

# Using Students' Perceptions to Modify Activities

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Teachers of Mathematics are encouraged to use a variety of methods and activities in their classroom practice but situational constraints lead to their preference for routines that are conservative and involve little risk. Regardless, some teachers do try new ideas with their students and improving the efficacy of these attempts may encourage further activity exploration. This paper presents a survey and graphing template that was developed by the first author while employed in Brunei Darussalam. They help teachers obtain indications of students' perceptions following any activity. Five characteristics are considered: Understanding Content, Communication, Relevance, Work Output, and Enjoyment. Practicality is central to success. Students require about ten minutes to complete the survey in the first instance and responses from 25 students take about twelve minutes to process.

When teachers attempt to improve student outcomes through the use of different activities they meet challenges that profoundly influence their enthusiasm for similar efforts. A natural question for a teacher to ask following the trial of any activity is *How effective was it?* This presentation describes a survey developed in Brunei Darussalam that has been found useful in helping teachers look at activities from the perspective of their students. Obtaining early indications of the strengths and weaknesses of an activity increases the likelihood of a few changes having a significant effect when repeating the activity with another class, or when attempting further activities with the same class.

## Calls for Change

Teachers over the world face numerous and regular calls for reform (Fullan, 1993). Unfortunately, enacting reforms and changes is clearly a difficult matter and traditional practices show a tenacious resilience to change (Deal, 1990). These calls in Brunei Darussalam are manifest in several forms. Teachers are required to attend inservice training days and in 1999 all mathematics teachers in the country were obliged to attend a national conference aimed at sharing teaching ideas. The Department of Science and Mathematics Education, Universiti Brunei Darussalam, hosts an annual international conference at which selected teachers are directed to be present. A summary report following a school inspection in 1996 contained comments that strongly emphasised the need for a broader range of imaginative and challenging teaching and learning strategies in mathematics (H. Guan, personal communication, February 1, 1997). Teachers occupy the well recognised central role if educational changes are to be effected (Fullan & Hargreaves, 1992). Efforts and good intentions of organising committees will be futile and the inspector's report remain empty grandiloquence unless teachers try new approaches in a spirit of willingness.

## *Situational Constraints*

Any attempt at educational change must include consideration of the situational constraints under which teachers and students operate (Fullan & Hargreaves, 1992). There is great security for teachers who emulate existing practices that are both accepted and expected by stakeholders in an educational system. Praxis changes do not come with guarantees of improved cognitive or affective student outcomes so teachers who engage their students in new activities require significant intrinsic motivation.

Teachers in Brunei face conflicting forces that both promote and discourage their attempts at new activities. Teachers are commonly allocated several classes at the same level and the punctuation of the year by common tests and examinations has these classes undertaking content concurrently. This provides an incentive for teachers to attempt new activities as the same preparation can be utilised for these classes within a short time period.

Individual teachers' attempts to introduce changes to teaching and learning in Brunei schools are required to dovetail into existing assessment schedules. Results from common tests are subject to close public scrutiny and tension for both students and teachers is greatly increased in years of external examinations. These constraints encourage teachers to conform to methods of teaching expected by students and administrators, as well as inciting any praxis exploration to be small in scale. As teachers retrench in their use of various teaching and learning techniques they are in danger of stagnating in their praxis, which in turn may influence their self-perception (Hargreaves, 1988). Attempts to counter this tendency must be a positive enterprise.

Obtaining appropriate and timely information that indicates merits and weaknesses of activities between successive implementations may assist teachers to improve the efficacy of those activities. Such personal adaptations would develop ownership of the activities, a factor considered crucial for teachers' adoption of change as well as being a means of increasing teacher satisfaction (Goldenburg & Gallimore, 1991). Teachers' enthusiasm towards exploring new ideas may then be enhanced and the incremental improvements accumulate to form significant changes.

Brunei has an expanding population and teachers from foreign countries are employed to fill vacancies. Capable local teachers are required to fill necessary school administrative positions, which increases the influence in classrooms of foreign teachers whose first language and culture differ from those of their students. Modes and perceptions of communication are culturally influenced (Levy, Wubbels, Brekelmans, & Morganfield, 1994) and cultural sensitivity is vital in any educational setting. Fisher and Fraser (1983) indicate that students' preference for an activity may be as important as the activity itself in determining students' attitudes, and hence influences their achievements. The success of an activity may be negatively influenced if the participants believe it transgresses their beliefs (Deal, 1990). Determining students' reactions to a new activity is important, but can be a difficult task, especially for foreign teachers.

### *Students' and Teachers' Perceptions*

On occasions when teachers attempt new activities they rely on their own impressions if considering changes (Hargreaves, 1992). These are convenient and will always be strongly influential. However, differences between the perceptions of even experienced teachers and their students for the same situation are quite common (Wubbels, 1993). If students' perceptions are as influential as the literature suggests, an effort should be made to obtain timely data to assist in adaptations of activities that take into account students' perceptions.

Perception Instruments. The use of surveys to obtain perception information is established in educational research (Fraser, 1982). Surveys readily provide data for processing outside class contact time, permitting teachers to concentrate on teaching during time with students rather than gathering data. Problematic linguistic differences between students and teachers can be reduced through the provision of translations, and anonymity, which promotes the collection of valid data, is easily achieved.

Practicality. George Bernard Shaw has written that “Reformers have the idea that change can be achieved through brute sanity” (Fullan, 1991, p. 97). More than a good idea backed by theory and research is required. Practicality is vital if teachers are to engage any extra process willingly. Opinions of practising classroom teachers were sought throughout the development of the survey and graphing template of this paper.

## Method

The *Students’ Perceptions of an Activity Instrument and Display* (SPAID) consists of a survey supported by a graphing template that uses Excel. The survey asks students to compare their reactions to an activity with what they consider to be usual for that class. It takes about ten minutes of class time for students to complete it on the first occasion, decreasing with iteration for subsequent activities. This period of time has proved useful at the end of lessons for settling a class and tidying up equipment.

Five Characteristics. Teachers have their own ideas of what is important and it is impossible to please all. Mathematics and Science teachers experienced at teaching in Brunei were canvassed for areas of students’ opinions that would be of interest to them following engaging a class in an activity. Suggestions from five teachers were received, being a mixture of local and foreign, male and female, and different racial backgrounds. Comments were compared with the external examination syllabi (University of Cambridge Local Examination Syndicate, 1999) and recent research into the concerns of teachers in Brunei (Wong, Nannestad, Palanisamy, & Lourdusamy, 1999). Five characteristics were identified and these are listed in Table 1 with a brief description of each.

Table 1

*The Five Characteristics Measured by the Survey with Brief Descriptions*

Characteristic	Brief description
Understanding Content	How well students consider they understood the content of the activity
Communication	How well students consider they understood the instructions for the activity
Relevancy	How relevant students considered the activity
Work Output	How hard students think they worked
Enjoyment	How enjoyable students found the activity

Scales from a range of existing educational environment instruments were considered for appositeness to the five characteristics and for use with Brunei students. All were found wanting. Individual items of SPAID were then formed based upon teachers’ comments. Each characteristic has three items, giving a total of 15 for the survey. This small number of items abates the time required for students to complete the survey and for teachers to process responses, but considerably diminishes the value of statistical analysis in establishing validity. The validity of the survey is obtained through considering its viability in assisting teachers to effect changes cognisant of students’ perceptions.

Responses. Students respond to items, such as *I enjoyed doing this work* (Item 5) by selecting one of four Likert-type responses; *A lot more true than usual* which scores 4, *A little*

*more true than usual* scores 3, *A little less true than usual* scores 2, and *A lot less true than usual* scores 1. There are two negatively-worded items (Items 12 and 15) and these are scored in reverse order. An open-ended response at the end of the survey provides students with the opportunity to add comments. The anonymity of the survey has paved the way for comments that would not have been expected from Brunei students given their traditional acquiescence to authority. Linguistic challenges for foreign teachers have been noted when students respond to the open-ended item in their local language. However, obtaining translations through local colleagues does open opportunities for collaboration.

Three Versions. Two student versions of the survey were produced to reduce linguistic difficulties between foreign classroom teachers and their students in Brunei. The first is in a local language and the second version is in English (Appendix), the official language of mathematics instruction in Brunei secondary schools. Both versions are A4 in size and printing these on opposite sides of the same sheet of paper gives students a choice in response. Teachers are encouraged to use the Teacher Version to record their predictions prior to processing students' responses.

Computer Graphing. Manual computations are possible but there is a limit to the effort of even enthusiastic teachers. The Excel graphing template that accompanies the survey requires about twelve minutes to enter results from a class of 25 students and produces five pages of printouts. Responses from the students and the teacher are entered in the first page of the template and generate the graphs on the other pages. Page 2 gives two line graphs showing the average responses for each of the five categories; one graph compares students' responses with those of the teacher and the other contrasts male students' responses with female. The third page provides bar graphs of collated totals for each of the five categories. Page 4 provides the frequencies of responses for each of the 15 individual items and Page 5 breaks these responses into male/female.

## Results

Teachers who have used the survey and computer displays have been positive about the information they received. Different information is useful for different situations and will always be balanced against the teacher's existing knowledge and professional expertise.

### *Example*

Below is an example of how information from the survey helped improve the impact of one activity with two classes. These findings are neither startling nor dramatic. Such attempts to improve the efficacy of small individual events are grounded in what Goldenburg and Gallimore (1991, p. 69) describe as "the mundane but very real detail of teachers' daily work lives", considered to be a component of successful professional teacher development.

The students came from two lower ability Form 4 classes of sizes 19 and 21 within a boys-only school in Brunei Darussalam. The students and teacher completed the survey following a mathematics activity outdoors and Figure 1 gives the summary of responses for the first class. Students' average responses suggest that they considered the activity favourably compared with their perception of normal mathematics classes. Significant difference between the students' perceptions of the activity and the teacher's estimation of their perceptions is immediately apparent in the two categories of Understanding Content and Enjoyment. When combined with the close estimation of Communication, this implied to the

teacher that students understood what they were to do but had trouble going about it. The gap between Enjoyment responses for students and the teacher prompted closer observation of students' enjoyment in future.

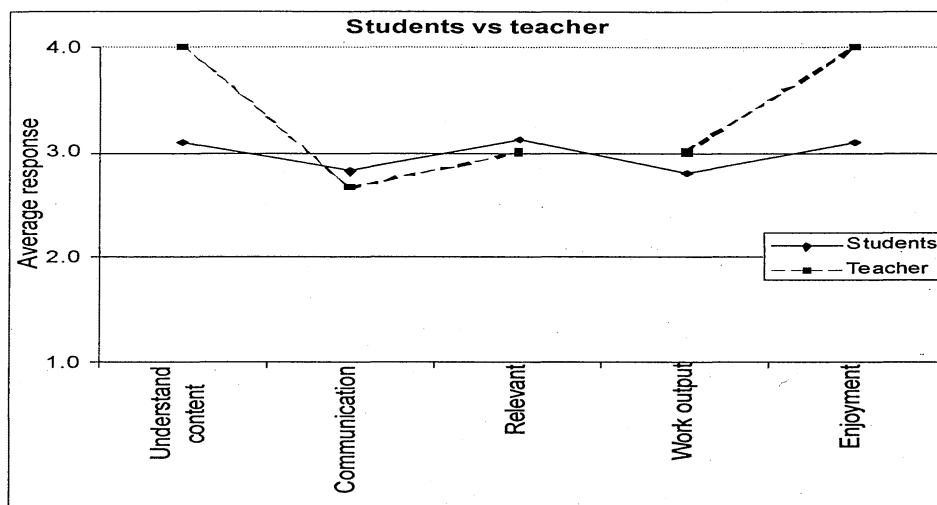


Figure 1. Summary of responses of the first class and teacher for the five categories.

The second class to engage in the activity was less academically able than the first and the teacher considered the students less likely to connect the relevance of the activity with the mathematics. Responses from the first class prompted more emphasis with the second class on showing how to go about the activity, breaking the steps into even smaller stages and demonstrating each in turn. These were simple to effect but would not have been considered without cognisance of students' perceptions.

Figure 2 shows the summary of responses for the second class. The average Understanding Content result of the second class was higher than the teacher estimated, suggesting that the students may have benefited from the changes made. The teacher still overestimated students' enjoyment of the activity but the biggest surprise was the underestimation of the relevance that students placed on the activity. This response provided further incentive to try other new activities with the class.

### *Possible Uses*

Obtaining indications of students' perceptions following engagement in activities through a simple, quick and easy-to-use instrument may encourage teachers to temper their adaptations of those activities cognisant of students' perceptions. Information from SPAID can contribute to the cross-sectional development of a single activity with several classes within a short period of time, or can be used longitudinally to guide the development of several activities with a single class over a longer period.

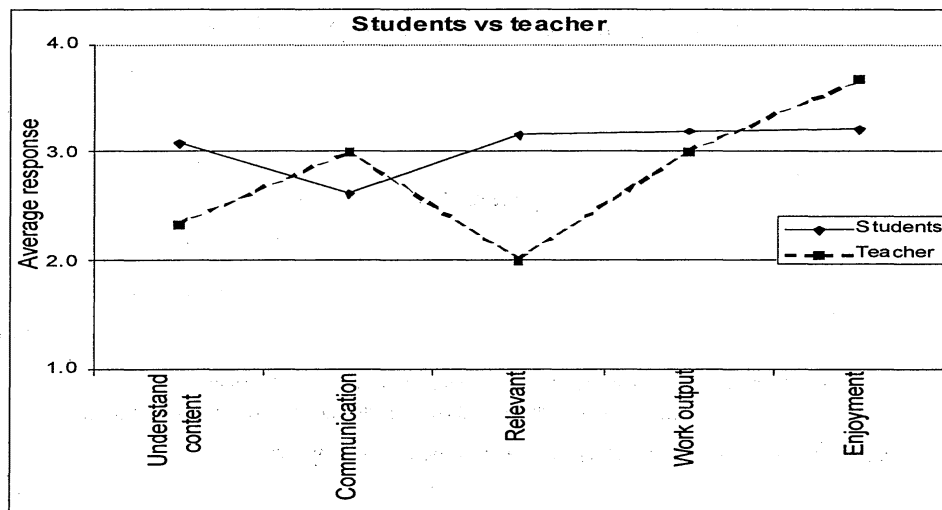


Figure 2. Summary of responses of the second class and teacher for the five categories.

## Summary

The combined survey and graphing template that constitutes SPAID provides teachers in Brunei with an insight into their students' perceptions following the use of an activity. Responses require less than ten minutes of class time to obtain and twelve minutes to process using the computer template. Consideration of graphical displays and students' responses to the open-ended item can indicate adaptations to increase the efficacy of activities. These can be cross-sectional between iterations of the same activity with several classes, or longitudinal while introducing one class to several activities over a longer period of time.

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# Appendix: English Version of the Survey

## SURVEY

Class.....

Date .....

Activity .....

Male / Female

This is not a test. No names are required and there are no right or wrong answers.  
 Your teacher will use your responses to improve class activities so please answer honestly.  
 Your friends will give their own answers so do not copy what they put.

### DIRECTIONS

Below are some statements. As you read them think about the activity you did. How do you feel about that activity compared with what you consider to be usual for this class?

- If you think the statement is **a lot more** true than usual, circle **4**.
- If you think the statement is **a little more** true than usual, circle **3**.
- If you think the statement is **a little less** true than usual, circle **2**.
- If you think the statement is **a lot less** true than usual, circle **1**.

If you change your mind about an answer, just cross it out and circle your new answer.

<i>Remember to circle how <u>you</u> feel about the activity that you have done.</i>		A lot more true than usual	A little more true than usual	A little less true than usual	A lot less true than usual
1U	The activity helped me understand what I need to learn.	4	3	2	1
2C	I understood the instructions that the teacher gave.	4	3	2	1
3R	The activity that I did is useful.	4	3	2	1
4W	I tried my best to do the work.	4	3	2	1
5E	I enjoyed doing this work.	4	3	2	1
6U	This activity would help me explain the work to a friend.	4	3	2	1
7C	I understood how I had to do the activity.	4	3	2	1
8R	The activity I did will help me in the subject.	4	3	2	1
9W	I was happy to do the work because it was useful.	4	3	2	1
10E	I want to do more work like this.	4	3	2	1
11U	This will help me remember what I need to know for my tests.	4	3	2	1
12C	I was confused about what we were to do in the activity.	4	3	2	1
13R	What I did in the activity is useful for doing tests.	4	3	2	1
14W	I wanted to do the work for this activity.	4	3	2	1
15E	The activity was boring.	4	3	2	1
<i>I feel the activity we did would have been better if.....</i>					

Thank you for completing this form and for your honesty.