

## 2. Scale variables, cluster variables, and history variables

The students, their teachers, and parents were asked series of questions about their attitudes to or opinions about aspects of the students' school and out-of-school life. The responses were measured on Likert-type scales. These questions were used to construct the scale variables.

Where the questions were of the "tick if true for participant" type (binary responses), we used cluster analysis to define clusters of participants who tended to give similar responses to groups of the questions of interest.

We have, for the past several rounds of analysis, used some history variables, based on responses to similar questions asked each time we interviewed the participants or their teachers or parents. In many ways these history variables are similar to the cluster variables, but the method of defining the categories for the history variable has been more subjective.

There are a few other derived variables that are described in this section.

We describe for each of these types of variables in turn:

- the methodology used to obtain the new variable
- the list of all such variables, their characteristics (where relevant), and the constituent items used to derive them.

### Scale variables

These variables were constructed from:

- Student responses to the stems:
  - School is a place where ...
  - English/most enjoyed subject/least enjoyed subject is a class where ...
  - I feel I'm doing well at school when ...
  - When I'm at home ...
  - In the past year I've had happen to me ...
  - My friends are ...
- Parent responses to the stems:
  - Relationships at home
  - Student's way of doing things (at home)
  - Teacher responses to the stem: Characteristics that describe the student in your class ... were used to construct the attitudinal competencies described in the first report on the Competent Children, Competent Learners study at 16 (Hodgen, 2007).
  - Dean (or equivalent) description of hindrances and support for students in the participants' year.

## Method

### *Likert-type scale items*

We used principal factor analysis with varimax rotation using SAS/STAT<sup>®</sup> (SAS Institute Inc, 2002-2003) to determine which items should constitute possible scales, and used Cronbach's alpha to get a measure of the reliability of the scales.

The actual scale variables were calculated as the unweighted mean of the Likert-scaled items indicated by the rotated principal factor analysis (where necessary, items were scaled to be on a scale with the same number of points), and converted to a 1–10 scale by a linear transformation.

The scale scores used as explanatory variables were constructed so that a higher value corresponded to more of the attribute. Sometimes this is "good", as in supportive family, or engaged in school, and sometimes this is "bad", as in disrupted learning environment or being disengaged in learning. The signs of the correlation coefficients and regression coefficients reflect the relationship between "good" and "bad" attributes: two "good" attributes tend to have a positive association, as do two "bad" ones, whereas one "good" and one "bad" have a negative association.

### *Other items*

For the student hindrances and teacher hindrances scales we calculated the mean of the items involved. For the hindrance scales, this was the mean of the 4-point scale items, converted to a 10-point scale by a linear transformation.

## Listings of scale variables and their items

Where students and/or parents and/or teachers were asked similar questions and we put all such items into a single analysis, we found each time that they loaded onto different possible factors or scale variables. In consequence we tended to analyse each of the banks of items indicated above separately, and the scale variables derived all tend to be derived from items from a single bank of questions; all the items are student responses, or parent responses, or teacher responses. Almost always, all the items in a scale are responses to a common stem ("School is a place where ..." for example).

We obtained a number of possible scale variables that had Cronbach's alpha values of at least 0.7, each constructed from a minimum of four items. Possible scale variables with lower alpha values, or fewer items, were not used. The only exception was *satisfied with subject mix*, which has  $\alpha = 0.7$  and is constructed from three items.

In the lists that follow, an (r) indicates that the scale of the item was reversed before being used to form the scale variable.

*School is a place where ...*

**Scale 1 Engaged in school**

A high score corresponds to positive (good) engagement in school.

Age 16	Age 14
( $\alpha = 0.79$ ) Item-scale correlations between 0.41 and 0.61; $n = 416$	( $\alpha = 0.79$ ) $n = 447$
<ul style="list-style-type: none"> <li>• I like my teachers</li> <li>• I keep out of trouble</li> <li>• I enjoy learning</li> <li>• I want to leave school as soon as I can (r)</li> <li>• I get bored (r)</li> <li>• I get tired of trying (r)</li> <li>• I skip classes (r)</li> <li>• I feel restless (r)</li> </ul>	<ul style="list-style-type: none"> <li>• The discipline rules are fair</li> <li>• I keep out of trouble</li> <li>• I like my teachers</li> <li>• I enjoy learning</li> <li>• I get tired of trying (r)</li> <li>• I get too much work to do (r)</li> <li>• I skip classes (r)</li> <li>• I want to leave as soon as I can (r)</li> </ul>

**Scale 2 Affirmed at school**

A high score corresponds to being affirmed.

Age 16	Age 14
( $\alpha = 0.80$ ) Item-scale correlations between 0.32 and 0.55; $n = 416$	( $\alpha = 0.73$ ) $n = 447$
<ul style="list-style-type: none"> <li>• I feel I belong</li> <li>• I am treated like an individual</li> <li>• Students have a say in how our school runs</li> <li>• I am treated like an adult</li> <li>• The discipline and rules are fair</li> <li>• I feel safe</li> <li>• Teachers ask for our views about how to make the school and our class better</li> <li>• I learn most things pretty quickly</li> <li>• I can take leadership roles if I want to</li> <li>• It's important to do my best</li> <li>• I get all the help I need</li> </ul>	<ul style="list-style-type: none"> <li>• I am treated like an individual</li> <li>• I feel I belong</li> <li>• I feel safe</li> <li>• I get all the help I need</li> <li>• I learn most things pretty quickly</li> <li>• It's important to do my best</li> <li>• I am treated like an adult</li> <li>• I have good friends</li> </ul>

**Scale 3 Satisfied with subject mix**

A high score corresponds to satisfaction with the subjects taken.

( $\alpha = 0.70$ ) Item–scale correlations between 0.46 and 0.56;  $n = 420$

- I am happy with my subjects this year
- My parent/s are happy with my subjects this year
- The subjects I am doing will help me do the subjects I want to do next year

*I feel I'm doing well at school when ...*

A high score on both scales corresponds to using internal/external markers of success.

**Scale 4 Student uses internal markers of achievement**

Age 16	Age 14
( $\alpha = 0.86$ ) Item–scale correlations between 0.55 and 0.70; $n = 420$	( $\alpha = 0.86$ ) $n = 447$
<ul style="list-style-type: none"> <li>• I do my very best</li> <li>• I learn something interesting</li> <li>• I solve a problem by working hard</li> <li>• I work really hard</li> <li>• I get a new idea about how things work</li> <li>• Something I learn makes me think about things</li> <li>• What I learn really makes sense</li> <li>• I catch on quickly</li> </ul>	<ul style="list-style-type: none"> <li>• I solve a problem by working hard</li> <li>• I learn something interesting</li> <li>• I do my very best</li> <li>• I get a new idea about how things work</li> <li>• Something I learn makes me think about things</li> <li>• I work really hard</li> <li>• What I learn really makes sense</li> <li>• I catch on quickly</li> </ul>

**Scale 5 Student uses external markers of achievement**

Age 16	Age 14
( $\alpha = 0.84$ ) Item–scale correlations between 0.53 and 0.72; $n = 420$	( $\alpha = 0.86$ ) $n = 447$
<ul style="list-style-type: none"> <li>• I know more than other people</li> <li>• Others get things wrong and I don't</li> <li>• I'm the only one who can answer questions</li> <li>• I don't have to try hard</li> <li>• I don't have anything hard to do</li> <li>• I get good marks/results</li> </ul>	<ul style="list-style-type: none"> <li>• I know more than other people</li> <li>• Others get things wrong and I don't</li> <li>• I have the highest test marks</li> <li>• I don't have anything hard to do</li> <li>• I'm the only one who can answer questions</li> <li>• I don't have to try hard</li> </ul>

*English/most enjoyed subject/least enjoyed subject is a class where ...*

We have a choice between forming separate scales for each of the classes, and also for attitudes to the class and attitudes to the teacher, or forming overall scales: attitude to class across the three classes; to the teacher across the three teachers; to English class and teacher, most enjoyed class and teacher, and least enjoyed class and teacher; or even a single overall scale for attitude to all three classes and all three teachers.

For each of the three classes and the combined classes, the class and teacher scales are strongly correlated ( $0.8 < r < 0.9$ ), which means that, while they do measure slightly different aspects of the student–class interaction (at

least in theory), only one could be used in a linear model at a time (using both would mean that the model would have problems with collinearity). The strength of the correlations is indicative of the extent to which, at age 16, students' attitudes to their teacher and class are not separated. They tend to like a class in which they have an effective teacher whom they like, and to dislike a class as much on the basis of the characteristics of the teacher as the subject being taught.

The most enjoyed subject and least enjoyed subject measures are weakly correlated, which is indicative of the diversity of opinion on the students' most enjoyed and least enjoyed classes and teachers.

In the analyses, the composite class and teacher (across all three classes) measures were used, as well as the subscale measures, depending on which was more appropriate.

All the other scales are formed across all three subjects.

**Scale 6 Positive learning environment in English/most enjoyed subject/least enjoyed subject**

Age 16 (n = 420)	Age 14 (n = 446)
<b>Teacher only</b>	
<ul style="list-style-type: none"> <li>• My teacher treats me fairly</li> <li>• I can count on the teacher for help when I need it</li> <li>• The teacher really understands how I feel about things</li> <li>• I like the teacher</li> <li>• I understand my teacher's attitudes and rules</li> </ul>	<ul style="list-style-type: none"> <li>• I like the teacher</li> <li>• My teacher treats me fairly</li> <li>• The teacher really understands how I feel about things</li> <li>• I understand my teacher's attitudes and rules</li> </ul>
<b>Class only</b>	
<ul style="list-style-type: none"> <li>• My teacher is interested in my ideas</li> <li>• The teacher gives us clear expectations of what we are to do</li> <li>• My teacher gives clear instructions</li> <li>• My teacher knows about what interests us</li> <li>• My teacher keeps teaching till we understand</li> <li>• I gain knowledge that will be useful for my future</li> <li>• The teacher spends most of their time helping us to learn</li> <li>• We discuss different ways of looking at things/interpretations</li> <li>• The teacher gives useful feedback on my work that helps me see what I need to do next and how to do it</li> <li>• The teacher uses examples that are relevant to my experience</li> <li>• The teacher is happy to explain things more than once</li> <li>• I get to think about ideas and problems in new ways</li> <li>• I can make mistakes and learn from them without getting into trouble</li> <li>• I can try out new ideas/ways of doing things</li> </ul>	<ul style="list-style-type: none"> <li>• My teacher gives clear instructions</li> <li>• The teacher helps me do my best</li> <li>• I can count on the teacher for help when I need it</li> <li>• The teacher gives us clear expectations of what we are to do</li> <li>• My teacher knows about what interests us</li> <li>• My teacher is interested in my ideas</li> <li>• My teacher keeps teaching till we understand</li> <li>• The teacher gives useful feedback on my work</li> <li>• The teacher is happy to explain things more than once</li> <li>• The teacher uses examples that are relevant to my experience</li> <li>• I enjoy doing the homework I get</li> </ul>

The next table gives a summary of the statistical properties of the scales.

Details	Cronbach's alpha	Range of correlations with scale
English		
Class	0.91	0.39–0.77
Teacher	0.88	0.60–0.78
Most enjoyed subject		
Class	0.88	0.42–0.64
Teacher	0.84	0.61–0.69
Least enjoyed subject		
Class	0.90	0.33–0.76
Teacher	0.86	0.31–0.72
All subjects combined		
Class	0.89	0.21–0.54
Teacher	0.79	0.29–0.54

**Scale 7 Absorbed in learning, combined from all three subjects**

A high score corresponds to being absorbed in learning.

Age 16	Age 14
( $\alpha = 0.87$ ) Item–scale correlations between 0.27 and 0.57; n = 420	( $\alpha = 0.86$ ) n = 447
<ul style="list-style-type: none"> <li>• When I'm doing something, I think about whether I understand what I'm doing</li> <li>• I organise my time so that I get things done</li> <li>• When I finish my work, I check and make changes if needed before handing it in</li> <li>• I meet any goals that I set myself</li> <li>• I like to reflect on how I've learnt something (the method I used)</li> <li>• I enjoy doing the homework I get</li> </ul>	<ul style="list-style-type: none"> <li>• I get totally absorbed in my work</li> <li>• Things I do outside school help my learning</li> <li>• When I finish my work, I check to make sure it is correct</li> <li>• Students work out problems together</li> <li>• When I'm writing something, I think about whether I understand what I'm doing</li> <li>• I can do the hardest work if I try</li> <li>• I can get help at home if I need to</li> </ul>

### Scale 8 Disengaged in learning, combined from all three subjects

A high score on this scale corresponds with the behaviours or activities taking place in class.

Age 16	Age 14
( $\alpha = 0.80$ ) Item-scale correlations between 0.30 and 0.60; n = 420	( $\alpha = 0.85$ ) n = 447
<ul style="list-style-type: none"> <li>• I muck around</li> <li>• I can get away with not doing much work</li> <li>• I behave in a way which annoys the teacher</li> <li>• We keep doing the same things without learning anything new</li> </ul>	<ul style="list-style-type: none"> <li>• I behave in a way which annoys the teacher</li> <li>• I muck around</li> <li>• I can get away with not doing much work</li> <li>• We keep doing the same things without learning anything new</li> <li>• I don't like asking my teacher questions</li> <li>• We get too much homework</li> </ul>

### Scale 9 Disrupted learning environment, combined from all three subjects

A high score on this scale corresponds to the behaviours or activities taking place in class.

Age 16	Age 14
( $\alpha = 0.76$ ) Item-scale correlations between 0.21 and 0.50; n = 420	( $\alpha = 0.84$ ) n = 447
<ul style="list-style-type: none"> <li>• The class gets interrupted (e.g. by external events, messages)</li> <li>• Students don't listen to what the teacher says</li> <li>• The teacher spends most of the time telling us what to do</li> <li>• The teacher spends most of the time telling us how to behave</li> <li>• Other students are distracting</li> </ul>	<ul style="list-style-type: none"> <li>• Other students are distracting</li> <li>• The class gets interrupted</li> <li>• Students don't listen to what teacher says</li> </ul>

### Scale 10 Attitude to work, combined from all three subjects

A high score corresponds to a positive attitude to work.

( $\alpha = 0.81$ ) Item-scale correlations between 0.20 and 0.56
<ul style="list-style-type: none"> <li>• I don't know how to do the work (r)</li> <li>• I plan to drop the subject as soon as I can (r)</li> <li>• I do well</li> <li>• I'm confident I can master the skills being taught</li> <li>• The NCEA credits are easy to get</li> <li>• I will get a lot of NCEA credits in this class</li> </ul>

**Scale 11 Relevant learning opportunities, combined from all three subjects**

A high score corresponds to the connections being made in class.

( $\alpha = 0.73$ ) Item–scale correlations between 0.16 and 0.43

- We learn things outside the classroom, e.g. on field-trips
- I see connections with other things outside of school
- We do projects about real issues
- We have a lot of hands-on/practical activities
- We can choose the topics we want to do
- I can choose which assessments I want to do for NCEA

**Scale 12 Comparative learning environment, combined from all three subjects**

A high score corresponds to the comparisons being made in class. Although there are only two items used for this score, we effectively had up to six items, two from each of the three teachers.

Age 16	Age 14
( $\alpha = 0.77$ ) Item–scale correlations between 0.44 and 0.57; n = 419	( $\alpha = 0.79$ ) n = 447
<ul style="list-style-type: none"> <li>• The teacher tells us how we compare with other students</li> <li>• The teacher tells us who has the highest and lowest marks for their work</li> </ul>	<ul style="list-style-type: none"> <li>• The teacher tells us how we compare with other students</li> <li>• The teacher tells the whole class who has the highest and lowest marks for their work</li> </ul>

*When I'm at home ...*

**Scale 13 Family communicates well**

A high score corresponds to a family with good communication.

Age 16	Age 14
( $\alpha = 0.73$ ) Item–scale correlations between 0.32 and 0.54; n = 447	( $\alpha = 0.80$ ) n = 447
<ul style="list-style-type: none"> <li>• My Mum can tell when I'm upset about something</li> <li>• I tell my family my problems and troubles</li> <li>• My family checks that I've done my homework/what I need to do</li> <li>• My Dad can tell when I'm upset about something</li> <li>• I talk about what I'm reading</li> <li>• I can talk about my hopes and plans for the future</li> <li>• I do interesting things with my parents</li> </ul>	<ul style="list-style-type: none"> <li>• My Mum can tell when I'm upset about something</li> <li>• I tell my family my problems and troubles</li> <li>• My family checks that I've done my homework</li> <li>• My Dad can tell when I'm upset about something</li> <li>• I talk about what I'm reading</li> <li>• I can talk about my hopes and plans for the future</li> <li>• My family asks me about school</li> <li>• I do interesting things with my parents</li> </ul>

### Scale 14 Family pressure

A high score corresponds to a family where individuals feel pressure.

Age 16	Age 14
( $\alpha = 0.85$ ) Item–scale correlations between 0.41 and 0.73; $n = 447$	( $\alpha = 0.80$ ) $n = 447$
<ul style="list-style-type: none"> <li>• My Mum is always trying to change me</li> <li>• My Dad is always trying to change me</li> <li>• Home is more friendly if I just do what my parents want</li> <li>• My parents want to control whatever I do</li> <li>• My parents expect too much from me</li> <li>• My family worry too much about what I do with my friends</li> <li>• My parents have their own problems so I don't bother them with mine</li> <li>• I need more privacy</li> </ul>	<ul style="list-style-type: none"> <li>• My Mum is always trying to change me</li> <li>• My Dad is always trying to change me</li> <li>• Home is more friendly if I just do what my parents want</li> <li>• My parents want to control whatever I do</li> <li>• My parents expect too much from me</li> <li>• My family worry too much about what I do with my friends</li> <li>• My parents have their own problems so I don't bother them with mine</li> <li>• I need more privacy</li> </ul>

### Scale 15 Inclusive family

A high score corresponds to a family that is inclusive.

Age 16	Age 14
( $\alpha = 0.85$ ) Item–scale correlations between 0.50 and 0.67; $n = 447$	( $\alpha = 0.80$ ) $n = 447$
<ul style="list-style-type: none"> <li>• I get treated fairly</li> <li>• I am comfortable</li> <li>• My family respects my feelings</li> <li>• I get help if I need help</li> <li>• The expectations are fair</li> <li>• My family asks me about school/what I do</li> <li>• Everyone is too busy to bother about me (r)</li> </ul>	<ul style="list-style-type: none"> <li>• I get treated fairly</li> <li>• I am comfortable</li> <li>• My family respects my feelings</li> <li>• I get help if I need help</li> <li>• The expectations are fair</li> <li>• Everyone is too busy to bother about me (r)</li> </ul>

### Scale 16 Supportive family

A high score corresponds to a family that is supportive.

Age 16	Age 14
( $\alpha = 0.85$ ) Item–scale correlations between 0.59 and 0.68; $n = 447$	( $\alpha = 0.87$ ) $n = 447$
<ul style="list-style-type: none"> <li>• I trust my Dad</li> <li>• My Dad is warm and loving towards me</li> <li>• I trust my Mum</li> <li>• My Mum is warm and loving towards me</li> <li>• I feel close to my family</li> <li>• My family really help and support each other</li> </ul>	<ul style="list-style-type: none"> <li>• I trust my Dad</li> <li>• My Dad is warm and loving towards me</li> <li>• I trust my Mum</li> <li>• My Mum is warm and loving towards me</li> <li>• I feel close to my family</li> <li>• My family really help and support each other</li> </ul>

*In the past year I've had happen to me ...*

**Scale 17 Risky behaviour**

A high score corresponds to having shown risky behaviour.

Age 16	Age 14
( $\alpha = 0.79$ ) Item-scale correlations between 0.29 and 0.63; $n = 444$	( $\alpha = 0.80$ ) $n = 447$
<ul style="list-style-type: none"> <li>• Doing something you regretted when drunk</li> <li>• Drinking alcohol</li> <li>• Getting in trouble with the police</li> <li>• Having sex</li> <li>• Getting into a physical fight</li> <li>• Breaking up with a boyfriend/girlfriend</li> <li>• Getting in trouble at school</li> <li>• Having to lie about something someone else did</li> <li>• Getting behind with school work</li> </ul>	<ul style="list-style-type: none"> <li>• Doing something you regretted when drunk</li> <li>• Drinking alcohol</li> <li>• Getting in trouble with the police</li> <li>• Having sex</li> <li>• Getting into a physical fight</li> <li>• Breaking up with a boyfriend/girlfriend</li> <li>• Getting in trouble at school</li> <li>• Having to lie about something someone else did</li> <li>• Falling behind with school work</li> </ul>

**Scale 18 Rejection**

A high score corresponds to having been hassled or rejected.

Age 16	Age 14
( $\alpha = 0.74$ ) Item-scale correlations between 0.33 and 0.54; $n = 444$	( $\alpha = 0.75$ ); $n = 447$
<ul style="list-style-type: none"> <li>• Feeling left out</li> <li>• Being pressured to do something you did not want to</li> <li>• Being hassled about your body size/shape</li> <li>• Being bullied/hassled at school</li> <li>• Hassling/bullying someone at school</li> <li>• Being hassled about your sexuality</li> <li>• Being hassled about your culture</li> <li>• Coping with body changes</li> </ul>	<ul style="list-style-type: none"> <li>• Feeling left out</li> <li>• Not having enough freedom</li> <li>• Losing control of your temper</li> <li>• Having nothing to do/being bored</li> <li>• Being pressured to do something you did not want to</li> <li>• Not having enough money</li> <li>• Losing a friend</li> <li>• Trying to fit everything into your time</li> <li>• Being hassled about your body size/shape</li> <li>• Fighting with others at home</li> <li>• Being bullied/hassled at school</li> <li>• Coping with body changes</li> </ul>

### Scale 19 Achievement and praise

A high score corresponds to having an achievement or being praised.

Age 16	Age 14
( $\alpha = 0.68$ ) Item-scale correlations between 0.31 and 0.51; n = 444	( $\alpha = 0.71$ ); n = 447
<ul style="list-style-type: none"> <li>• Being praised for achievement</li> <li>• Getting selected for a team or event</li> <li>• Making a new friend</li> <li>• Being included in a group you really wanted to be in</li> <li>• Supporting a friend in trouble</li> <li>• Taking action about a situation that concerns you</li> <li>• Trying to fit everything into your time</li> </ul>	<ul style="list-style-type: none"> <li>• Being praised for your achievements in sport or cultural activity</li> <li>• Getting selected for a team or event</li> <li>• Being praised for achievements</li> <li>• Making a new friend</li> <li>• Being included in a group you really wanted to be in</li> <li>• Supporting a friend in trouble</li> <li>• Taking action about a situation that concerns you</li> <li>• Being praised for your achievements in a paid work situation</li> </ul>

### Scale 20 Adverse events

A high score corresponds to having had one or more adverse events in the year.

( $\alpha = 0.58$ ) Item-scale correlations between 0.24 and 0.47
<ul style="list-style-type: none"> <li>• Having sex when you didn't want to</li> <li>• Death of a friend</li> <li>• Had an accident/been injured</li> <li>• Shifting to live with a different parent or family member/changing where you live</li> <li>• Family break-up</li> <li>• Health problem</li> </ul>

*My friends are ...*

The students still at school were asked questions about their school friends, or friends at school, and the young people who had left school were asked more general questions about friendships. However, the items asked were sufficiently similar that the responses to the slightly different items could be combined into a single scale score.

**Scale 21 Friends with risky behaviour**

A high score corresponds to having friends with risky behaviour.

Age 16	Age 14
( $\alpha = 0.81$ ) Item-scale correlations between 0.48 and 0.72; $n = 447$	( $\alpha = 0.84$ ) $n = 446$
<ul style="list-style-type: none"> <li>• My friends smoke cigarettes</li> <li>• My friends think it is okay to have unsafe sex</li> <li>• When my friends and I party we like to drink alcohol</li> <li>• My friends smoke marijuana</li> <li>• My friends do other drugs</li> <li>• My friends get into trouble [at school]</li> </ul>	<ul style="list-style-type: none"> <li>• My friends smoke cigarettes</li> <li>• My friends think it is okay to have sex before you are 16</li> <li>• My friends like to party and drink alcohol</li> <li>• My friends wag school</li> <li>• My friends smoke marijuana</li> <li>• My friends get into trouble at school</li> </ul>

**Scale 22 Solid friendships**

A high score corresponds to having solid friendships.

Age 16	Age 14
( $\alpha = 0.77$ ) Item-scale correlations between 0.47 and 0.60; $n = 447$	( $\alpha = 0.79$ ) $n = 446$
<ul style="list-style-type: none"> <li>• My friends respect my feelings</li> <li>• I trust my friends</li> <li>• My [school] friends are good friends</li> <li>• I wish I had different friends [at school] (r)</li> <li>• I feel alone or apart when I am with my friends (r)</li> </ul>	<ul style="list-style-type: none"> <li>• My friends listen to what I have to say</li> <li>• My friends respect my feelings</li> <li>• I trust my friends</li> <li>• My school friends are good friends</li> <li>• My friends are people my parents like</li> <li>• I like to get my friends' point of view on things I am concerned about</li> <li>• My friends push me to do stupid things (r)</li> <li>• I wish I had different friends at school (r)</li> <li>• I feel alone or apart when I am with my friends (r)</li> </ul>

### Scale 23 Extending friendships

A high score corresponds to the existence of friendships with these attributes.

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( $\alpha = 0.74$ ) Item–scale correlations between 0.38 and 0.55

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- My friends push me to do well
  - I like to get my friends' point of view on things I am concerned about
  - My friends talk about hopes and plans for the future
  - My friends have introduced me to interesting activities that I would not have known about otherwise
  - My friends listen to what I have to say
  - My friends enjoy learning new things [at school]
  - My parents like my friends
- 

### *Student's way of doing things (at home)*

High scores on these scales correspond to the young person having the attributes.

### Scale 24 Parental view of student self-confidence

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( $\alpha = 0.79$ ) Item–scale correlations between 0.36 and 0.57

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- Enjoys new experiences or challenges
  - Is confident in his/her interactions with adults
  - Expresses his/her views and needs appropriately
  - Clearly explains things s/he has seen or done, so that you get a very good idea of what happened
  - Asks a lot of questions
  - Takes active interest in the outside world beyond him/herself
  - Asks for help or support if s/he needs it
  - Is good at negotiating with friends
  - Presents his/her point of view to an adult in an appropriate manner even when there's a disagreement
- 

### Scale 25 Parental view of student self-efficacy

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( $\alpha = 0.82$ ) Item–scale correlations between 0.40 and 0.61

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- Takes responsibility for his/her actions
  - Meets any goals s/he sets her/himself
  - Shows respect for adults
  - Is a good listener
  - Takes optimistic view of life
  - Is willing to learn from his/her mistakes
  - Learns from feedback
  - Sees others' points of view
  - Is influenced by peer pressure to do something out of character (r)
  - Acts without thinking of the consequences (r)
-

**Scale 26 Parental view of student responsibility**

( $\alpha = 0.80$ ) Item–scale correlations between 0.37 and 0.60

- Is able to remember and carry out instructions after hearing them only once
- Takes responsibility for getting organised
- Passes on messages accurately
- Finishes all his/her chores
- Follows what is being talked about in a conversation and stays on the same topic
- Asks for something to be repeated or explained again if s/he does not get it the first time
- Persists with solving a problem, even when things go wrong for a while
- Has a good concentration span when working on things that interest him/her

**Scale 27 Parent–child friction at age 14**

( $\alpha = 0.73$ )

- Home would be friendlier place if the student would do as s/he was told
- I worry that their friends have too much freedom
- There are things about the student I am really trying hard to change
- Privacy is source of friction between the student and other family members
- There is a lot of friction in our home
- I trust the student to behave appropriately when in the company of his/her friends (r)
- I generally like their friends (r)
- I see the student's friends as a positive influence on him/her (r)

Listings of other scale variables

*Teacher perception of class and student*

Responses to several of the items were used to make the attitudinal competencies, as in previous years. Other questions asked at age 16 were used to make some descriptors of the class environment. The items are in response to an overall descriptor "In this class:" and in general the three classes need to be treated separately, with the situation in the English classes being used to represent the students' most "typical" experiences.

**Scale 28 Students involved and active**

( $\alpha = 0.81, 0.80, 0.78$  for English, most enjoyed, and least enjoyed subjects, respectively) Item–scale correlations between 0.33 and 0.66

- Students do a lot of group activities and discussions
- We have a lot of fun
- Students have the opportunity to act on issues that concern them
- Students interact with people outside school as part of school work (e.g. on fieldtrips)
- Students work out problems together
- Students are encouraged to assess each other's work and give feedback
- Students are encouraged to lead group projects or class activities
- When students work in groups, they solve their own conflicts

### Scale 29 Feedback and support

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( $\alpha = 0.80, 0.78, 0.77$  for English, most enjoyed, and least enjoyed subjects, respectively) Item–scale correlations between 0.24 and 0.68

---

- I model the skills and attitudes I would like the students to develop
  - Students make mistakes and learn from them without getting into trouble
  - Most of my time in class is spent helping students learn
  - I encourage students to ask for assistance or support
  - I encourage students to discuss things with me
  - I use different approaches for different students
  - The feedback I give students shows them their weaknesses
  - The feedback I give students shows them their strengths
  - The feedback I give students shows them their next steps
- 

### Scale 30 Reflective learning

---

( $\alpha = 0.68, 0.68, 0.69$  for English, most enjoyed, and least enjoyed subjects, respectively) Item–scale correlations between 0.36 and 0.55

---

- I encourage students to think and talk about how they are learning (the methods they are using)
  - Students are given input into the context and direction of learning activities
  - Students have the opportunity to set their own learning goals
  - Students are given time to reflect on their learning
- 

### Scale 31 Students working alone

---

( $\alpha = 0.45, 0.69, 0.64$  for English, most enjoyed, and least enjoyed subjects, respectively) Item–scale correlations between 0.15 and 0.58

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- Students do a lot of practical activities (r)
  - Students do a lot of written activities by themselves
  - Students take a lot of notes
-

The next four scales are the four attitudinal competencies, and were formed from responses to items about the student and how they behaved in class.

### Scale 32 Thinking and learning

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( $\alpha = 0.96$ )

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- Carries out any leadership role s/he is given
  - Can reflect on how s/he has learnt about something (the methods used)
  - Asks questions so s/he understands
  - Enjoys new experiences or challenges
  - Learns from my feedback
  - Thinks "outside the square"; thinks of new ways to do things or solve problems
  - Asks me for advice or help when s/he needs it
  - Aware that there are different ways of interpreting knowledge
  - Takes full part in a group that is working to complete a learning task together
  - Takes on new ideas
  - Clearly explains things so that you get a very good idea of what is happening and what s/he is thinking
  - Expresses her/his views and needs appropriately
- 

### Scale 33 Focused and responsible

---

( $\alpha = 0.97$ )

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- Persists with solving a problem even when things go wrong for a while
  - Has a good concentration span when working
  - Assesses her/his work and makes improvements before completing it or handing it in
  - When there is a choice of work, chooses work that allows him/her to gain further knowledge or skills
  - Finishes all class work
  - Finishes all homework
  - Follows all class routines and rules without needing to be reminded
  - Turns up to class on time
  - Brings all the equipment s/he needs to class
  - Takes responsibility for his/her actions
  - Acts without thinking of the consequences
  - Meets any goals that s/he sets her/himself
  - Learns from mistakes/experience
  - Remembers and carries out instructions after hearing them once
  - Follows what is being talked about in a conversation and stays on the same topic
  - Good listener: e.g. lets others finish before speaking; concentrates on what they're saying
-

### Scale 34 Social skills

( $\alpha = 0.79$ )

- Good at resolving disputes or keeping things smooth with peers
- Helps/supports other students in the class
- Presents her/his point of view in an appropriate manner even when there's a disagreement
- Respects other points of view or different ways of doing things

### Scale 35 Social difficulties

( $\alpha = 0.79$ )

- Gets hassled/bullied by other students
- Hassles/bullies other students
- Influenced by peer pressure to do something out of character
- Mixes with students who are antisocial or get into trouble

The next two scales are in response to items about the student and NCEA assessment.

### Scale 36 Teacher view of student and NCEA assessment

( $\alpha = 0.92, 0.92, 0.93$  for English, most enjoyed, and least enjoyed subjects, respectively) Item–scale correlations between 0.19 and 0.85

- S/he does the bare minimum to get the credits (r)
- S/he is not interested in the work if there are no credits to be gained (r)
- S/he works hard regardless of whether a topic is assessed or not
- S/he is organised and well prepared for assessments
- S/he can cope with pressure of internal assessments
- S/he uses time well in assessment tasks
- S/he always strives for excellence
- S/he always tries to learn from my feedback on trial assessments
- S/he typically questions judgements and grades awarded
- S/he is realistic about likely achievement in assessment tasks
- S/he makes impulsive decisions to not do assessments (r)
- S/he makes strategic decisions to not do assessments (r)
- S/he is able to cope with pressure of external assessments

The three NCEA measures from the three teachers were moderately correlated (0.50 between most and least enjoyed subject teachers and 0.56 between the least enjoyed subject and English teachers, and 0.51 between most enjoyed subject teachers and English teachers). The pattern of moderate levels of agreement between teachers was noticeable for the other scales, too. The most strongly correlated were the *focused and responsible* subscales (correlations between 0.53 and 0.56), followed by *thinking and learning* (between 0.39 and 0.45), *NCEA assessment*, then *social difficulties* (between 0.29 and 0.42), and *social skills* (between 0.29 and 0.33).

*Dean (or equivalent) description of hindrances and support for students in the participant's year*

These two variables apply at the school and year level, not at the individual level, as they are measures of the environment in which the participants at the same year level at each school found themselves in during the relevant year of data collection.

Possible hindrances were measured as the mean of the Likert-scale student and teacher hindrance items, scaled to a 1–10 scale.

**Scale 37 Hindrances to learning, student causes**

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( $\alpha = 0.72$ ) Item–scale correlations between 0.24 and 0.55

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- Student absenteeism
  - Students disrupting classes
  - Students skipping class
  - Student transience
  - Students lacking respect for teachers
  - Students' use of alcohol/illegal drugs
  - Students intimidating/bullying others
- 

**Scale 38 Hindrances to learning, teacher causes**

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( $\alpha = 0.83$ ) Item–scale correlations between 0.45 and 0.63

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- Teacher absenteeism
  - Teacher turnover
  - Teachers being too strict
  - Poor student–teacher relationships
  - Range of subjects available
  - Teachers not meeting individual student needs
  - Teachers having low expectations of students
  - Students not being encouraged to achieve full potential
-

## Cluster variables

These variables were constructed from a range of multiple response questions (and occasionally other variables, sometimes dichotomised or converted into a series of binary variables):

- Leisure interests listed by parents when the students were 14
- Leisure interests mentioned by students at age 14
- Family income, and the proportion of income spent on housing, the family's ability to pay bills each month, and how much money is left after paying the bills each month at age 14
- The things that are most important to the student, both now (at 16) and when they are an adult
- Student subject choices (for those still at school)

## Method

Most of our clusters were formed using binary data, as this seemed the best way to make use of the information coded this way. Where nonbinary variables were used in the same cluster analysis along with binary variables, the nonbinary variables were usually dichotomised or else turned into a number of binary variables (one for each point on the scale), because the distance measure we used was appropriate for binary variables.

We used SAS/STAT® (SAS Institute Inc, 2002-2003) to do the analysis. We calculated the distance matrix using the distance macro, provided by SAS to calculate the distance matrix. If the responses were binary, we calculated Jaccard distances. The Jaccard similarity for two students would be the ratio of the number of times they both had the value of 1 to the number of times where either one or both had the value 1. The Jaccard distance is one minus the similarity. If the responses were not binary (for example, the parental interests), we calculated squared Euclidean distances.

We tried a variety of clustering methods and found that the Lance-Williams flexible-beta method of clustering (Lance & Williams, 1966) and the Ward method gave reasonably even-sized clusters. We checked the number of clusters to retain and the effectiveness of the clustering in defining groups with differing characteristics by comparing cluster means for the competencies and sometimes some of the scale variables. We found that often the cluster means for the former method were more extreme than those for the Ward method. We used the method that gave the greatest separation between clusters on a case-by-case basis.

Descriptions of the cluster groups were based on a comparison of item frequencies across the clusters. The description of a group was formed from the items for which the group had higher frequencies than any of the other groups (the item was overrepresented in that group).

## Listings of the cluster variables

The clusters described here are those that proved to define groups with clear mean differences in competency scores and/or scale scores.

Cluster membership cannot be entirely clear, nor unambiguous. However, it seems that the clusters have allowed us to define subgroups within the sample who respond differently on a variety of measurements.

### *Student values at age 16*

The students were asked to indicate the three things that are most important to them at age 16, and the thing(s) that they think will be most important to them as adults. A cluster analysis yielded three clusters:

- Having a satisfying life (wanting to be helpful or kind, have a good sense of humour, enjoy the things they do, have a happy family life, have an interesting job, being creative)

- Standing out (wanting to look good/cool, have money and friends, have an important job, and do well at sport)
- Aspirational (wanting to be with family/whānau/fanau, do well at school and sport, get a good education, have an important job, influence other people, and have good health)

**Scale 39 Student values at age 16**

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- Current values:
    - wearing the right clothes/looking cool
    - being good looking
    - having money to spend
    - being helpful or kind
    - having the latest things
    - being with family/whānau/fanau
    - having a good sense of humour
    - doing well at school
    - doing well at sport
    - doing well at an interest outside school
    - going to church
    - having lots of friends
    - enjoying the things I do
  - Future adult values:
    - good looks
    - happy family life
    - lots of money
    - lots of friends
    - an interesting job
    - a good education
    - an important job
    - influencing other people
    - being creative/making something new
    - taking part in church/spiritual activities
    - good health
-

### *Student values at age 14*

The students were asked to indicate the three things that are most important to them at age 14, and the thing(s) that they think will be most important to them as adults. A cluster analysis yielded three clusters:

- Anchored/achieving
- Anchored
- Standing out

#### **Scale 40 Student values at age 14**

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- Current values:
    - wearing the right clothes/looking cool
    - being good looking
    - having money to spend
    - being helpful or kind
    - having the latest things
    - being with family/whānau/fanau
    - having a good sense of humour
    - doing well at school
    - doing well at sport
    - doing well at an interest outside school
    - going to church
    - having lots of friends
    - enjoying the things I do
  - Future adult values:
    - good looks
    - happy family life
    - lots of money
    - lots of friends
    - an interesting job
    - a good education
    - an important job
    - influencing other people
    - being creative/making something new
    - taking part in church/spiritual activities
    - good health
-

### *Motivation at age 14*

In these reports, "motivation" refers to the perceived value of education, and long-term ambition of the student and for the student by their parent. This is clear from the items used to construct the clusters. The clusters formed at age 14 were used again at age 16, as they were useful indicators of the value placed on education early in secondary education.

The three clusters used were named:

- University/professional orientation; high faith in gains from school
- Less positive of gains from school and less sure of future goals
- Aiming for skilled/unskilled jobs; low conviction about gains from school

The items listed below were all either binary responses or responses on a Likert-type scale that were converted to binary variables.

#### **Scale 41 Motivation**

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- Some of the things the students enjoy about the school are:
  - good teachers
  - independence/treated as an individual/adult
  - facilities
  - extracurricular activities
- The student thinks that they will have a career that is:
  - professional
  - skilled
  - unskilled/unknown
- As an adult the student thinks that the most important things will be:
  - happy family life
  - lots of money
  - lots of friends
  - an interesting job
  - a good education
  - an important job
  - doing well at sports
  - influencing other people
  - being creative/making something new
  - taking part in church/spiritual activities
  - good health
- The student thinks that when they leave school they:
  - will study further
  - will travel
  - will get a job
  - have no idea what they will do

- The parent's hopes for the student's future education are:
    - as far as they want to/are able to go
    - university
    - other tertiary
    - end of secondary
  - The parent thinks that the student will have a career that is:
    - professional
    - skilled
    - unskilled/unknown as yet
  - The student aims to leave school:
    - at the end of Year 12
    - at the end of Year 13
    - unsure
  - The parent perceives that an expectation that the student would do well at school is:
    - like us [their family]
    - not like us
  - The student gains knowledge useful for their future in English/mathematics/science (entered as separate variables):
    - agree
    - neutral/ disagree
- 

### *Student interests*

The students were asked to rate how often they were involved in various leisure activities on a scale of often/most days, once or twice a week, less than once a week, and never. A comparison between the age-14 and age-16 clusters indicated that the age-14 clusters showed greater association with the age-16 competencies, so we have used these clusters at age 16, too. The four clusters were:

- Sports player
- Computer games player/no strong interests
- Reading, arts, and sport
- Creative interests

## Scale 42 Student interests

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- watch television
  - read
  - use a computer
  - play computer/video games etc.
  - hang out with friends
  - do homework
  - play sport for fun
  - go to art/music/dance classes
  - do exercise/physical training
  - play competitive sport
  - make things—a hobby or craft
  - practise singing or playing a musical instrument
  - cultural activities, e.g. kapa haka
- 

### *Student subject choices*

Separate cluster analyses were run on student subject choices for the Year 11 and Year 12 students. In both instances, four similar clusters were found to be most appropriate.

## Scale 43 Subject clusters

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- Traditional academic: arts orientation. These students were more likely to take achievement standards (AS) in maths, visual art, music, economics, accountancy, graphics, one or more languages, geography, history, design or fabric technology, the English unit standards (US) that require reading a range of texts, and at Level 2 more creative options among the English AS, photography
  - Traditional academic: science orientation. These students were more likely to take AS in maths (including standards in geometry), physical education, economics, science subjects (science in Year 11, and biology, chemistry, physics, etc. in Year 12), geography
  - Contextually-focused options. These students were more likely to take food technology, outdoor/sport options, physical education, visual art, fabric or other soft technology options, geography, computer-oriented options, text information management, a mix of US and AS in maths, life skills, hospitality, or tourism
  - Vocational orientation. These students were more likely to take food technology, physical education, dance and/or drama, music, one or more of the hard technology options, text information management, life skills US, hospitality or tourism, US in maths and English, science (US at Level 2), business studies, other technology options
-

## History variables

In the last several rounds of analysis<sup>1</sup> we have developed history variables, based on responses to similar questions asked at ages 5 to 14. Some of these history variables cover only a subset of the years. For this report we re-used the age-14 history variables, as the changes (or stability) reflected in these variables is unlikely to be modified much by the addition of an extra round of data and the variables are not affected by nonresponse (particularly of parents, or of those no longer at school on questions about school).

### Method

Developing history variables was a very empirical process. We concatenated the numerical codes for the responses at each data collection round to form a string of digits as long as the number of data rounds, and then grouped the resultant strings into categories. Usually there were categories of all/almost all "good", and all/almost all "bad" (the two extreme categories), one or two clearly categorised mixtures (mainly all good/bad), and a "mixture" category (often difficult to categorise any other way).

The divisions between the categories were checked and finetuned by looking at boxplots and category means for the competencies and scale variables (described above).

### Listings of the history variables

#### Scale 44 History of watching age-8–14 categories

---

- Mainly low (up to 2 hours a day in at least three of the rounds)
  - Mixed (everything else)
  - Mainly high (over 2 hours a day in at least three of the rounds)
- 

#### Scale 45 History of school decile age-8–14 categories

---

- Mainly low-decile (decile 1 or 2 school in at least three of the rounds)
  - Mainly mid-decile (decile 3–8 school in at least three of the rounds)
  - Mixed (everything else)
  - Mainly high-decile (decile 9 or 10 school in at least 3 of the rounds)
- 

#### Scale 46 History of family income age-8–14 categories

---

- Mainly low (under \$30K in at least three of the rounds)
  - Mostly moderate (\$30–100K in at least three of the rounds)
  - Mixed (everything else)
  - High at least once (over \$100K in at least one of the rounds)
- 

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<sup>1</sup> See, for example, Wylie, Thompson et al. (2004).

**Scale 47 History of involvement in bullying age-10–14 categories**

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- Never involved in bullying
  - Has been involved once (as either bully or victim)
  - Has been involved at least twice (as either bully or victim)
- 

**Scale 48 History of enjoyment of reading age-8–14 categories**

This variable is based on parental reports of the students' enjoyment of reading at ages 8 and 10, and the students' reports at ages 12 and 14.

---

- Always enjoyed reading
  - Everything else—mainly said yes or qualified yes
  - Said they did not enjoy reading at least twice
- 

**Scale 49 History of feelings about school age-6 or 8–12 categories**

For this history variable, where we had age 6 data, we used it, and for the other students we used age-8–12 data.

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- Always enthusiastic
  - Fairly enthusiastic (in two or three of the rounds)
  - Mixed (everything else)
  - Unhappy at least once
- 

**Scale 50 History of parents and teachers working on concerns age-8–14 categories**

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- Never done so
  - Reported a single occurrence
  - Reported doing so twice in the four rounds
  - Reported doing so in three of the four rounds
  - Reported doing so in each of the rounds
-

## Other derived variables

In this section we report on other derived variables that do not fit into any other category. These are attendance, current bullying, and adverse events.

### Method

Different methods were used for each of these variables, and the methodology is described for each of the described variables below.

#### *Family financial situation*

Ordinal-scaled variables used to form three clusters:

- Comfortable family financial situation
- Moderate family financial situation
- Difficult family financial situation

#### **Scale 51 Family financial situation**

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- Family income (if known)
  - The approximate proportion of income that was spent on housing
  - The ability to pay all the family's bills each month (4-point scale from no difficulty to a great deal of difficulty)
  - The amount of money left each month after paying bills (5-point scale from plenty to in debt).
- 

#### *Attendance*

In the previous round of data collection we asked for attendance records from the schools, which presented considerable challenges as the schools (or the software systems they used) reported different data. Some counted presences, some absences, some provided information on the maximum number of days (or half days), and others did not. At age 16 we asked the schools to rate the students' attendance on a 5-point scale (from excellent to multiple absences, seldom attends) with two other possible values to cover many absences due to illness, and other absences (the most common reason offered for these was to do with sport).

In the analyses we used two versions of this variable: the full 7-point scale described above, and a dichotomised version where the only distinction was between those with poor attendance, and the others (no matter how well they attended, or what the reason for being absent). Typically, if attendance was associated with another variable, one of the two versions showed a stronger association, and that version was used in that particular analysis.

#### *Other teacher-based variables*

The next two variables are derived from the mean across the three teachers of a single item. Overall ability was measured on a 5-point scale, rating the achievement of the student against that of their peers (and predictably, the students typically received a lower rating from the teacher of their least enjoyed subject than from their English teacher, and the discrepancy with the rating from their most enjoyed subject's teacher was more marked). Highest level of post-school qualification was measured on a 5-point scale, and as with ability, the teachers of the least enjoyed subjects tended to be less optimistic than those of the most enjoyed subjects.

**Scale 52 Overall ability/achievement**

Mean of up to three teacher evaluations on a 5-point scale (from minimal/very low to very good/excellent). The ratings of the three teachers were only moderately correlated (0.53 between the English teacher and least enjoyed subject, 0.44 between the English teacher and the most enjoyed subject, and 0.41 between the teachers of the most and least enjoyed subjects).

**Scale 53 Post-school qualifications**

Mean of up to three teacher evaluations on a 5-point scale with levels: none, trades qualification, tertiary diploma, undergraduate university degree, postgraduate university degree.

## NCEA variables

Apart from the teacher judgement of the approach and attitude of the student to their work for the NCEA (0), we used the students' responses to questions about whether they skipped any NCEA credits, and if so why, to create some binary variables.

**Scale 54 Missed internal credits**

**Scale 55 Missed external credits**

**Scale 56 Missed two or more credits**

From the students' NCEA results we determined several totals of different categories of credits, and also some percentages:

- The total number of Level 1 and Level 2 credits achieved
- The total number of credits in achievement and unit standards achieved
- The percentage of credits achieved that were achievement and unit standards The number of credits for unit standards achieved, achievement standards achieved (A), achievement standards that were merit (M) or excellence (E) or not achieved (N)
- The number of credits from achievement standards attempted
- The number of credits for achievement standards attempted plus number of credits for unit standards—the number of unit standards attempted and not achieved is not known
- The percentage of credits for achievement standards that were achieved at the levels achieved, merit, or excellence calculated as a percentage of all credits known to have been attempted, and as a percentage of all credits for achievement standards attempted