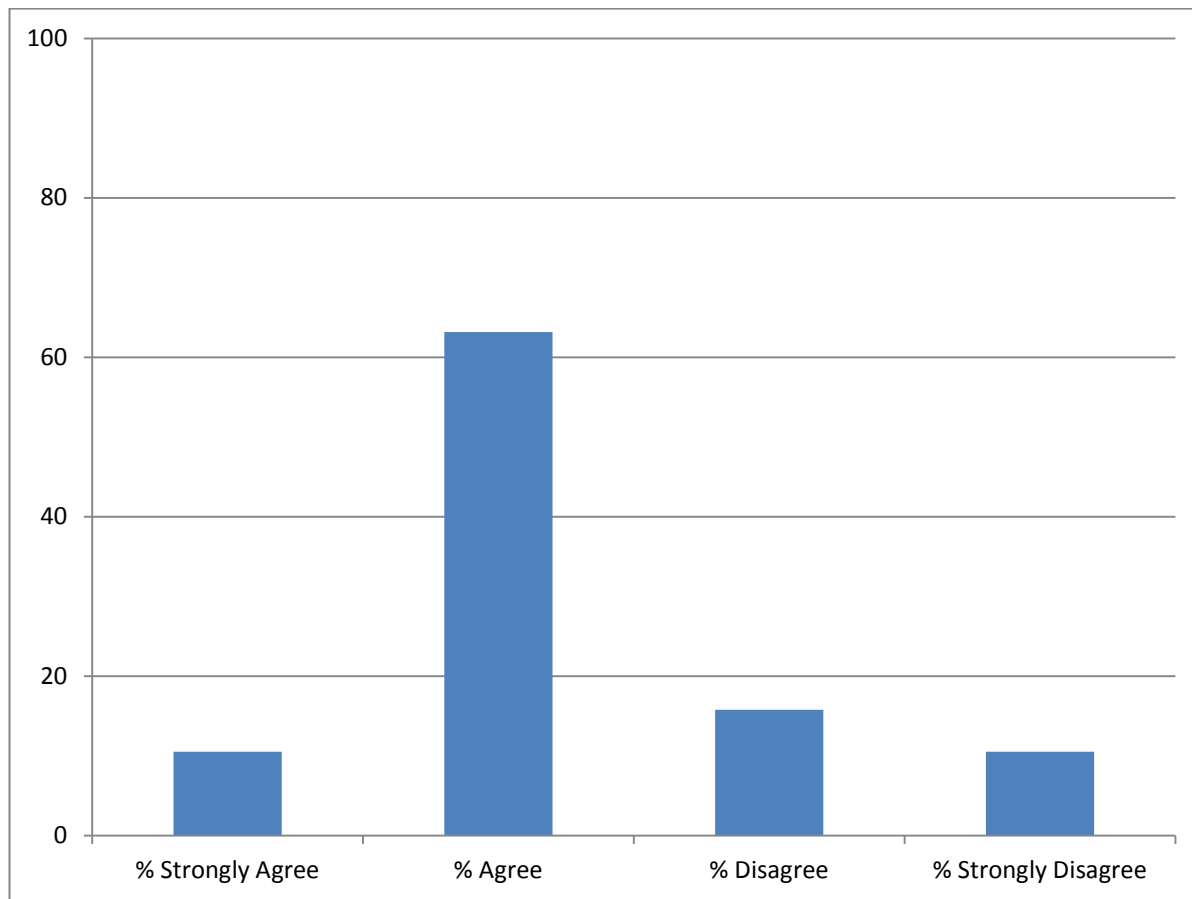


Figure 36: Response to Question 44. The cross-curriculum priorities that naturally fit with this subject are appropriately represented (n=18)

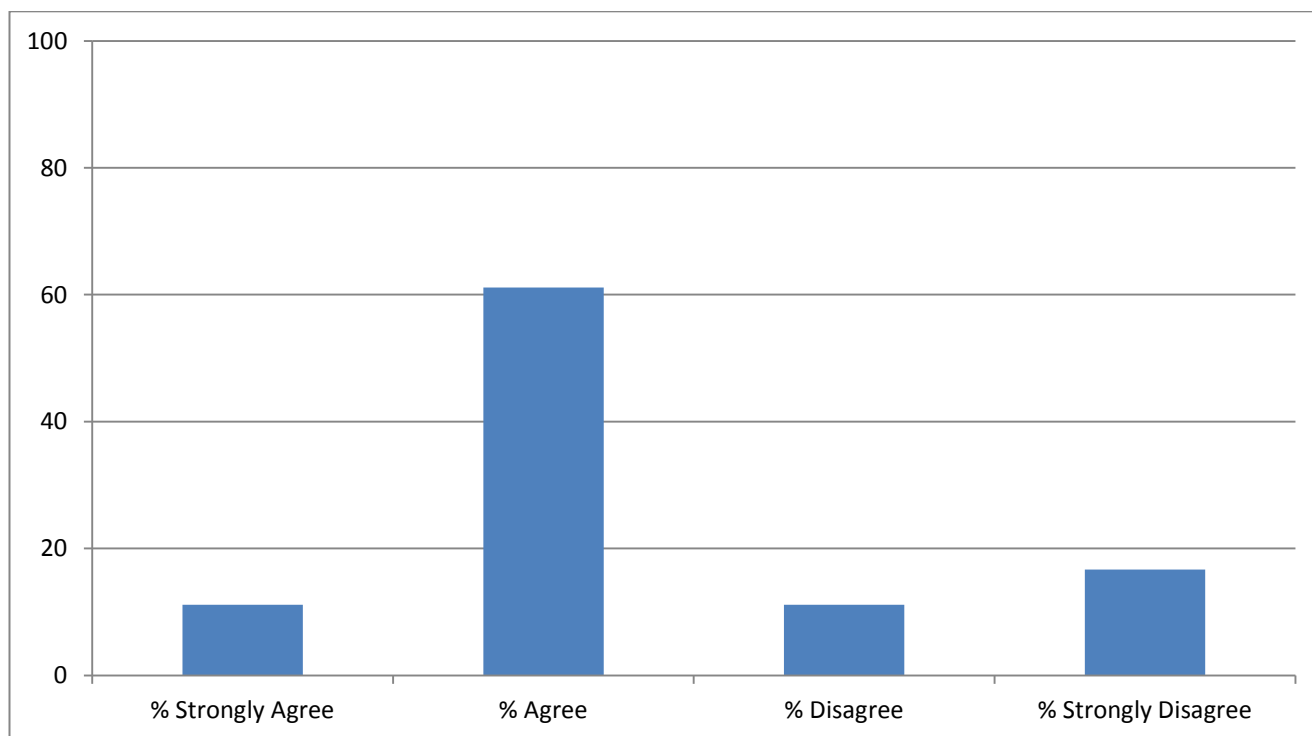
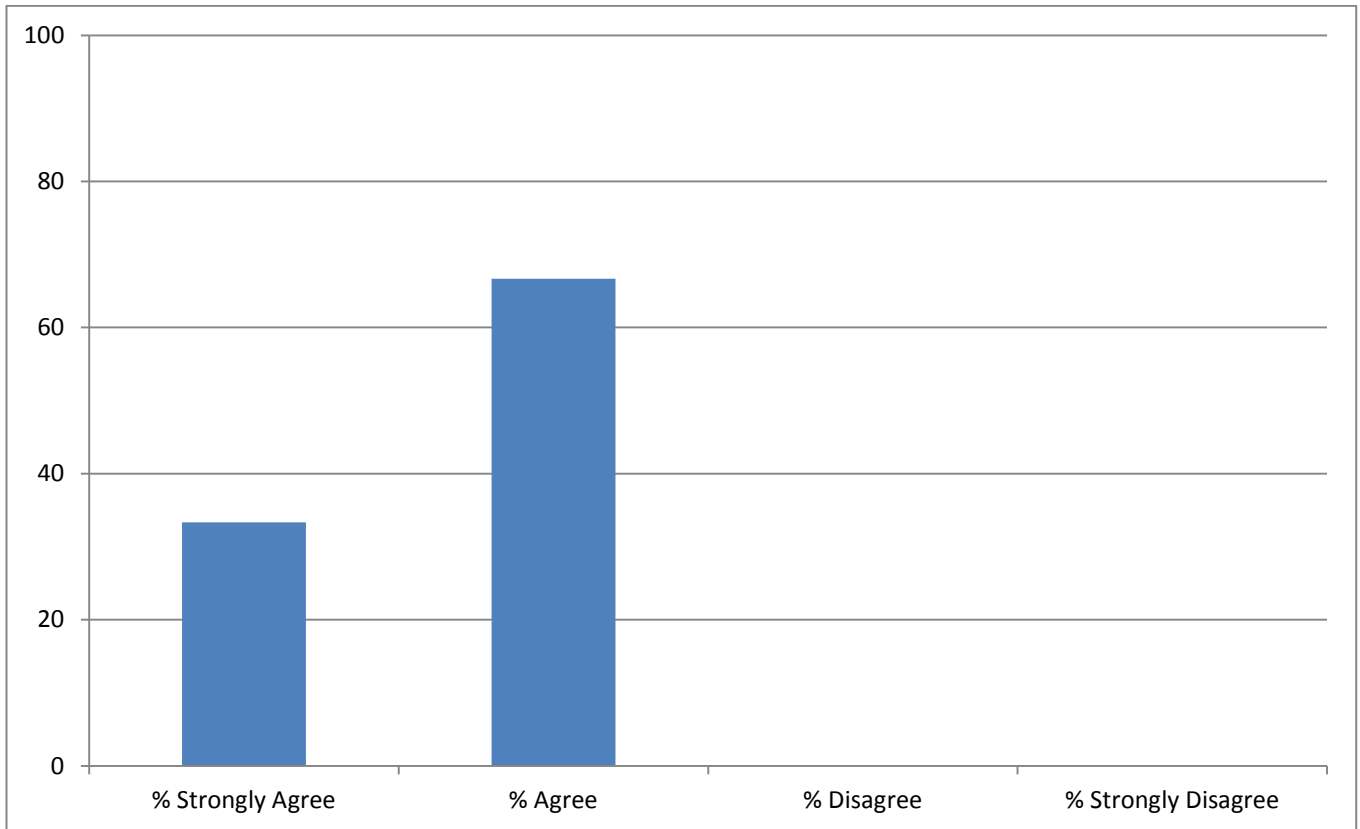


Figure 37: Response to Question 45. The glossary is comprehensive (n=18)



## Appendix 2 – Written submission respondents

This appendix lists the organisations, groups and individuals who made written submissions on the consultation draft curriculum across the Mathematics learning area.

Organisation	State or Territory	Respondent type/industry	Number of contributors	Subject
Asia Education Foundation (AEF)	NATIONAL	State or Territory Education Authority	3	All subjects
Australian Bureau of Statistics (ABS)	NATIONAL	Other Authorities	Not specified	Essential Mathematics and General Mathematics
Australian Council for Adult Literacy	NATIONAL	Community Organisation	12	Essential
Australian Council for Educational Research (ACER)	NATIONAL	Professional Association	1	Essential
Australian Securities and Investments Commission (ASIC)	NATIONAL	Professional Association	2	All subjects
Master Electricians Australia	NATIONAL	Professional Association	4	General Mathematics, Mathematical Methods and Specialist Mathematics
Mathematics Education Research Group of Australasia (MERGA)	NATIONAL	Professional Association	8	All subjects
Open Source Industry Australia Ltd	NATIONAL	Industry body	2	General Mathematics and Specialist Mathematics
Australian Human Rights Commission	ACT	Independent Statutory Organisation	Organisation wide	All subjects
Australian Council of Deans of ICT (ACDICT)	NSW	Teaching Professional Association	Not specified	Overall comments
Australian Mathematical Olympiad Committee Australian Mathematics Trust	NSW	Professional Association	1	All subjects
Barker College	NSW	School	Not specified	All subjects
Catholic Education Office Sydney	NSW	State or Territory Education Authority	35	All subjects
Mathematical Statistics School of Mathematics and Statistics, The University of Sydney	NSW	University	6	Mathematical Methods and Specialist Mathematics
Mathematics Faculty - Wagga School	NSW	School	1	All subjects
Presbyterian Ladies' College, Sydney	NSW	School	Not specified	All subjects
The Mathematical Association of NSW Inc (MANSW)	NSW	Teaching Professional Association	Not specified	All subjects

Organisation	State or Territory	Respondent type/industry	Number of contributors	Subject
University of New South Wales	NATIONAL	University	9	Mathematical Methods and Specialist Mathematics
Brisbane Catholic Education (BCE)	QLD	Teaching Professional Association	Not specified	All subjects
Independent Schools Queensland (ISQ)	QLD	Teaching Professional Association	Not specified	All subjects
North Bundaberg State High School	QLD	School	Not specified	All subjects
Plat Qld	QLD	School	Not specified	All subjects
University of Queensland	QLD	University	1	General, Methods and Specialist
Westside Christian College	QLD	School	1	All subjects
Eynesbury Senior College	SA	School	1	All subjects
Mathematical Association of South Australia	SA	Professional Association	1	All subjects
Pembroke School	SA	School	7	All subjects
Tasmanian Qualifications Authority (TQA)	TAS	State or Territory Education Authority	Not specified	All subjects
iCT Training Centre	UK	Professional Association	1	All subjects
Brighton Grammar School	VIC	School	3	Mathematical Methods and Specialist Mathematics
Camberwell Girls' Grammar	VIC	School	1	Mathematical Methods and Specialist Mathematics
Catholic Education Office, Melbourne	VIC	School	Not specified	All subjects
Genazzano FCJ College	VIC	School	Not specified	All subjects
Melbourne University	VIC	University	1	All subjects
Presbyterian Ladies' College	VIC	School	1	Methods
Scotch College	VIC	School	3	All subjects

Organisation	State or Territory	Respondent type/industry	Number of contributors	Subject
Swinburne University of Technology	VIC	University	4	All subjects
The Mathematical Association of Victoria	VIC	Professional Association	Not specified	All subjects
University of Victoria	VIC	University	1	General
Victorian Curriculum and Assessment Authority (VCAA)	VIC	State or Territory Education Authority	Not specified	All subjects
Association of Independent Schools of Western Australia (AISWA)	WA	Teaching Professional Association	22	Specialist
Department of Environment and Conservation	WA	Government Department	1	Essential Mathematics
School Curriculum and Standards Authority (SCSA)	WA	State or Territory Education Authority	1	All subjects
St Brigid's College Lesmurdie	WA	School	1	
St Norbert College	WA	School	6	General, Methods and Essential



## Appendix 3 - Consultation findings – states and territories

This section provides hyperlinks to the responses to the draft senior secondary Australian Curriculum: Mathematics from those authorities responsible for senior years curriculum in their respective states and territories.

AUTHORITY	STATE/TERRITORY	Submission prepared
<a href="#">Board of Senior Secondary Studies</a>	ACT	Feedback from consultation meetings
<a href="#">Board of Studies</a>	NSW	From BOS NSW consultation processes and input from educational sectors of NSW
<a href="#">Board of Studies</a>	NT	From consultation meetings conducted by BOS consultants
<a href="#">Queensland Studies Authority (QSA)</a>	QLD	In partnership with Education Queensland, Queensland Catholic Education Commission (QCEC) and Independent Schools Queensland (ISQ)
<a href="#">South Australian Certificate of Education (SACE) Board</a>	SA	In partnership with Government, Catholic and Independent sectors in South Australia
<a href="#">Tasmanian Qualifications Authority (TQA)</a>	TAS	Response including matters discussed by the TQA and from a program of workshops and consultation meetings with senior secondary teachers
<a href="#">Department of Education, Tasmania</a>		From consultations held in schools and colleges throughout the state
<a href="#">Victorian Curriculum and Assessment Authority (VCAA)</a>	VIC	In partnership and on behalf of Department of Education and Early Childhood Development, Catholic Education Commission Victoria and Independent Schools Victoria
Schools Curriculum and Standards Authority (SCSA) <i>ACARA has been advised that the Western Australian response to consultation is to be published subsequent to further consultation.</i>	WA	In partnership with Department of Education (WA), Catholic Education Office of WA, Association of Independent Schools of WA