

# Multiple-Baseline, Multiple-Probe Data Acquisition - Space to Grow

Table 1: Multiple-Baseline, Multiple-Probe Data Collection and Intervention Timeline 2009-2011

2009			2010			2011		
PRE Intervention		POST Intervention	PRE Intervention		POST Intervention	PRE Intervention		POST Intervention
Baseline Data Collection	Intervention Groups	Data Collection	Data Collection	Intervention Groups	Data Collection	Data Collection	Intervention Groups	Data Collection
<u>A<sub>10</sub></u> A <sub>11</sub> A <sub>12</sub>	<u>A<sub>10</sub></u>	<u>A<sub>10</sub></u> A <sub>12</sub>	<u>A<sub>10</sub></u> <u>A<sub>11</sub></u>	<u>A<sub>10</sub></u> <u>A<sub>11</sub></u>	<u>A<sub>10</sub></u> <u>A<sub>11</sub></u> A <sub>12</sub>	<u>A<sub>10</sub></u> <u>A<sub>11</sub></u> <u>A<sub>12</sub></u>	<u>A<sub>10</sub></u> <u>A<sub>11</sub></u> <u>A<sub>12</sub></u>	<u>A<sub>10</sub></u> <u>A<sub>11</sub></u> <u>A<sub>12</sub></u>
B <sub>10</sub> B <sub>11</sub> B <sub>12</sub>		B <sub>10</sub> B <sub>12</sub>	<u>B<sub>10</sub></u> B <sub>11</sub>	<u>B<sub>10</sub></u>	<u>B<sub>10</sub></u> B <sub>11</sub> B <sub>12</sub>	<u>B<sub>10</sub></u> <u>B<sub>11</sub></u> B <sub>12</sub>	<u>B<sub>10</sub></u> <u>B<sub>11</sub></u>	<u>B<sub>10</sub></u> <u>B<sub>11</sub></u> B <sub>12</sub>
C <sub>10</sub> C <sub>11</sub> C <sub>12</sub>			C <sub>10</sub>		C <sub>10</sub>	<u>C<sub>10</sub></u> C <sub>11</sub>	<u>C<sub>10</sub></u>	<u>C<sub>10</sub></u> C <sub>11</sub> C <sub>12</sub>

## KEY:

### Treatment/Control Groups:

A = the set of one third of schools who begin the intervention in 2009.

B = the set of one third of schools who begin the intervention in 2010.

C = the set of one third of schools who begin the intervention in 2011.

### Year Groups within Treatment/Control Groups

A<sub>10</sub> = The Year 10 students and their teachers in the Set of Schools designated A.  
A<sub>11</sub> = The Year 11 students and their teachers in the Set of Schools designated A who were previously in Year 10 and who have chosen to study Physics.  
A<sub>12</sub> = The Year 12 students and their teachers in the Set of Schools designated A who were previously in Year 11 studying Physics.

C<sub>10</sub> = The Year 10 students and their teachers in the Set of Schools designated C.  
C<sub>11</sub> = The Year 11 students and their teachers in the Set of Schools designated C who were previously in Year 10 and who have chosen to study Physics.  
C<sub>12</sub> = The Year 12 students and their teachers in the Set of Schools designated C who were previously in Year 11 studying Physics.

B<sub>10</sub> = The Year 10 students and their teachers in the Set of Schools designated B.  
B<sub>11</sub> = The Year 11 students and their teachers in the Set of Schools designated B who were previously in Year 10 and who have chosen to study Physics.  
B<sub>12</sub> = The Year 12 students and their teachers in the Set of Schools designated B who were previously in Year 11 studying Physics.

### Colour Coding

A<sub>10</sub> Colour (red, green, lilac, turquoise, yellow and teal) indicates a Cohort. This form indicates the data collection occasion for the cohort who have not yet been exposed to the Intervention for that year.

A<sub>10</sub> This form indicates the Cohort who are experiencing the Intervention or the data collection occasion after experiencing the Intervention. For example, A<sub>10</sub> in 2009 becomes A<sub>11</sub> in 2010 and A<sub>12</sub> in 2011 who experience the Interventions.

B<sub>10</sub> Grey (12.5%, 20%, 25% and 50%) scale indicates a cohort who have not experienced an intervention.

A<sub>10</sub> An Underline indicates those groups who have experienced or are experiencing an Intervention.

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## Data Collection

1. At the data collection points, the selected cohorts indicated in Table 1 will complete the Astronomy Diagnostic Test (ADT) and Secondary School Science Questionnaire (SSSQ). Teachers will complete the Teacher version of the SSSQ.
2. The Post-Intervention SSSQ student and teacher version will contain additional evaluative questions related to the Intervention.
3. The ADT and SSSQ (students and teacher) instruments will be completed Online. On the first Occasion, students and teachers will read the Ethics Clearance and give their permission for the data to be used for research purposes. No identifying information (personal, school or sector based) will ever be revealed in publications.
4. Samples of students and teachers will be interviewed during the Intervention each year.
5. A sample of science classrooms will be observed during the intervention period.
6. Schools/stakeholders will be asked to supply the following data across the three years of the study:
  - a. School Certificate and Higher School Certificate science performance data;
  - b. Enrolment contextual data appropriate to the study.
  - c. Work samples in science subjects in Year 11 and 12; and,
7. Other (data from telescope observations and students' reports).
8. Teacher programs + additional materials or resources they generate.
9. Monitoring of website activity and interchanges amongst participating schools.
10. Each year we will need to be notified of changes to science teaching staff (through the completion of the Teacher version of the SSSQ).

## Unpacking the Table

### 2009

In 2009, on the pre-Intervention occasion, we collect baseline data on all students. That is to say, we wish to conduct a *census* of all students in Years 10, 11 and 12.

On the post-Intervention occasion, we wish to survey all Year 12 students before they exit the school. It may only be necessary to survey them once if they have already completed the Astrophysics Option of the Year 12 Physics syllabus or they do not intend to study it for the HSC examination.

All Year 11 students who have elected to study Physics should be surveyed as soon as possible. We also ask that teachers of those classes/students identify whether or not they have already studied “The Cosmic Engine” in the Preliminary Physics Course.

All Year 10 students should be surveyed as soon as possible. Again, we also ask teachers to identify if they have already studied the Astronomy component of the Stage 5 Science Syllabus. If the B-group schools (designated B<sub>10</sub>) *have* studied it then there will be no need to survey these students on the post-Intervention occasion.

The A-group schools (designated A<sub>10</sub>), we presume, will not have studied the Astronomy component of the Stage 5 Science Syllabus. Here, the intervention will be implemented with these classes. After the implementation is completed, these students and their teachers will again be surveyed.

## 2010

In the second year of operation, the **A<sub>10</sub>** classes of 2009 will become the **A<sub>11</sub>** classes who have elected to study Physics. These classes, and their Physics teachers, will be surveyed prior to the Intervention embedded within the Cosmic Engine being implemented. After the Intervention is completed, both the students and their teachers will be surveyed again. The classes in the B-Group schools will be surveyed both before and after their study of the Cosmic Engine using the “standard method”.

Also in the second year, we wish to survey all the Year 10 students before they experience any Astronomy. Both the A- and the B-group students in year 10 will experience the Intervention. After the intervention, we wish to again survey all of the year 10 students after they experience either the Astronomy intervention or the “standard method” (the C-group schools).

We also wish to survey all students in year 12 who have elected to study Physics at the end of their school year and before they exit the school.

## 2011

In the third year of operation, the **A<sub>11</sub>** classes of 2009 will become the **A<sub>12</sub>** classes who have elected to study Physics. These classes and their Physics teachers will be surveyed prior to the Intervention embedded within the Astrophysics Option being implemented. After the Intervention is completed, both the students and their teachers will be surveyed again.

The classes in the B-Group schools will also be surveyed both before and after they study the Year 12 Physics course. They will be asked to identify whether or not they have studied the Astrophysics Option of the Year 12 Syllabus using the “standard method”.

The Year 12 students in the C-Group schools will only be surveyed at the conclusion of their school year and asked to identify whether or not they have studied the Astrophysics Option of the Year 12 Syllabus.

Both the **A<sub>10</sub>** and **B<sub>10</sub>** classes of 2010 will become the **A<sub>11</sub>** and **B<sub>11</sub>** classes who have elected to study Physics in 2011. These classes and their Physics teachers will be surveyed prior to the intervention embedded within the Cosmic Engine being implemented. After the intervention is completed, both the students and their teachers will be surveyed again. The Year 11 classes in the C-Group schools (designated **C<sub>11</sub>**) will also be surveyed both before and after they study the Cosmic Engine using the “standard method”.

All students and their teachers in Year 10 will be surveyed both before and after they experience the Intervention. That is to say, all Year 10 classes designated as **A<sub>10</sub>**, **B<sub>10</sub>** and **C<sub>10</sub>** will experience the Intervention in 2011.