



*Centre for Learning, Change and Development*

## **Evaluation of *Maths by Email***

**Final report**

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## Executive Summary

*Maths by Email* (MbE) is a free fortnightly email newsletter produced during 2010 through a partnership between CSIRO Education and the Australian Mathematical Sciences Institute (AMSI), with funding from the Australian Government Department of Education, Employment and Workplace Relations (DEEWR). The principal aim of MbE has been “to communicate that mathematics is making a valuable contribution to the community, is relevant, beautiful, interesting and enjoyable and provides many employment opportunities.”

This evaluation study was commissioned to provide independent feedback to the editors and publisher of the *Maths by Email* (MbE) initiative to potentially improve the service and to inform decision making regarding future plans for the service. In detail, the study was concerned with (i) who is using MbE and how it is being used, (ii) the extent to which MbE is meeting its stated aims, (iii) the effectiveness of the various components of MbE newsletters, (iv) the delivery mechanism, and, (v) possible improvements to the newsletter.

The evaluation methodology comprised two voluntary online subscriber surveys and regular written feedback from the evaluation team on successive issues of the newsletter. Details of survey questions were negotiated between the evaluation team and the CSIRO personnel. Written feedback identified some early concerns with the level of sophistication of early issues and offered educational, mathematical and layout advice on the various newsletter components.

An initial survey in May 2010 attracted 586 respondents, self-identified as teachers, parents and students, with interests at upper primary, lower secondary and senior secondary levels of schooling. Analysis of survey data suggested a high level of satisfaction by respondents with the newsletter’s characteristics and significant progress towards achieving the stated aims. The various components of the newsletters were well-received, especially the Hands-on Activity, the Feature Article and the Brain Teasers. Questions asked specifically of teachers provided evidence that the materials were being successfully used in classrooms at all levels, especially in the target age group. As the survey was completed after many subscribers had seen only a few issues, the data were regarded as providing formative feedback to the publishers

The second survey in October/November 2010 repeated many of the same questions, although more detailed information was obtained regarding the perceived effects of the newsletter on subscriber views, identified as the principal aim of *Maths by Email*. The survey attracted 902 responses from subscribers, with a good spread across categories such as levels of school interest and from teachers, parents and students. Teachers comprised around half the respondents.

Responses were similar to those in the first survey, and the same high levels of satisfaction with the newsletter and its various components were reported. As in the initial survey, around 95% of respondents reported that they would recommend a subscription for *Maths by Email* to others. The analysis of perceived effects of the newsletter on attitudes towards mathematics suggested that large proportions of readers reported positive changes in attitudes towards the relevance and beauty of mathematics, interest in mathematics and careers related to mathematics. Most of the rest of the respondents already had positive attitudes towards these, suggesting that there is a ceiling effect involved. Detailed analyses of written responses to open survey question have explored the ways in which teachers use the newsletter and materials successfully with students and colleagues as well as subscriber advice for further refinements and improvements.

A series of specific recommendations encourage the publishers to retain the newsletter in its current format, which appears to be very successful and well received by the overwhelming majority of subscribers. Advice is also offered regarding publicising the newsletter more widely to ensure that the good work is taken advantage of by a wider community of students, teachers and others.

## Background

*Maths by Email* (MbE) is a free fortnightly email newsletter produced through a partnership between CSIRO Education and the Australian Mathematical Sciences Institute (AMSI), with funding from the Australian Government Department of Education, Employment and Workplace Relations (DEEWR).

The principal aim of MbE was described in the CSIRO tender documents as intended “to communicate that mathematics is making a valuable contribution to the community, is relevant, beautiful, interesting and enjoyable and provides many employment opportunities.”

According to the tender documents, MbE newsletters were expected to comprise:

- a short article about maths (maths in the news, news from the maths world or other content)
- a hands-on activity related to maths, using equipment from around the home and/or game boards and pieces provided in PDF format
- web links to maths-related online content from other providers/organisations as well as links to other content from CSIRO and AMSI
- a brainteaser or puzzle
- short maths ‘facts’
- events, competitions or other relevant information (in some issues only)

The tender documents also noted:

The content will be written for 9-13 year olds, with extension ideas for more advanced students provided where appropriate. Based on CSIRO Education’s experience with *Science by Email*, we expect many of the subscribers, perhaps a majority of the audience, to be teachers and/or parents who subscribe on behalf of their students/children and use the content with them at home or in the classroom.

This report supercedes the earlier draft report in June 2010 that provided early evaluative feedback, based on the first six issues of MbE and summarised and interpreted responses to the initial survey of users.

## Evaluation purpose

Overall, the agreed purpose of this evaluation is to provide independent feedback to the editors and publisher of the *Maths by Email* (MbE) initiative to potentially improve the service and to inform decision making regarding future plans for the service.

Specifically, advice is to be provided from the evaluators, based on data gathered from users, regarding:

- Who is using MbE and how it is being used
- The extent to which MbE is meeting its stated aims
- The effectiveness of the various components of MbE newsletters

- The delivery mechanism
- Possible improvements to the newsletter or the project
- Overall execution of the project.

## Methodology

As agreed, two different sources of data have been collected to inform the evaluation. The first of these consists of feedback on successive individual issues from the evaluation team, sent directly to the Editor. The second source comprises responses to an online survey constructed for the purpose.

### *MbE newsletter responses*

Following publication of each issue, the evaluation team has read and responded via email to the details of the content, from both a mathematical and an educational point of view, considered the format of various elements and offered advice of various kinds intended to inform the editorial team and to improve the product. Responses to each issue have been generated within two weeks after the issue publication.

### *User surveys*

The first online questionnaire was designed in May to meet the agreed purposes of the evaluation, as well as to gather information about:

- The extent to which the newsletter offers mathematics ideas and materials potentially new and not readily available to subscribers
- Coherence between the newsletter and the relevant school curriculum of the intended 9-13 year-old audience
- General appropriateness of the materials to the groups of children in the intended age group
- Self-sufficiency of the activities

The evaluation team drafted survey items, which were then discussed with CSIRO publishing and editorial staff by teleconference, to reach an agreed final version. This version was subsequently discussed by CSIRO staff with the Australian Mathematical Sciences Institute, so that a consensus was reached among evaluation staff and the publication partners (CSIRO and AMSI) that the survey was appropriately targeted on issues of importance. Agreement was also reached on the details of introductory material for the survey, ensuring that respondents were adequately informed of the nature of the survey and their participation.

The evaluation team secured formal ethics approval for the surveys, through Murdoch University's Human Research Ethics Committee, and ensured that all necessary steps were taken to inform potential respondents of the nature of their participation, to safeguard them from any perceived risks and to secure informed consent in an acceptable manner, of particular importance as some of the respondents were expected to be minors.

The initial survey was administered in May 2010 and an analysis of data used to compile the Initial Report sent to CSIRO in June 2010.

Following consultation between CSIRO and the evaluation team, small changes were made to the initial survey to produce the final survey that comprises the main data source for this report. The



most significant changes were concerned with capturing better the impressions of respondents to the various views about mathematics encapsulated in the stated aims of *Maths by Email*, since it was recognised that there was insufficient information captured in the first survey, as it was likely that many subscribers already held positive attitudes towards mathematics.

A copy of the final form of the survey is included in Appendix A.

The surveys were made available online at Murdoch University via Murdoch's Institutional Research and Evaluation Services, and newsletter subscribers were invited to respond to it through a brief note in an edition of *Maths by Email*. In the first survey, there were insufficient responses to the invitation to respond to the survey in the two weeks immediately following the invitation so it was agreed that the deadline would be extended for another week, with the request to participate inserted again into the following edition, and that the publishers would send an email reminder of the request to participate to all subscribers. The effect of these actions was to generate sufficient responses by the end of May for the survey to be closed.

A similar process was followed in October/November, precisely mimicking the earlier time lines and methods of encouraging respondents.

All responses to the survey were anonymous, with a mechanism in place to prevent more than one response coming from any one computer, so that it is assumed that each response represents the views of a single volunteer *Maths by Email* subscriber, self-identified. It was anticipated that a suitably large sample would provide a range of feedback from various audiences likely to inform the evaluation, although it was also recognised that the sample unavoidably comprised volunteers and thus could not be regarded as a strict random sample of subscribers.

Although there were 586 respondents to the first survey and 902 respondents to the second survey, only two problems related to accessing the survey online were brought to the attention of the evaluation team; on investigation, it seemed that these were likely to be idiosyncratic to the respondent's computer installations, so that it seems unlikely that survey responses were significantly affected by technical problems of accessing the survey.

## Evaluation team feedback

Feedback from the evaluation team direct to the Editor after each edition drew attention to a number of issues. The details of these are in the comments sent to the Editor, and have also informed the design of the survey questions. The following issues have been identified for consideration:

- (i) The choices of themes, activities, web links and other materials have generally served to broaden typical understandings of the place of mathematics in the wider society and its pervasiveness in human affairs, consistent with the principal aim of the newsletters, referred to above.
- (ii) The extent to which the intended target audience of students aged 9-13 was correctly identified was of some concern in the early issues, with several opinions expressed that the expected mathematical level was some distance beyond typical students in the 9-13 year-old age group. This issue seems to be of less concern in later issues.
- (iii) The choice of web links necessarily entails some risks that students might encounter inaccessible (or even inappropriate material, in very rare cases); it was agreed that linking to websites requiring a subscription ought to be avoided, and that, while care would be exercised, it is inevitable that public web sites might occasionally present inappropriate material.

- (iv) The possibility of flagging web links that might have higher mathematical or other demands on readers was canvassed. Some excellent web links of direct relevance and likely interest to younger readers have been identified, along with others at a higher level; recent issues have indicated to readers those that might be more advanced in nature.
- (v) The choices of themes have generally been sound, reflecting current events (such as earthquakes) or seasons (such as Easter) well. It has at times been difficult to strike a balance between engaging the audience with mathematics at a suitable level and yet dealing with contemporary issues (which may in fact place a much higher demand on readers).
- (vi) The practical activities have been generally clear and well illustrated, seeming to offer interesting opportunities for young students to engage with mathematical ideas in a practical way. Downloadable materials constructed to support the activities have been helpful; in general, activities have not drawn on materials that are not readily accessible to households, and have carried suitable warnings (e.g., about the safe use of scissors) for younger readers.
- (vii) The proximity of the *Brain Teasers* to their solutions, and the nature of the solutions have been discussed. Both the *Brain Teasers* and the *Did You Know* snippets have been carefully chosen to suit a wide audience.
- (viii) Making the mathematics and its significance explicit, in a relatively short physical space, for younger readers (or their parents) is sometimes challenging.

Some of these observations have informed the design of the survey questions and were part of the discussions between CSIRO staff and the evaluation team. For example, the extent to which home schooling parents are to be considered and the likely balance between engaging and interesting younger students versus offering mathematical challenges to stronger and possibly older students, are issues to be explored over 2010, with some advice from the survey likely to be helpful.

The evaluation team is unaware of any issues related to the management and execution of the project, including issues concerned with the working arrangements between the various people and organisations involved.

## Survey findings

This section of the report provides the results from the second user survey (October/November 2010) of *Maths by Email* subscribers. As for the first survey (May 2010) and *Interim Evaluation Report*, these findings are organized around a series of key analysis questions central to the evaluation of the *Maths by Email* newsletter. Readers should note that we regard the findings derived from the first survey as providing relatively early feedback about *Maths by Email*, and thus risking being somewhat subject to a novelty effect for subscribers after only a few issues. Thus, we view the results derived from this second survey as more credible, based as they are on a more substantial number of issues of *Maths by Email* (on average, for subscribers). Hence this evaluation report focuses mostly on findings from the second survey, while at the same time making observations where relevant or potentially interesting on comparisons or notable changes since the first. So, most often, we do not report again the first survey data, being mindful that clients already have them.

Some respondents omitted responding to some questions. Readers should note that respondents with missing data have not been excluded from this analysis, so that all data are shown here in their entirety.

### Analysis Question 1: Who responded to this survey?

In all, 902 subscribers to *Maths by Email* responded to the invitation to complete the second online survey. Of the 741 subscribers who answered the survey question *What best describes you?* a majority (52%) are teachers, as shown in Figure 1. Sixteen percent of those who answered this question are students. Overall, as shown in Figure 1, the distribution of respondents reporting their primary roles as teachers, parents, homeschooling parents, students and others are quite similar for the first and second surveys.

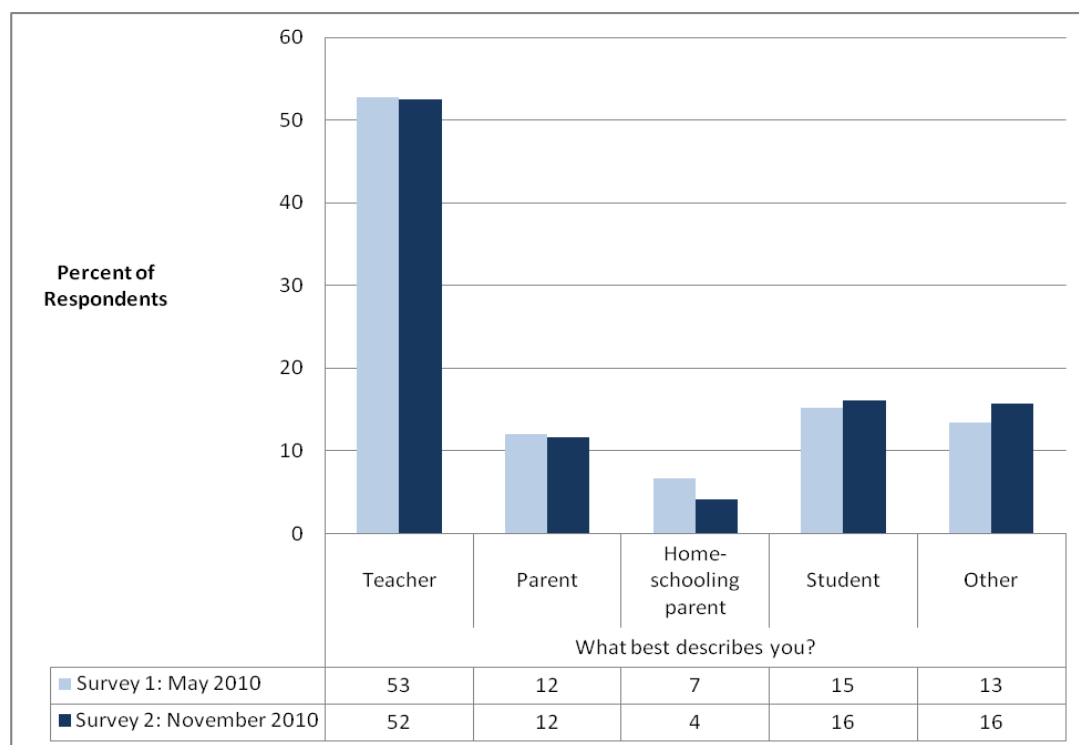


Figure 1. Self-reported primary roles of *Maths by Email* survey respondents.

Subscribers were also asked *For Maths by Email, which level of school is most relevant to you?* As shown in Table 1, of the 889 subscribers who responded to this question, a plurality (39%) reported that upper primary school (student ages 9-12) is the level of schooling most relevant to them. Lesser, and relatively equal, proportions of respondents reported that early secondary (23%) and upper secondary (24%) were the levels most relevant to them. Readers would also be interested to know that the 122 subscribers who chose *other* in answering this question included postgraduate students, university staff, and many respondents for whom more than one level or multiple levels of schooling are relevant. The following response was typical: *all three levels (I teach remedial as well as regular).*

Overall, as shown in Figure 2, the percentage distribution of respondents according to the level of schooling most relevant is very consistent across the first and second surveys, and also not inconsistent with the intended audience for *Maths by Email*.

Table 1. *Maths by Email* survey respondents by level of schooling reported as most relevant.

Survey		Level of School				Total
		Upper primary (9-12)	Early secondary (12-14)	Upper secondary (14-18)	Other	
Survey 1: May 2010	Count	211	134	137	103	585
	%	36.1%	22.9%	23.4%	17.6%	100.0%
Survey 2: November 2010	Count	346	204	217	122	889
	%	38.9%	22.9%	24.4%	13.7%	100.0%

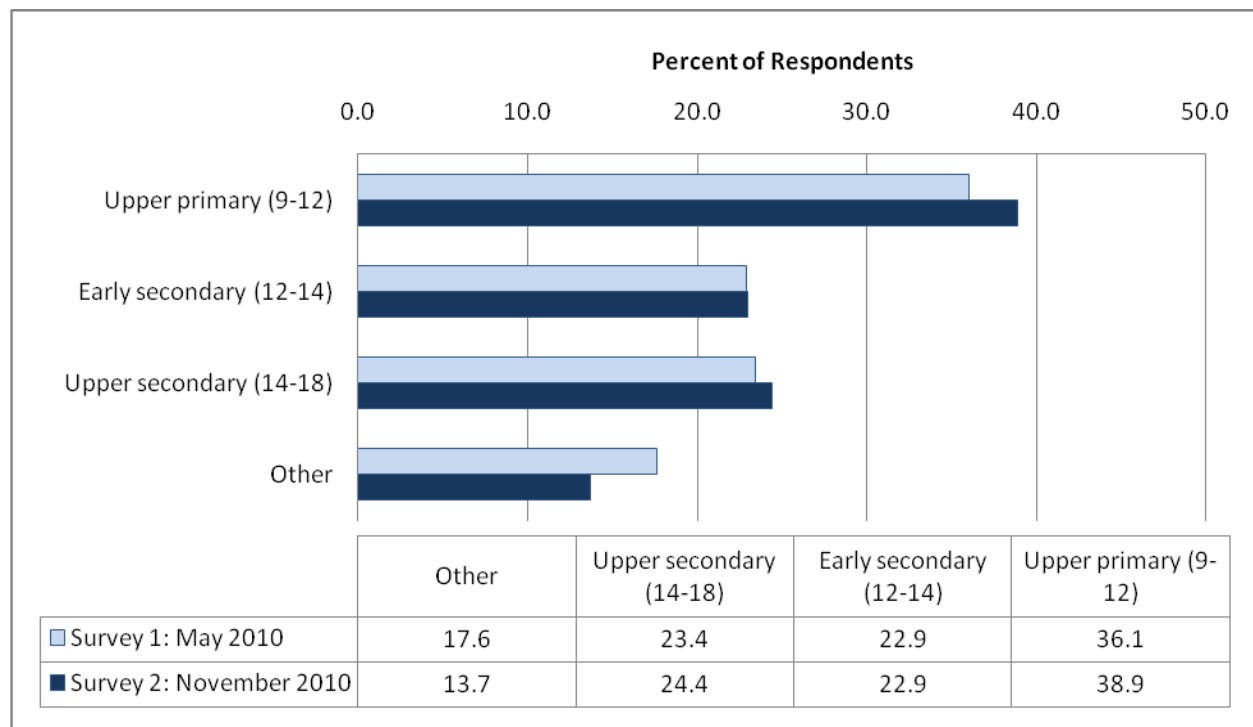


Figure 2. *Maths by Email* survey respondents by level of schooling reported as most relevant.

We further queried survey respondents about where they live. As shown in Table 2 and in Figure 3, of the 738 respondents who answered this question, as well as indicating whether or not they are a teacher, a plurality (30%) reported living in Victoria, with somewhat smaller proportions in New South Wales (23%) and Queensland (18%), respectively. Yet smaller proportions live in South Australia, Western Australia and the Australian Capital Territory. Notably different to the other states and territories, for Victoria and to a lesser degree for Queensland, teachers appear to outnumber non teachers as respondents to the current survey and therefore also likely as subscribers to *Maths by Email*.

*Maths by Email* has also attracted a not insignificant proportion of subscribers from overseas. In the current survey 40 overseas subscribers responded, including 16 from the USA, 7 from New Zealand, 6 from the UK, 2 from Mexico, and 1 from each of Austria, Denmark, the Netherlands, China, South Africa, Thailand, Italy, Fiji and India.

Table 2. Distribution of *Maths by Email* respondents by home state/territory and whether a teacher.

Survey 2	Where do you live?									
	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Other	Totals
Count	12	91	3	85	26	19	164	27	19	446
Teachers %	2.7%	20.4%	0.7%	19.1%	5.8%	4.3%	36.8%	6.1%	4.3%	100.0%
% of Total	1.6%	12.3%	0.4%	11.5%	3.5%	2.6%	22.2%	3.7%	2.6%	60.4%
Count	25	76	2	44	31	15	57	21	21	292
Non teachers %	8.6%	26.0%	0.7%	15.1%	10.6%	5.1%	19.5%	7.2%	7.2%	100.0%
% of Total	3.4%	10.3%	0.3%	6.0%	4.2%	2.0%	7.7%	2.8%	2.8%	39.6%
Count	37	167	5	129	57	34	221	48	40	738
Totals %	5.0%	22.6%	0.7%	17.5%	7.7%	4.6%	29.9%	6.5%	5.4%	100.0%

As portrayed in Figure 4, the geographic distribution of survey respondents was also contrasted against the distribution of subscribers to *Maths by Email* as at November, 2010. As shown in the figure, the proportion of respondents to the current survey were essentially consistent with the proportions of subscribers in each state and territory as well as overseas, with two exceptions. Survey respondents from Victoria and New South Wales over-represent their respective proportions in the subscribership of *Maths by Email*, both by 6%. Thus, readers of this report should take note that Victoria and New South Wales subscribers' views may be slightly over-represented (in comparison to their respective proportions in the subscriber base) in the findings reported for this second survey. However, we can also be confident that the views of all subscriber groups, according to the region in which they live, are represented in the current survey findings.

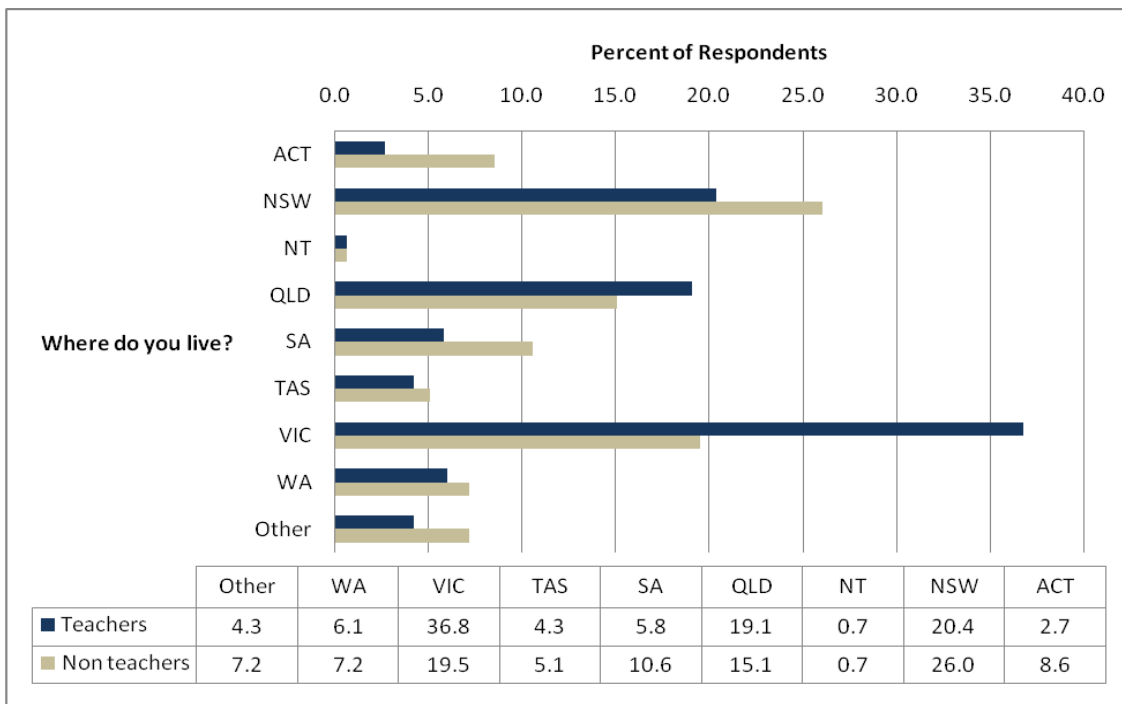


Figure 3. Geographic Distribution of *Maths by Email* survey respondents for teachers and non teachers

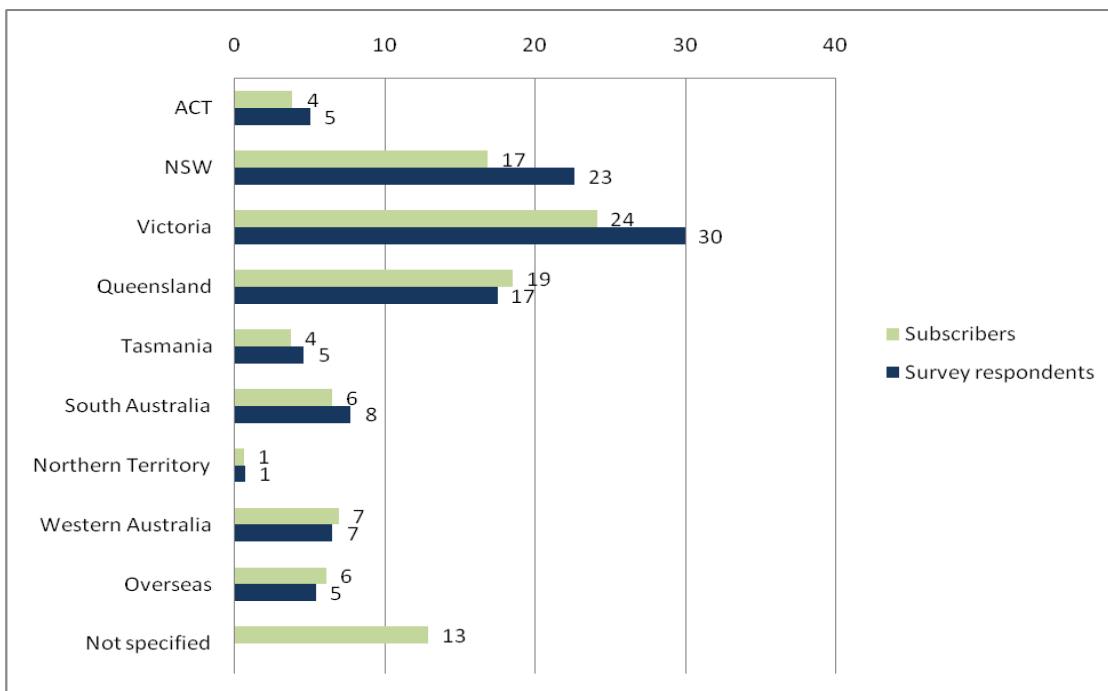


Figure 4. Geographic Distribution of *Maths by Email* Subscribers as at November 11 2010, versus Respondents to the November Survey

## Analysis Question 2: How much time do subscribers spend reading *Maths by Email*?

As shown in Table 3, 886 subscribers provided responses regarding how long they typically spend reading *Maths by Email*, as well as indicating the level of schooling most relevant to them. The current survey results detailed in Table 3, and portrayed in Figure 5, show a consistent message: the majority of *Maths by Email* subscribers—ranging from 54% to 65% across the levels of schooling—typically spend between 5 and 15 minutes reading the newsletter. Smaller proportions spend 5 minutes or less (23%), or between 15 minutes and one hour (16%). These proportions are generally consistent with the findings for the first survey, reported in the *Interim Evaluation Report*.

Table 3. Level of school most relevant to subscribers by time spent reading *Maths by Email*

Survey Number	Time spent reading <i>Maths by Email</i>					Total
	5 mins or less	5 to 15 mins	15 mins to an hour	more than an hour	other	
Survey 2: November 2010 Upper primary (9-12) Early secondary (12-14) Upper secondary (14-18) Other Total	77	201	61	0	5	344
	50	110	38	2	3	203
	41	140	31	2	3	217
	38	67	12	2	3	122
	206	518	142	6	14	886

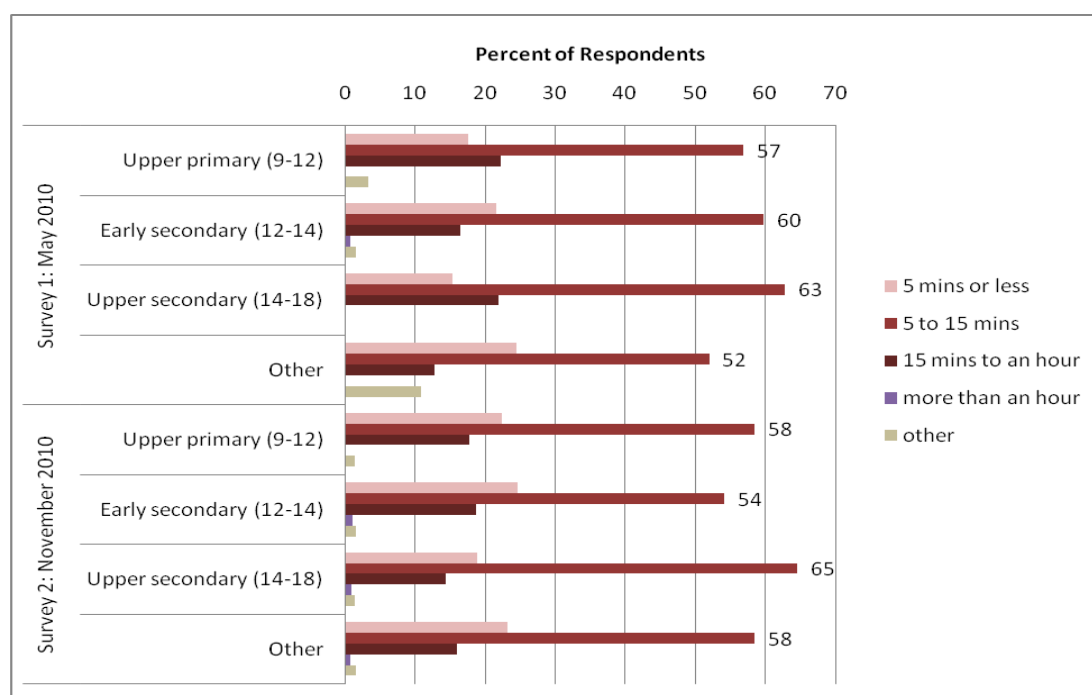


Figure 5. Time spent reading *Maths by Email* by level of schooling most relevant for respondents.

### Analysis Question 3: How do respondents perceive the accessibility of *Maths by Email* for themselves, personally?

To assess the accessibility of *Maths by Email* for its readership, survey respondents were asked to address questions about the *familiarity* of the maths language used in the newsletter as well as the degree to which the mathematical ideas contained in the newsletter were *understandable*.

As shown in Table 4, 451 out of 883 survey respondents (51%) found the language used in *Maths by Email* to be *mostly familiar*. Another 279 (32%) found the maths language used *usually familiar*. Respondents who reported upper primary school to be most relevant to them were the subscriber respondents who were most likely to assess the maths language in *Maths by Email* as only *sometimes familiar*, or *mostly not familiar*. About 20% of this group found the language *sometimes* or *mostly not* familiar as compared to 14% of early secondary respondents and 10% of upper secondary respondents. The distribution of respondents' views—according to level of school most relevant—about the familiarity of maths language used in *Maths by Email* is further portrayed in Figure 6 that reinforces the assessment that across the levels of schooling, a majority of respondents found the maths language *mostly familiar*.

Table 5 and Figure 7 tell a similar story for respondents' views on the *understandability* of maths ideas in *Maths by Email*. The majority of respondents (54%) assessed the maths ideas contained in the newsletter as *mostly understandable*. This ranged from 42% of respondents for whom upper primary school is most important to 66% for whom upper secondary is most relevant. Overall, another 34% rated the maths ideas in *Maths by Email* as *usually understandable*. Again, the group for whom upper primary school is most relevant was most likely (14%) to assess the ideas in *Maths by Email* as only *sometimes* understandable or *mostly not* understandable.

Table 4. Familiarity of maths language by level of school most relevant to *Maths by Email* subscribers.

		Maths language familiar?					Total
		mostly unfamiliar	sometimes familiar	usually familiar	mostly familiar	other	
Upper primary (9-12)	Count	29	43	132	133	5	342
	%	8.5%	12.6%	38.6%	38.9%	1.5%	100.0%
Early secondary (12-14)	Count	14	14	71	102	1	202
	%	6.9%	6.9%	35.1%	50.5%	0.5%	100.0%
Upper secondary (14-18)	Count	15	6	47	144	5	217
	%	6.9%	2.8%	21.7%	66.4%	2.3%	100.0%
Other	Count	10	6	29	72	5	122
	%	8.2%	4.9%	23.8%	59.0%	4.1%	100.0%
Total	Count	68	69	279	451	16	883
	% of Total	7.7%	7.8%	31.6%	51.1%	1.8%	100.0%



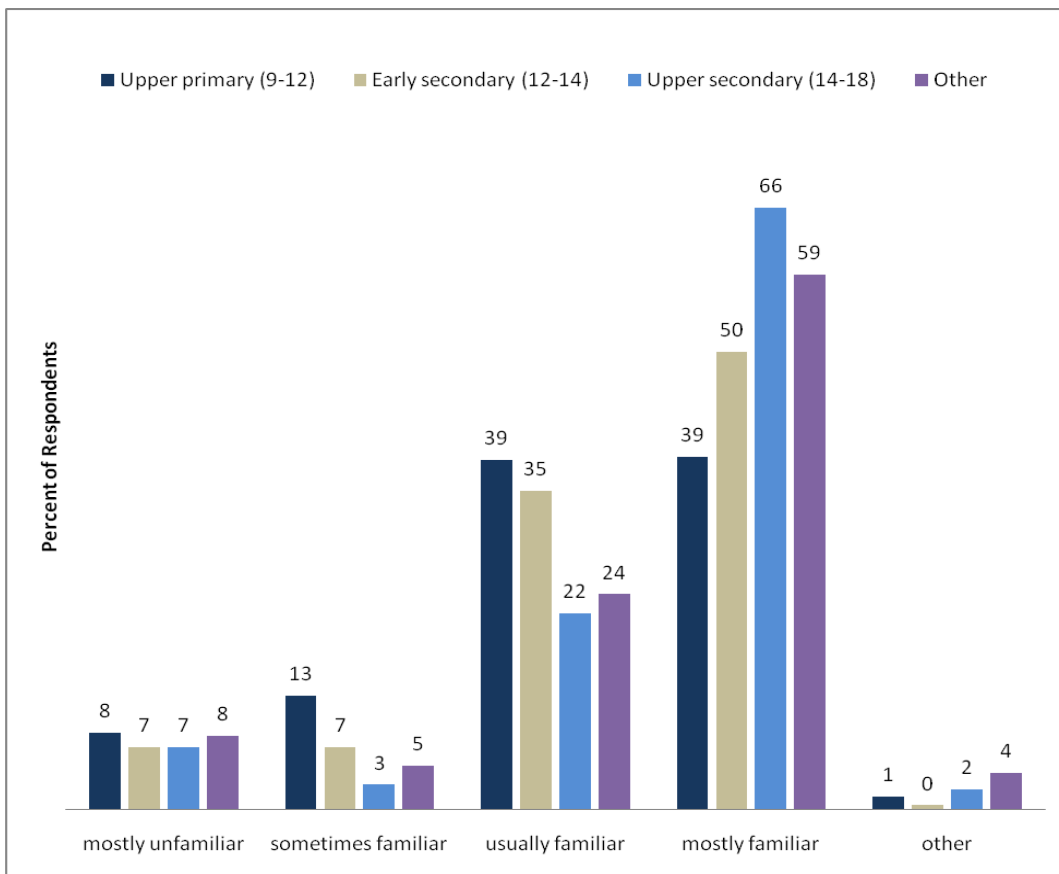


Figure 6. Familiarity of *Maths by Email* language by level of schooling most relevant for respondents.

Table 5. Understandability of maths ideas by level of school most relevant to *Maths by Email* subscribers.

		Maths ideas understandable?					Total
		mostly not	some-times	usually	mostly	other	
Upper primary (9-12)	Count	11	36	145	147	4	347
	%	3.2%	10.4%	41.8%	42.4%	1.2%	100.0%
Early secondary (12-14)	Count	6	15	68	111	2	204
	%	2.9%	7.4%	33.3%	54.4%	1.0%	100.0%
Upper secondary (14-18)	Count	3	7	58	144	5	217
	%	1.4%	3.2%	26.7%	66.4%	2.3%	100.0%
Other	Count	3	5	29	81	4	122
	%	2.5%	4.1%	23.8%	66.4%	3.3%	100.0%
Total	Count	23	63	300	483	15	890
	% of Total	2.6%	7.1%	33.7%	54.3%	1.7%	100.0%

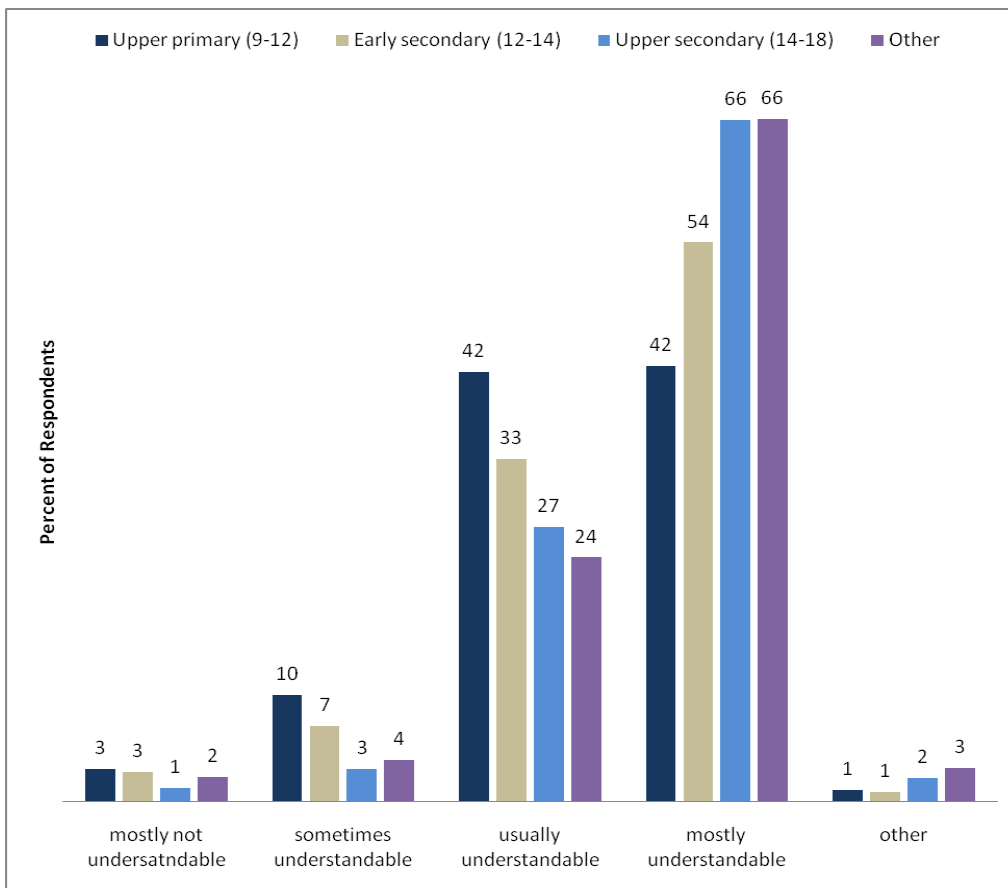


Figure 7. Understandability of *Maths by Email* ideas by level of schooling most relevant for respondents.

#### Analysis Question 4: How do respondent subscribers perceive the *Feature Articles of Maths by Email*?

Each issue of *Maths by Email* contains a feature article at the beginning of the newsletter. Survey respondents were asked to appraise the feature article in terms of its newness and interest to them, personally. Respondents to the survey were also asked to indicate how often they read the article.

Survey respondents' views on the *Maths by Email* feature article are portrayed in Tables 6 and 7, and Figures 8 and 9. Importantly, the great majority of the 832 respondents who answered the question relating to how often they read the feature article reported reading it *usually* (47%) or *always* (35%).

As shown in Table 6, a substantial majority of respondents (81%) report that the feature article contains material new to them either *usually* (41%) or *sometimes* (40%). As shown in Figure 8, of those subscribers reading the feature article *usually* or *always*, most judge the article as either *usually* (38% to 46%) or *sometimes* (32% to 46%) containing material new to them personally, depending on the level of schooling most relevant. Generally, respondents for whom upper primary school is most relevant were more likely to judge the feature article material as *usually new* in comparison to respondents for whom secondary school is most relevant. Much smaller proportions of subscriber respondents, who are also regular readers of the feature article, judged the material to be new *most of the time*, while very few judged it to be *mostly not new*.

Table 6. Perceived newness of feature article material by level of school most relevant to *Maths by Email* subscribers.

Read Feature Article?		Article new?					Total
		mostly not	sometimes	usually	most of the time	other	
Upper primary (9-12)	never	0	0	1	0	0	1
	sometimes	2	18	13	4	0	37
	usually	3	56	67	27	2	155
	always	1	31	59	29	1	121
	other	0	4	0	0	0	4
	<b>sub total</b>	<b>6</b>	<b>109</b>	<b>140</b>	<b>60</b>	<b>3</b>	<b>318</b>
Early secondary (12-14)	never	1	0	2	0	0	3
	sometimes	1	14	8	3	0	26
	usually	0	41	27	12	0	80
	always	1	24	39	19	0	83
	other	0	1	0	0	0	1
	<b>sub total</b>	<b>3</b>	<b>80</b>	<b>76</b>	<b>34</b>	<b>0</b>	<b>193</b>
Upper secondary (14-18)	sometimes	2	6	8	0	1	17
	usually	1	52	36	8	0	97
	always	3	33	34	19	0	89
	<b>sub total</b>	<b>6</b>	<b>91</b>	<b>78</b>	<b>27</b>	<b>1</b>	<b>203</b>
Other	sometimes	1	4	3	2	0	10
	usually	2	30	23	4	1	60
	always	0	19	21	7	1	48
	<b>sub total</b>	<b>3</b>	<b>53</b>	<b>47</b>	<b>13</b>	<b>2</b>	<b>118</b>
<b>Total</b>		<b>18</b>	<b>333</b>	<b>341</b>	<b>134</b>	<b>6</b>	<b>832</b>

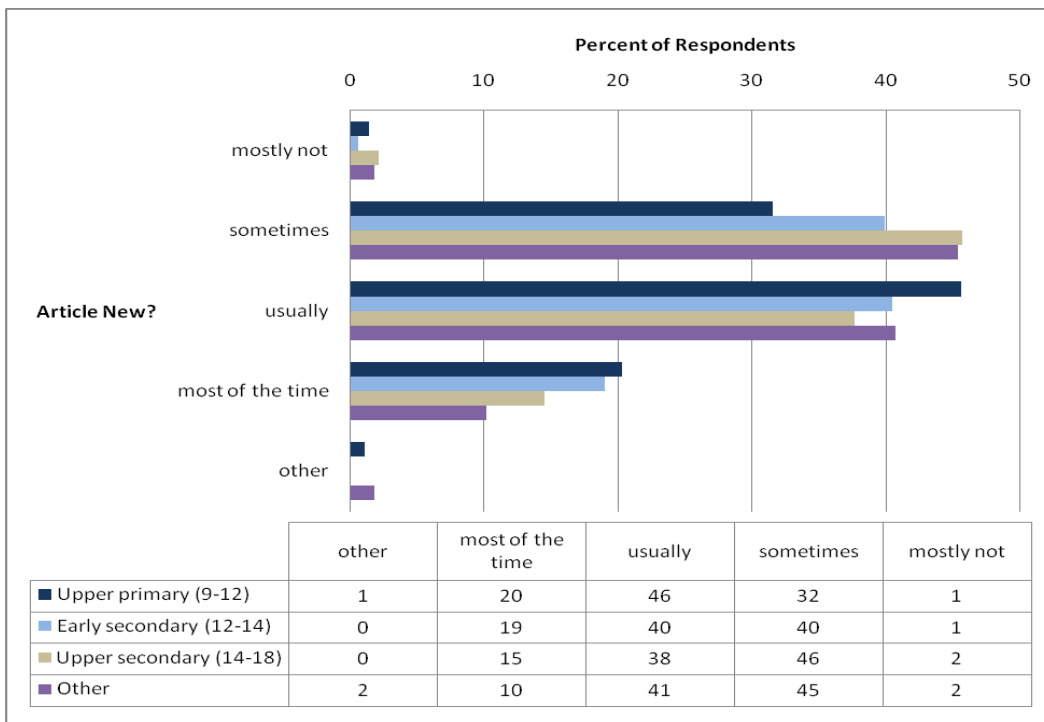


Figure 8. The extent to which respondents who *always* or *usually* read the feature article in *Maths by Email* rate the article’s material as “new” by level of schooling most relevant.

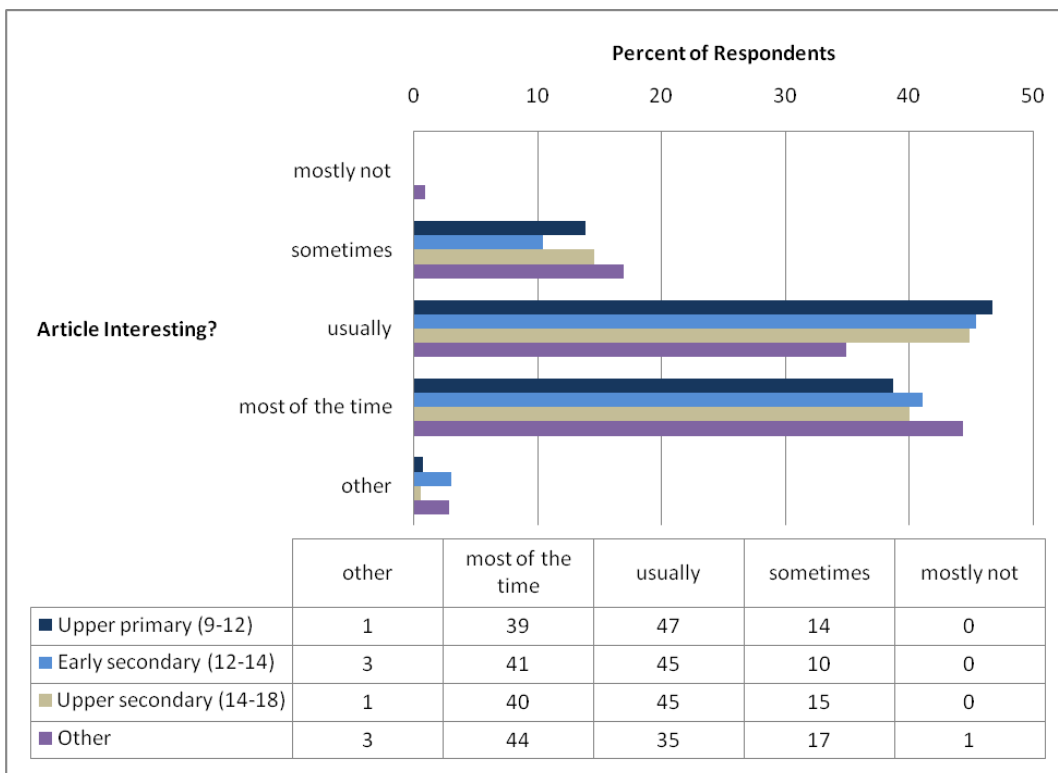


Figure 9. The extent to which respondents who *always* or *usually* read the feature article in *Maths by Email* rate the article’s material as “interesting” by level of schooling most relevant.

Similarly, in Table 7, the majority of the 826 respondents who answered this item reported the feature article to be interesting *usually* (42%) or *most of the time* (36%). As shown in Figure 9, most subscribers reading the feature article *usually* or *always*, also judge the article to contain material interesting to them personally either *usually* (35% to 47%) or *most of the time* (39% to 44%), depending on the level of schooling most relevant. A smaller proportion of subscriber respondents, who are also regular readers of the feature article, judge the material to be interesting *sometimes*. Only 1 regular reader of the feature article rated the feature as *mostly not* interesting.

Table 7. Perceived extent to which the feature article is interesting by level of school most relevant to *Maths by Email* subscribers.

Read Feature Article?		Article interesting?					Total
		mostly not	sometimes	usually	most of the time	other	
Upper primary (9-12)	never	1	0	0	0	0	1
	sometimes	4	19	12	1	0	36
	usually	0	31	87	35	0	153
	always	0	7	41	71	2	121
	other	0	3	1	0	0	4
	<b>sub total</b>	<b>5</b>	<b>60</b>	<b>141</b>	<b>107</b>	<b>2</b>	<b>315</b>
Early secondary (12-14)	never	2	1	0	0	0	3
	sometimes	2	17	5	2	0	26
	usually	0	13	42	23	2	80
	always	0	4	32	44	3	83
	other	0	0	1	0	0	1
	<b>sub total</b>	<b>4</b>	<b>35</b>	<b>80</b>	<b>69</b>	<b>5</b>	<b>193</b>
Upper secondary (14-18)	sometimes	2	9	5	1	0	17
	usually	0	22	45	28	1	96
	always	0	5	38	46	0	89
	<b>sub total</b>	<b>2</b>	<b>36</b>	<b>88</b>	<b>75</b>	<b>1</b>	<b>202</b>
Other	sometimes	0	5	3	2	0	10
	usually	1	15	22	19	1	58
	always	0	3	15	28	2	48
	<b>sub total</b>	<b>1</b>	<b>23</b>	<b>40</b>	<b>49</b>	<b>3</b>	<b>116</b>
<b>Total</b>	<b>12</b>	<b>154</b>	<b>349</b>	<b>300</b>	<b>11</b>	<b>826</b>	

## Analysis Question 5: How do respondent subscribers perceive the *Hands-On Activities* provided in *Maths by Email*?

Each issue of *Maths by Email* also contains a hands-on activity intended for subscribers to try on their own. Survey respondents were asked to appraise the hands-on activity in terms of how often they try it, its newness and interest to them, as well as the extent to which they typically have the materials necessary for the activity.

Table 8 shows the frequency with which respondents try the *Maths by Email* hands-on activity. As shown in Table 8, a plurality of respondents indicated trying the hands-on activities *sometimes* (46%). A somewhat more modest proportion of survey respondents (27%) report trying the hands-on activity, *usually*. As shown in Figure 10, across the three levels of schooling most relevant to subscribers, relatively equal proportions of respondents reported trying the *Maths by Email* hands-on activity either *usually* or *sometimes*. Specifically, 72% of respondents most aligned with upper secondary, 74% aligned with lower secondary and 77% for whom upper primary schooling is most relevant reported *usually* or *sometimes* trying the *Maths by Email* hands-on activity, themselves.

Table 8. Perceived extent to which *Maths by Email* hands-on activity is tried by subscribers by level of school most relevant to respondents.

Level of Schooling most relevant	Try hands-on activity?					Total
	never	sometimes	usually	always	other	
Upper primary (9-12)	32	140	105	15	27	319
Early secondary (12-14)	28	95	48	9	13	193
Upper secondary (14-18)	49	101	45	2	4	201
Other	24	44	30	5	14	117
Total	133	380	228	31	58	830
	16.0%	45.8%	27.5%	3.7%	7.0%	100.0%

Respondents to the current survey were further asked to rate the *Maths by Email* hands-on activities in terms of their newness, the extent to which they had the materials necessary for the activity and the extent to which they found the activity interesting. Respondents' ratings on these three dimensions are given in Table 9.

As detailed in Table 9, among respondents for whom upper primary (67%) or early secondary (63%) schooling are most relevant, about two thirds viewed the *Maths by Email* hands-on activities as either *always* or *usually* new. Among respondents for whom upper secondary schooling is most relevant, a slightly smaller 57% rated the hands-on activities as *always* or *usually* new.

Similarly, among subscribers for whom upper primary (61%) or early secondary (60%) schooling are most relevant, six in ten respondents reported either *always* or *usually* having the materials necessary for the *Maths by Email* hands-on activities. Among respondents for whom upper secondary schooling is most relevant, a slightly smaller 55% reported *always* or *usually* having the materials.

Table 9. Survey respondents' views on the extent to which *Maths by Email* hands-on activity is new, the degree to which they have the materials required for the activity and the extent to which they find the activity interesting.

Level of Schooling most relevant	never	sometimes	usually	always	other
	Hands-on activity new? (n=825)				
Upper primary (9-12)	1%	30%	43%	24%	2%
Early secondary (12-14)	2%	35%	33%	30%	1%
Upper secondary (14-18)	3%	39%	41%	16%	2%
Other	4%	31%	40%	22%	3%
Have hands-on materials? (n=819)					
Upper primary (9-12)	4%	32%	40%	21%	3%
Early secondary (12-14)	8%	31%	35%	25%	1%
Upper secondary (14-18)	7%	36%	38%	17%	3%
Other	5%	25%	41%	19%	9%
Hands-on activity interesting? (n=827)					
Upper primary (9-12)	2%	16%	44%	37%	2%
Early secondary (12-14)	5%	22%	35%	36%	3%
Upper secondary (14-18)	5%	30%	39%	25%	0%
Other	7%	18%	43%	27%	5%

On the question of the extent to which subscribers find the hands-on activities interesting, a strong majority (81%) of respondents for whom upper primary school is most relevant rated the activities as *always* or *usually* interesting. Slightly more modest proportions of respondents gave similar ratings amongst those for whom early secondary is most relevant (71%), and for whom upper secondary is most relevant (69%).

Across the levels of schooling, only quite small proportions—ranging from 1% to 8% of respondents—indicated that the hands-on activities were *never* new or interesting, or that they *never* had the materials required to carry out the activity.

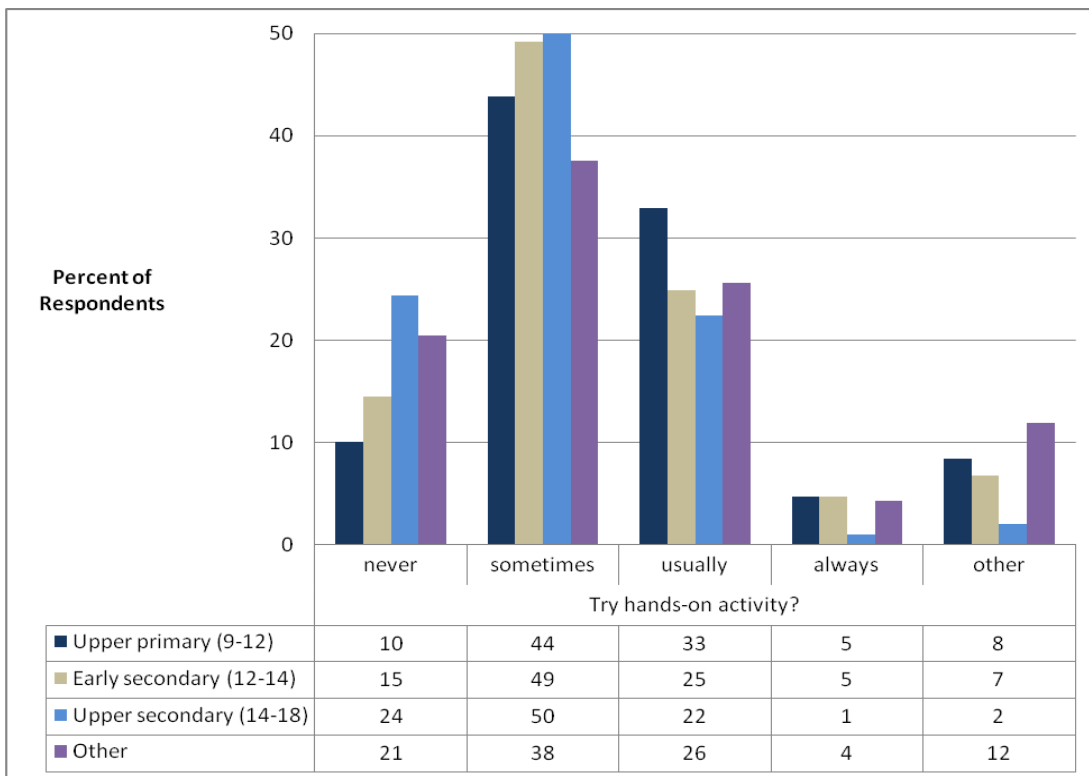


Figure 10. The extent to which respondents try the hands-on activity in *Maths by Email* by level of schooling most relevant.

### Analysis Question 6: How do respondent subscribers perceive the *Brain Teaser* provided in *Maths by Email*?

Each issue of *Maths by Email* also contains a *Brain Teaser* intended to engage the maths problem solving of subscribers in a fun way. Table 10 and Figure 11 detail the views of 786 subscriber respondents with regard to the perceived *suitability* of the *Brain Teaser*. As shown in the table, a majority of respondents (6 in 10) across each level of schooling perceived the *Brain Teasers* as *mostly suitable*. Another 3 in 10 survey respondents appraised the *Brain Teasers* as *very suitable*.

Table 10. Perceived extent to which *Maths by Email Brain Teaser* is suitable by level of school most relevant to respondents.

Level of Schooling most relevant	Brain Teaser suitable?				Total
	Not at all	Not usually	Mostly	Very	
Upper primary (9-12)	1	37	179	84	301
Early secondary (12-14)	3	16	109	56	184
Upper secondary (14-18)	0	9	117	67	193
Other	2	12	69	25	108
Total	6	74	474	232	786
	0.8%	9.4%	60.3%	29.5%	100.0%



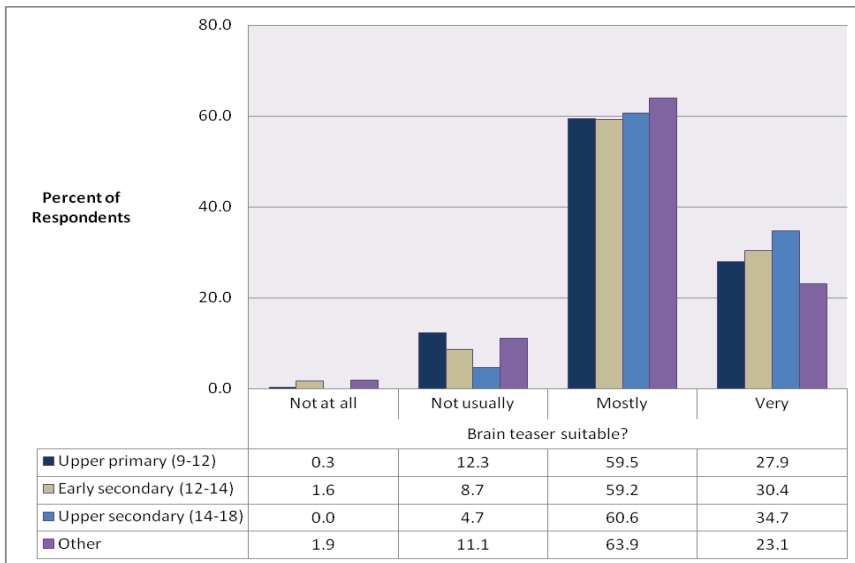


Figure 11. The extent to which respondents perceive the *Maths by Email Brain Teaser* as “suitable” by level of schooling most relevant.

### Analysis Question 7: To what extent do subscribers visit the Websites highlighted in *Maths by Email*?

Each issue of *Maths by Email* also has some websites featured. Respondents to the current survey were asked to indicate how often they visit these sites as part of the *Maths by Email* newsletter experience. As detailed in Figure 12, a plurality of survey respondents—ranging from 40% to 49% depending on the level of schooling most relevant—indicated that they visit the featured websites *sometimes*. Similar, but generally smaller proportions of subscribers reported visiting the websites *usually* (38% to 42%). These proportions were observed with relative consistency across the groupings reflective of the various levels of schooling addressed. Smaller proportions of respondents reportedly visited the websites either *never* (6% to 9%) or *always* (4% to 7%). Again, these proportions patterned with relative consistency across the levels of schooling addressed.

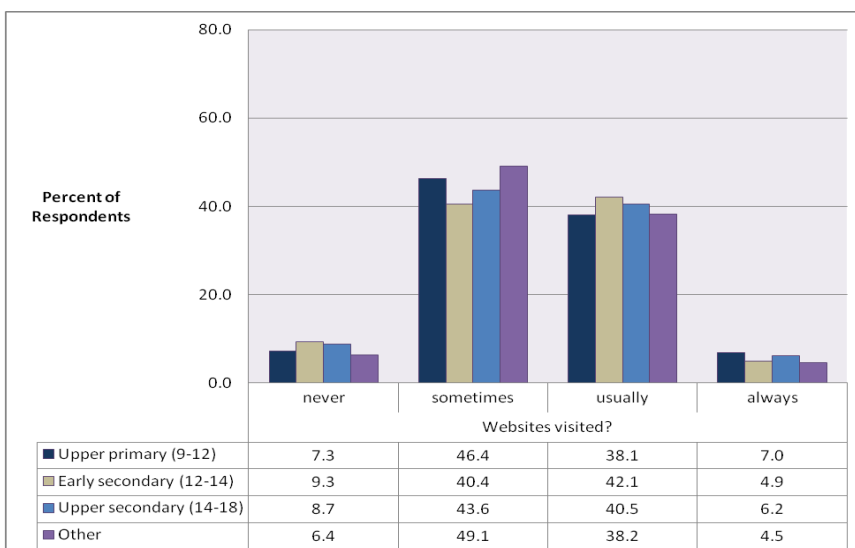


Figure 12. The extent to which respondents visit the websites highlighted in *Maths by Email* by level of schooling most relevant.

### Analysis Question 8: What components of *Maths by Email* are most and least liked by subscribers?

Survey respondents were also asked to indicate the component of *Maths by Email* newsletters they like most, as well as the component they like least. As shown in Table 11, of the 789 subscribers who responded to this question, a plurality (33%) indicated their preference for the *hands-on activities* included with each newsletter. This was particularly so for those respondents who had indicated being most closely affiliated with upper primary schooling. The newsletter components second- and third- most liked were *feature articles* (30%) and *brain teasers* (24%), respectively. Here it is notable that different from other groups, the component most liked by those affiliated with upper secondary schooling was the *feature article*. The component least liked by the majority of survey respondents (63%) was *events*, followed quite a distance away by *websites* (11%). These findings are largely consistent with those reported for the first survey, although it is also the case that the *feature articles* have gained in relative popularity since the first survey was conducted in May, 2010.

Table 11. Components of *Maths by Email* most and least liked by survey respondents.

<i>Maths by Email</i> Component	Level of School				Total
	Upper primary (9-12)	Early secondary (12-14)	Upper secondary (14-18)	Other	
	Component liked the most				
Feature article	64	55	73	42	234
Hands-on activities	134	51	43	32	260
Brain teasers	67	45	52	25	189
Websites	18	18	14	7	57
Events	1	3	1	0	5
Did you know?	15	13	12	4	44
	Component liked the least				
Feature article	16	10	3	2	31
Hands-on activities	11	13	25	6	55
Brain teasers	20	16	11	9	56
Websites	32	17	21	11	81
Events	178	100	114	61	453
Did you know?	22	13	7	6	48

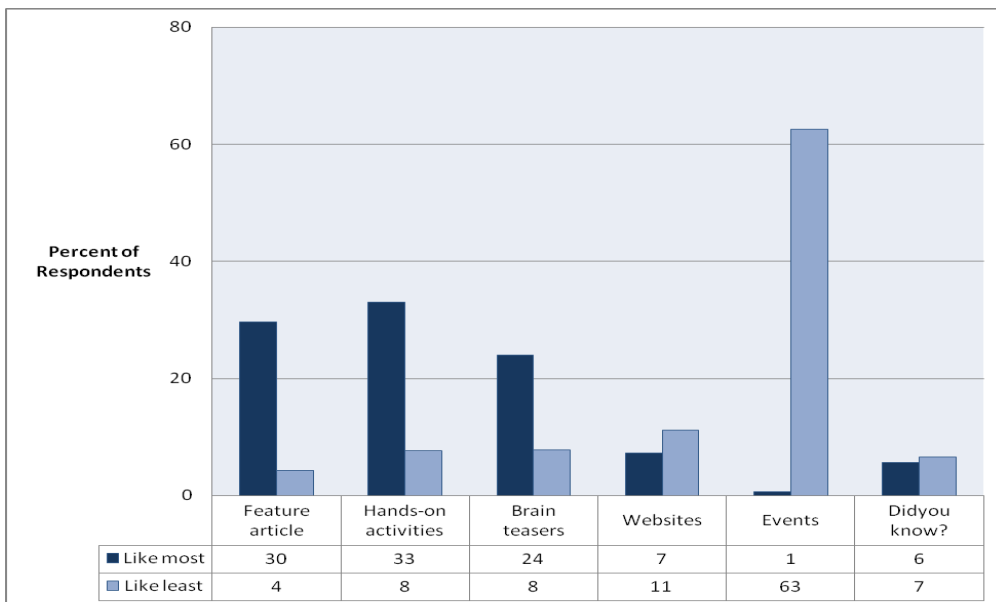


Figure 13. Components of *Maths by Email* most and least liked by survey respondents.

### Analysis Question 9: What do *Maths by Email* subscribers do with the newsletter after reading it?

Survey respondents were asked to indicate what they do with the *Maths by Email* newsletter after reading it. As portrayed in Figure 14, the majority (64%) said that they *save the email*. Smaller, and relatively equal proportions *delete it after reading*, *forward it to other people*, or *print a hard copy*.

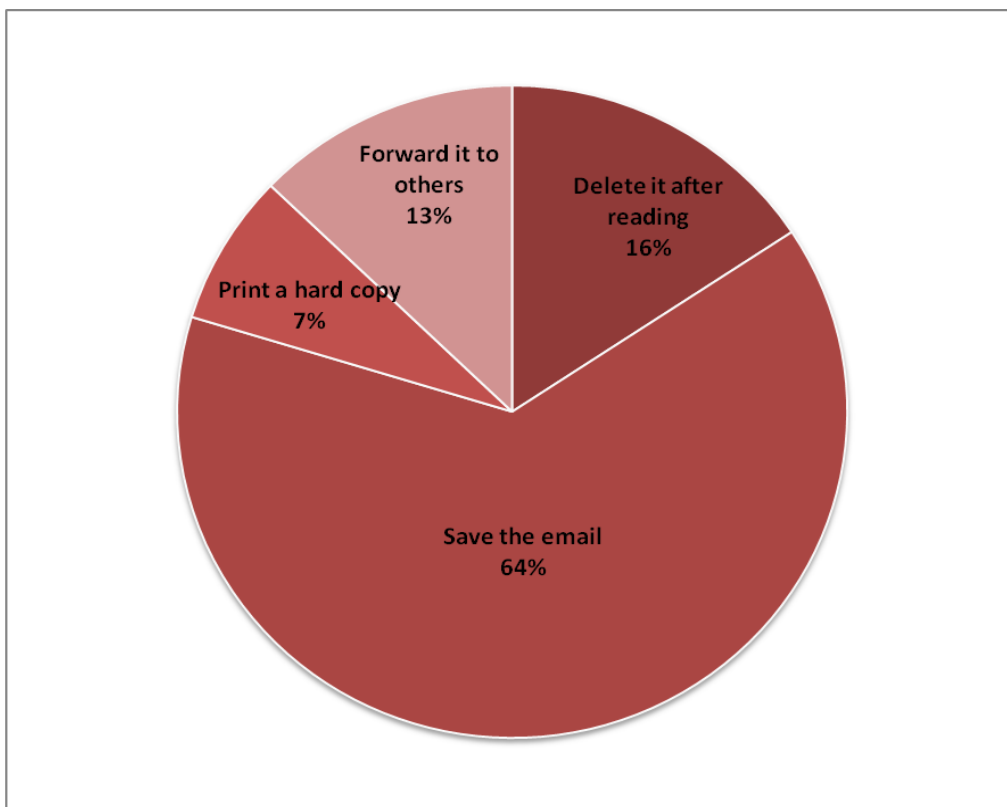


Figure 14. What subscribers do with the *Maths by Email* newsletter after reading it.

For the 101 respondents who indicated that they forward the newsletter to others, the average number of others to whom the newsletter is forwarded is 12. However, the maximum number to whom the newsletter was forwarded is 40, and the standard deviation is also 12. Given this variability, a more stable measure of the typical number of people to whom *Maths by Email* is forwarded might be the median (7.5 people), as the median tends to be less affected by outlying values in comparison to the mean. Notwithstanding the more appropriate measure of the typical number of persons to whom the newsletter is forwarded, this result would seem to indicate a somewhat larger readership for the newsletter than indicated simply by the number of subscribers. Specifically, if the average number to whom the newsletter is forwarded is indeed 7.5, and this is typically done by about 13% of subscribers, simple maths would seem to indicate that the readership of *Maths by Email* may be close to twice as large as the subscriber base. Of course, this would also assume that those to whom the newsletter is forwarded, also read the newsletter.

### Analysis Question 10: What email client do subscribers to *Maths by Email* use?

As portrayed in Figure 15 below, a significant plurality (34%) of the 529 *Maths by Email* subscribers who responded to this survey question use Microsoft *Outlook* to read the newsletter. Additionally, about 10% of respondents use each of *Hotmail* and *Google mail*. Only 5% (32 respondents) reported reading the online version of the newsletter. Again, these findings are generally very consistent with those observed for the first survey and *Interim Evaluation Report*.

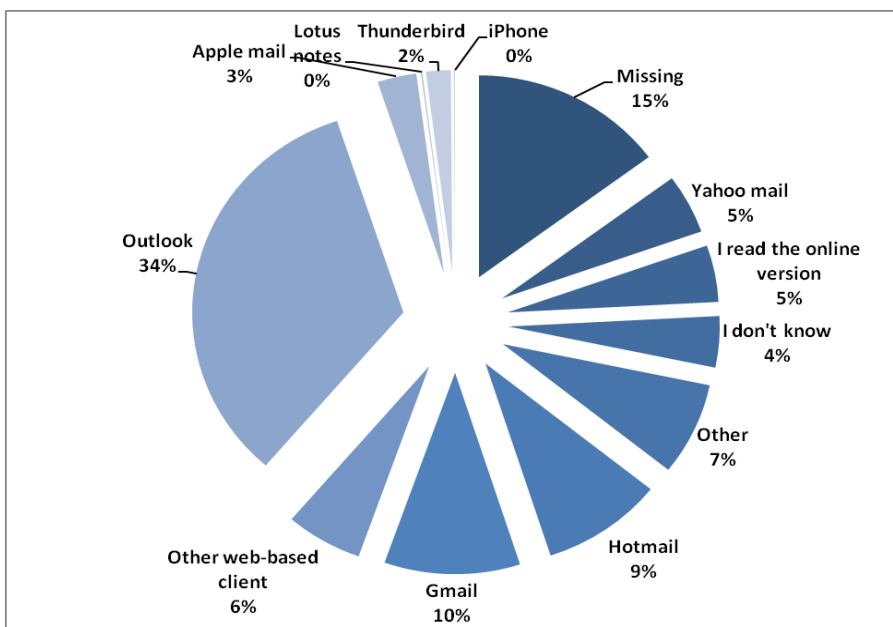


Figure 15. Email clients used by subscribers to the *Maths by Email* newsletter.

### Analysis Question 11: How did subscribers find out about *Maths by Email*?

In all, there were 982 responses to this survey item (respondents could indicate more than one source of finding out about *Maths by Email*). As indicated in Figure 16, a strong plurality of survey respondents (32%) became subscribers to *Maths by Email* as a result of already subscribing to

*Science by Email*. A more modest proportion became subscribers via CSIRO’s web link (22%), and yet smaller proportions via articles in the *Helix* or *Scientrific* magazines (7%), or through a school or professional body (7%). Even smaller proportions discovered *Maths by Email* via the *Double Helix Science Club* (5%) or via the Australian Mathematical Sciences Institute (4%).

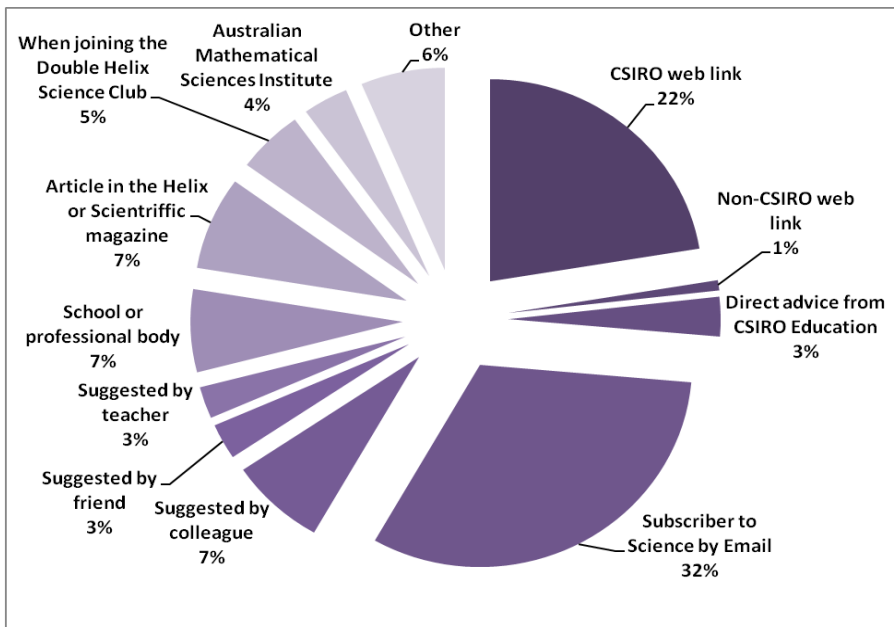


Figure 16. How subscribers found out about the *Maths by Email* newsletter.

### Analysis Question 12: How do respondents assess potential influences for *Maths by Email* subscribers?

Survey respondents were asked to indicate how *Maths by Email* had influenced their opinions regarding careers involving maths, the relevance of maths, the beauty of maths and their interest in maths. As shown in Table 12, of the 759 respondents to the survey question about maths careers, fully 7 out of 10 (70%) reported positive opinions regarding maths-related careers *before* their *Maths by Email* experience.

However, more than 4 of 10 (44%) respondents overall also perceive that their opinions regarding maths-related careers are currently more positive as a result of *Maths by Email*. Another 55% reported no change in their opinions on maths-related careers. As depicted in Figure 17, two-thirds of (the small number of) respondents whose initial opinions regarding careers in maths were negative experienced a more positive change as a result of *Maths by Email*. Additionally, one in two respondents whose opinions were initially neutral and 4 in 10 respondents whose opinions were initially positive, reported a positive change in their opinion of maths as a career resulting from their *Maths by Email* experience. Overall, as might be expected, most *Maths by Email* subscribers held positive opinions about careers in mathematics before subscribing; generally, the newsletter’s influence has been toward more positive or unchanged opinions for essentially all subscribers.

Table 12. Subscriber respondents' opinions on maths-related careers before *Maths by Email*, and currently.

Opinion on maths-related careers before <i>Maths by Email</i>		Opinion on careers currently			Total
		more negative	not changed	more positive	
Negative	Count	1	4	10	15
	% within Opinion on careers before	6.7%	26.7%	66.7%	100.0%
	% within Opinion on careers after	20.0%	1.0%	3.0%	2.0%
	% of Total	0.1%	0.5%	1.3%	2.0%
Neutral	Count	2	99	113	214
	% within Opinion on careers before	0.9%	46.3%	52.8%	100.0%
	% within Opinion on careers after	40.0%	23.7%	33.6%	28.2%
	% of Total	0.3%	13.0%	14.9%	28.2%
Positive	Count	2	315	213	530
	% within Opinion on careers before	0.4%	59.4%	40.2%	100.0%
	% within Opinion on careers after	40.0%	75.4%	63.4%	69.8%
	% of Total	0.3%	41.5%	28.1%	69.8%
Total	Count	5	418	336	759
	% within Opinion on careers before	0.7%	55.1%	44.3%	100.0%
	% within Opinion on careers after	100.0%	100.0%	100.0%	100.0%
	% of Total	0.7%	55.1%	44.3%	100.0%

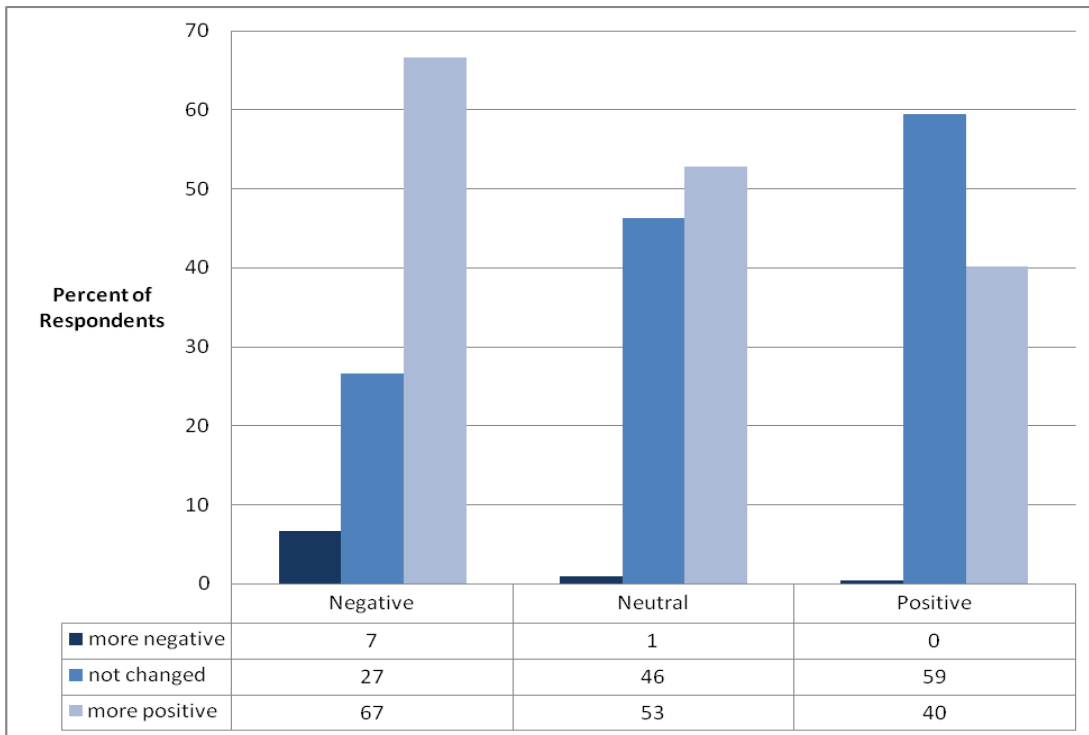


Figure 17. Subscribers’ opinions on careers in maths before their *Maths by Email* experience, and currently.

Similarly, survey respondents were asked to rate the influence of *Maths by Email* on their opinions regarding the *relevance* of maths. In this case, as detailed in Table 13, of 756 respondents to this survey question, fully 85% reported positive views regarding the relevance of maths *before* their *Maths by Email* experience.

Despite the large proportion of initially positive views, however, more than 5 of 10 (53%) respondents overall also perceive that their opinions regarding the relevance of maths became more positive as a result of *Maths by Email*. Another 46% reported no change in their opinions on the relevance of maths. As depicted in Figure 18, 86% (all but 2 out of 14) of respondents whose initial opinions regarding the relevance of maths were negative experienced a more positive change as a result of *Maths by Email*. Additionally, three out of four respondents whose opinions were initially neutral and 1 of 2 respondents whose opinions were initially positive, experienced more positive changes resulting from their *Maths by Email* experience. Overall, it is not surprising that a substantial majority of *Maths by Email* subscribers held positive opinions about the relevance of mathematics before subscribing; nevertheless, the newsletter’s influence has generally been toward more positive or unchanged opinions for essentially all subscribers. Only 6 out of 756 respondents to this survey item reported current views about the relevance of maths that were more negative than before experiencing *Maths by Email*.

Table 13. Subscriber respondents' opinions on the relevance of maths before *Maths by Email*, and currently.

Opinion on relevance of maths before <i>Maths by Email</i>		Opinion on relevance currently			Total
		more negative	not changed	more positive	
Negative	Count	1	1	12	14
	% within Opinion on relevance before	7.1%	7.1%	85.7%	100.0%
	% within Opinion on relevance after	16.7%	0.3%	3.0%	1.9%
	% of Total	0.1%	0.1%	1.6%	1.9%
Neutral	Count	0	23	77	100
	% within Opinion on relevance before	0.0%	23.0%	77.0%	100.0%
	% within Opinion on relevance after	0.0%	6.6%	19.3%	13.2%
	% of Total	0.0%	3.0%	10.2%	13.2%
Positive	Count	5	327	310	642
	% within Opinion on relevance before	0.8%	50.9%	48.3%	100.0%
	% within Opinion on relevance after	83.3%	93.2%	77.7%	84.9%
	% of Total	0.7%	43.3%	41.0%	84.9%
Total	Count	6	351	399	756
	% within Opinion on relevance before	0.8%	46.4%	52.8%	100.0%
	% within Opinion on relevance after	100.0%	100.0%	100.0%	100.0%
	% of Total	0.8%	46.4%	52.8%	100.0%

Third in this sequence of questions, survey respondents were asked to rate the influence of *Maths by Email* on their opinions regarding the *beauty* of maths. In this case, as detailed in Table 14, of 754 respondents to this survey question, about 7 in 10 (68%) reported positive views regarding the beauty of maths *before* their *Maths by Email* experience. Twenty-eight percent overall reported initially neutral views about the beauty of mathematics.

Currently, however, about 6 of 10 (59%) respondents overall perceive that their opinions regarding the beauty of maths are more positive having experienced *Maths by Email*. Another 40% reported no change in their opinions on the beauty of maths. As depicted in Figure 19, 87% of respondents (all but 3 of 21) whose initial opinions regarding the relevance of maths were negative experienced a more positive change as a result of *Maths by Email*. Additionally, 6 out of 10 respondents whose opinions were initially neutral and a similar proportion of respondents whose opinions were initially positive experienced positive changes resulting from their *Maths by Email* experience. Overall, as might be expected, most *Maths by Email* subscribers held positive opinions about the beauty of



mathematics before subscribing. Only a small proportion of subscribers initially held negative views about the beauty of mathematics, and only 2 of 754 respondents experienced a more negative change. Generally, therefore, the newsletter's influence has been toward more positive or unchanged opinions for essentially all subscribers.

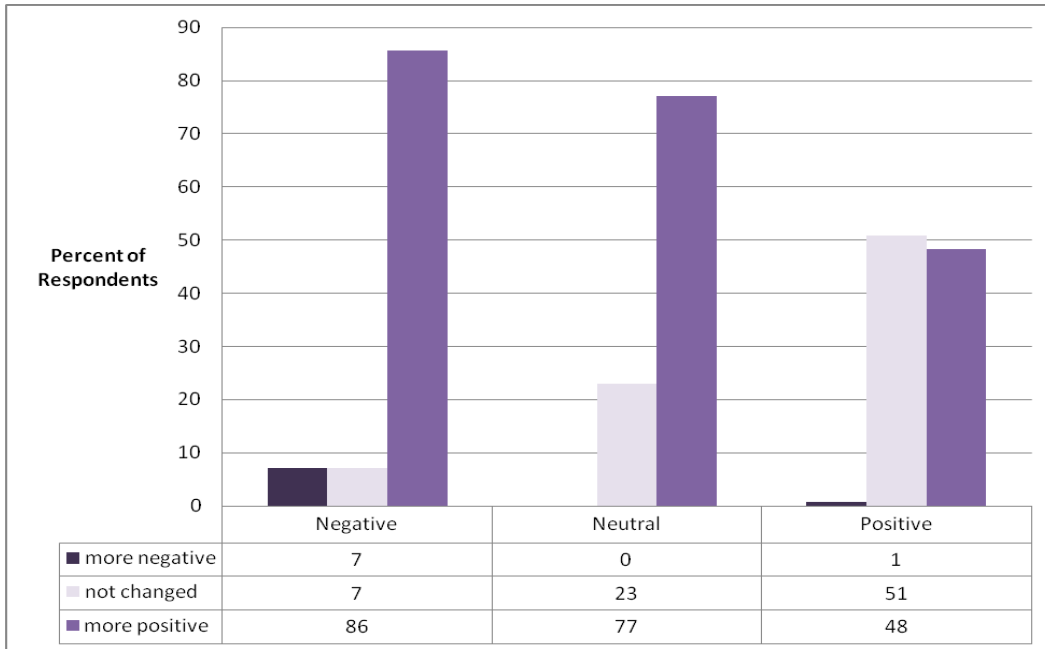


Figure 18. Subscribers' opinions on the relevance of maths before their *Maths by Email* experience, and currently.

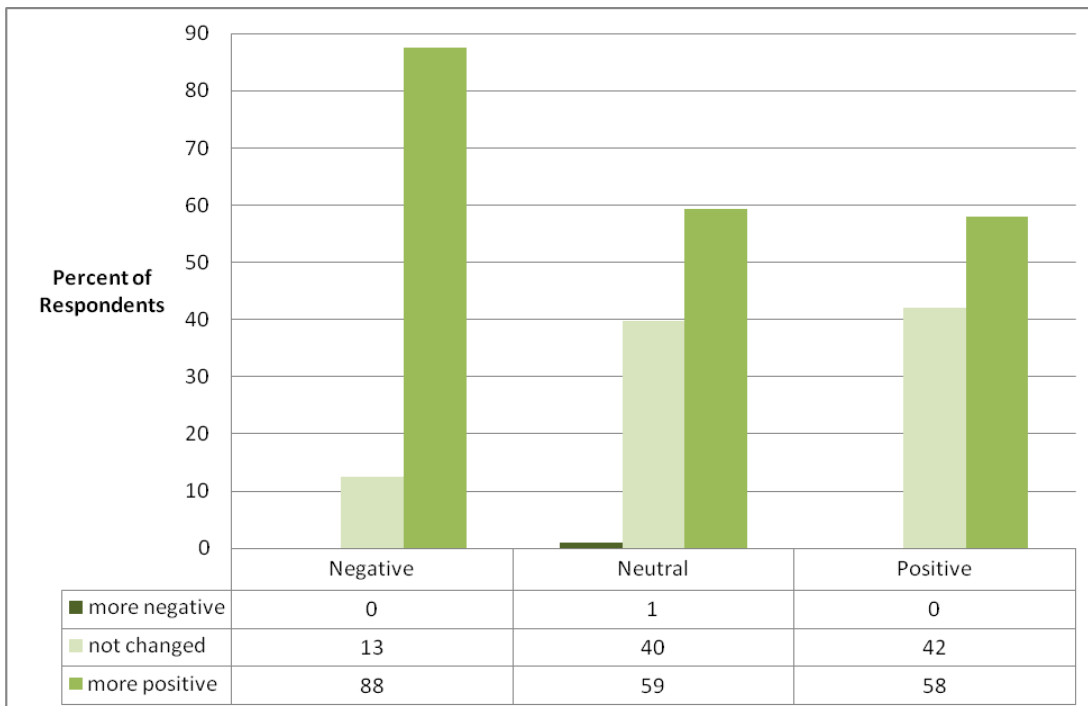


Figure 19. Subscribers' opinions on the beauty of maths before their *Maths by Email* experience, and currently.

Table 14. Subscriber respondents' opinions on the beauty of maths before *Maths by Email*, and currently.

Opinion on beauty of maths before <i>Maths by Email</i>		Opinion on beauty currently			Total
		more negative	not changed	more positive	
Negative	Count	0	3	21	24
	% within Opinion on beauty before	0.0%	12.5%	87.5%	100.0%
	% within Opinion on beauty after	0.0%	1.0%	4.7%	3.2%
	% of Total	0.0%	0.4%	2.8%	3.2%
Neutral	Count	2	85	127	214
	% within Opinion on beauty before	0.9%	39.7%	59.3%	100.0%
	% within Opinion on beauty after	100.0%	27.9%	28.4%	28.4%
	% of Total	0.3%	11.3%	16.8%	28.4%
Positive	Count	0	217	299	516
	% within Opinion on beauty before	0.0%	42.1%	57.9%	100.0%
	% within Opinion on beauty after	0.0%	71.1%	66.9%	68.4%
	% of Total	0.0%	28.8%	39.7%	68.4%
Total	Count	2	305	447	754
	% within Opinion on beauty before	0.3%	40.5%	59.3%	100.0%
	% within Opinion on beauty after	100.0%	100.0%	100.0%	100.0%
	% of Total	0.3%	40.5%	59.3%	100.0%

Last in this sequence of items about the influence of *Maths by Email*, respondents were asked to rate the influence of *Maths by Email* on their *interest* in maths. In this case, as shown in Table 15, of 760 respondents to this survey question, nearly 9 in 10 (87%) reported positive interest in maths *before* subscribing to *Maths by Email*. Eleven percent overall reported an initially neutral interest in mathematics.

Currently, however, about 6 of 10 (61%) respondents report a more positive interest in maths, having experienced *Maths by Email*. Another 4 in 10 (38%) reported no change in their interest in maths. As depicted in Figure 20, fully 95% of respondents (all but 1) whose initial opinions regarding the relevance of maths were negative experienced a more positive change as a result of *Maths by Email*. Additionally, 8 out of 10 respondents whose opinions were initially neutral and 6 out of 10 respondents whose opinions were initially positive experienced more positive changes resulting from their *Maths by Email* experience. Overall, as might be expected, a strong majority of *Maths by Email* subscribers held positive interest in mathematics before subscribing. Despite this,

however, the newsletter’s influence has clearly been toward more positive or unchanged interest in maths for the majority of subscribers. Only 5 of 760 respondents to this item reported currently more negative interest in maths having experienced *Maths by Email*.

Table 15. Subscriber respondents’ interest in maths before *Maths by Email*, and currently.

Interest in maths before <i>Maths by Email</i>		Interest currently			Total
		more negative	not changed	more positive	
Negative	Count	0	1	19	20
	% within Interest before	0.0%	5.0%	95.0%	100.0%
	% within Interest after	0.0%	0.3%	4.1%	2.6%
	% of Total	0.0%	0.1%	2.5%	2.6%
Neutral	Count	1	15	65	81
	% within Interest before	1.2%	18.5%	80.2%	100.0%
	% within Interest after	20.0%	5.2%	14.0%	10.7%
	% of Total	0.1%	2.0%	8.6%	10.7%
Positive	Count	4	274	381	659
	% within Interest before	0.6%	41.6%	57.8%	100.0%
	% within Interest after	80.0%	94.5%	81.9%	86.7%
	% of Total	0.5%	36.1%	50.1%	86.7%
Total	Count	5	290	465	760
	% within Interest before	0.7%	38.2%	61.2%	100.0%
	% within Interest after	100.0%	100.0%	100.0%	100.0%
	% of Total	0.7%	38.2%	61.2%	100.0%

### Analysis Question 13: Would subscribers recommend *Maths by Email* to others?

As an indicator of subscribers’ overall view of *Maths by Email*, survey respondents were asked whether they would recommend the newsletter to others. Figure 21 shows the overwhelmingly positive response to this question by the respondents. As shown in the figure, almost 95% of the 901 subscribers responding to this question on the current survey would recommend the newsletter to others. This was also the case for the first survey. Additionally, this high endorsement for the newsletter was observed to be the case across all levels of schooling identified as most relevant to survey respondents.

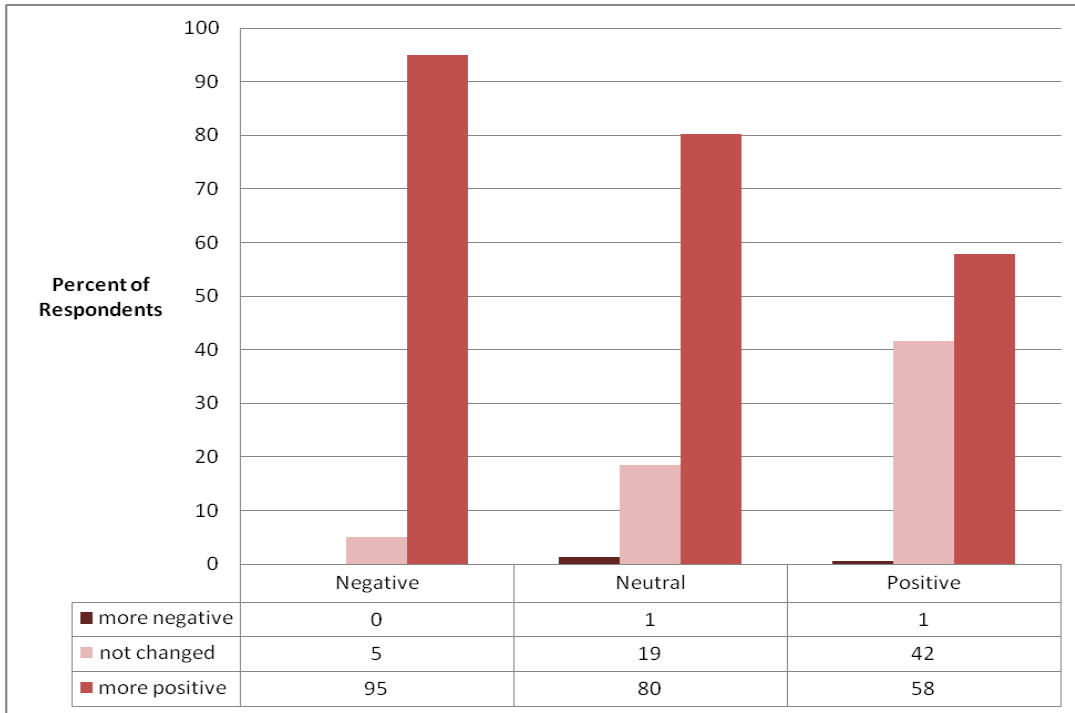


Figure 20. Subscribers' interest in Maths before their *Maths by Email* experience, and currently.

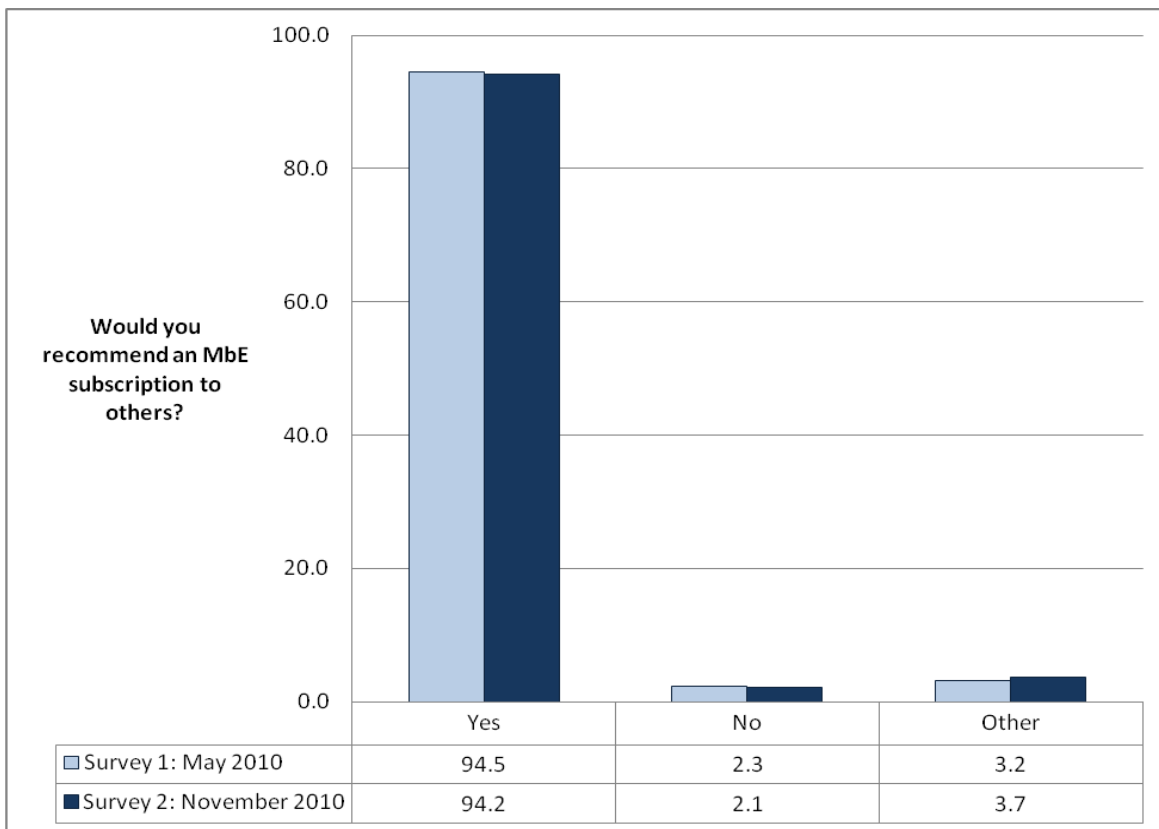


Figure 21. *Maths by Email* survey respondents' views on whether they would recommend the electronic newsletter to others.

**Analysis Question 14: For teachers only—how often do you use *Maths by Email* with others, and to what extent do you find the maths ideas and language consistent with the school curriculum for 9- to 13-year-olds, challenging and engaging?**

Survey respondents identifying themselves as teachers were asked a further series of questions to elicit the frequency with which they used *Maths by Email* with others generally, and the activities with students in classrooms specifically. In addition, these teachers were also asked about the extent to which they judged the maths language and ideas represented in *Maths by Email* as consistent with the school curriculum for 9- to 13-year-olds, as well as challenging and engaging for this age group.

**Teacher uses of *Maths by Email***

As shown in Table 16, a majority of teachers (51%) reported using *Maths by Email* with others *sometimes*. A further 31% of teachers overall reported using *Maths by Email* with others *usually*, while 6% reported doing so *always*. As shown in Figure 22, a higher proportion (4 out of 10) of upper primary teachers reported using the newsletter with others *usually*, as compared to only about 3 out of 10 teachers associated with the other levels of schooling.

Table 16. Extent to which teachers use *Maths by Email* with others such as students or colleagues.

How often do you use <i>Maths by Email</i> with others?	Level of School				Total
	Upper primary (9-12)	Early secondary (12-14)	Upper secondary (14-18)	Other	
Always	12	5	6	4	27
Usually	70	29	31	10	140
Sometimes	83	51	71	23	228
Never	10	7	8	6	31
Other	7	5	4	4	20
<b>Total</b>	<b>182</b>	<b>97</b>	<b>120</b>	<b>47</b>	<b>446</b>

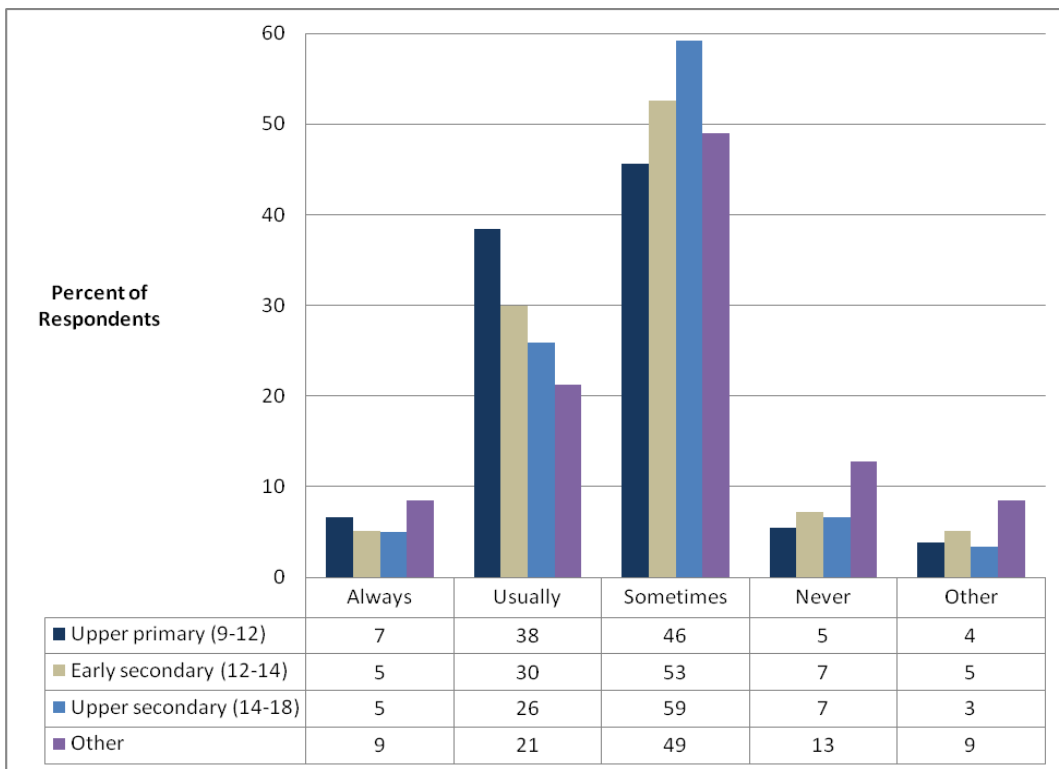


Figure 22. Extent to which teachers use *Maths by Email* with others, such as students or colleagues.

Teacher respondents were also asked to describe their use of the newsletter with the survey question: *In what ways do you use Maths by Email with other people?*

The 214 responses to this question comprised mostly two major activities, one concerned with discussion of newsletter material with others, including colleagues, students, friends and family and the other concerned with dissemination of information by other means, such as forwarding emails, using noticeboards, etc. The distribution of these is shown in Figure 23.

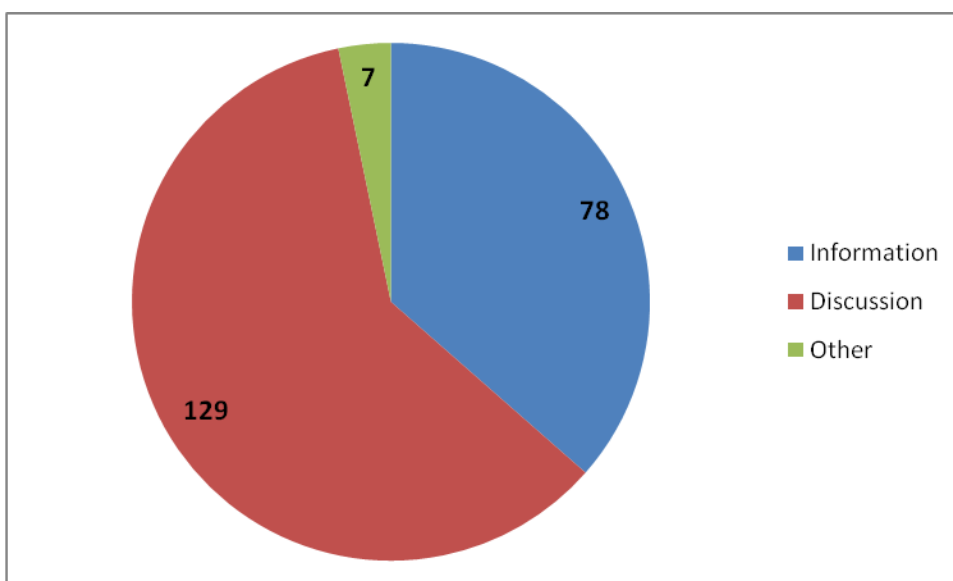


Figure 23. Teachers' patterns of use of *Maths by Email*.

### Information

Teachers described a variety of ways in which their subscription was used as a source of information for others. Typical responses in this category included the following:

*Pass on activities or websites they might find interesting.*

*As part of a newsletter with ideas for teaching.*

*Share the email.*

*I forward on to other teachers in my stage level.*

*Photocopy and distribute, scan for use on Smartboard.*

*Have published the Brain Teaser in the school newsletter to promote an interest in Mathematics in the broader school community.*

*Online gifted student in WebCT environment.*

*I use some of the 'did you know', main section and activities for my numeracy display board at school.*

### Discussion

The most frequent category of response involved personal discussion between the respondent and others. Typical responses in this category included the following:

*I integrate activities into my lessons; I talk to my class about the topic featured in the article; when I substitute for another teacher, I use the brain teasers to keep the class focussed.*

*I've posed the brain teasers to my family on serviettes in restaurants before!*

*In the classroom, as a talking point in the staffroom.*

*Share some of the ideas at staff meetings.*

*I often discuss the articles and do the activities with my classes.*

*We homeschool so I get a great deal of use out of the information.*

*Discuss the feature article in the staff room.*

*Talk to my family and get my children to do brain teasers.*

*I use the Activities in the classroom. They are fantastic, thankyou.*

### Newsletter components

While many of the responses did not refer specifically to components in *Maths by Email*, but rather referred generally to how they have used it, some did choose to refer to particular components. Responses were classified accordingly, separately from the classification above into modes of use. Figure 24 summarises the various references made. In interpreting the figure, note that some responses referred to more than one component, and so have been counted more than once.

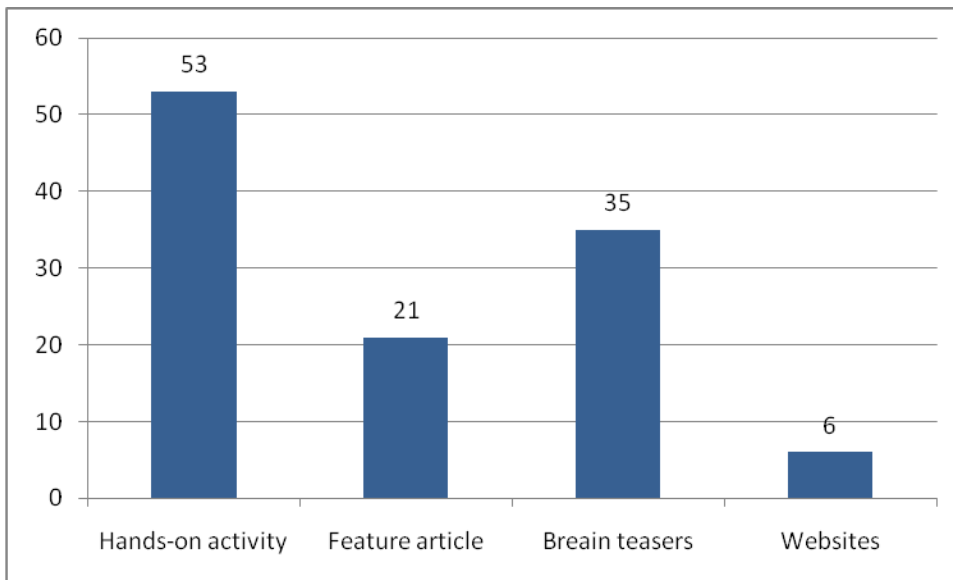


Figure 24. Teachers' references to components of *Maths by Email*.

Figure 24 makes clear that various newsletter components were used by teachers, particularly the Activity, Article and Brainteasers. The diversity of component types seems to support a range of responses by teachers, and the following section elaborates some of the ways in which materials have been used with students in particular.

### Use of *Maths by Email* with students

In addition to general use of *Maths by Email*, teachers were also asked about their specific use of the hands-on activities with students in classrooms. As shown in Table 17, a majority of teachers overall (54%) reported *sometimes* running *Maths by Email* activities with students in classroom settings.

Table 17. Extent to which teachers use *Maths by Email Hands-On Activities* in their classrooms.

How often do you use <i>Maths by Email</i> activities in the classroom?	Level of School				Total
	Upper primary (9-12)	Early secondary (12-14)	Upper secondary (14-18)	Other	
Always	2	0	2	0	4
Usually	58	15	17	4	94
Sometimes	79	51	71	25	226
Never	13	15	18	10	56
Other	21	10	5	4	40
Total	173	91	113	43	420



Overall, another 22% of teachers reported *usually* running *Maths by Email* activities with students in classrooms. However, as shown in Figure 23, and again unsurprisingly, 3 out of 10 upper primary teachers reported using the activities with students in classrooms *usually*, as compared to less than 2 out of 10 teachers associated with the other levels of schooling.

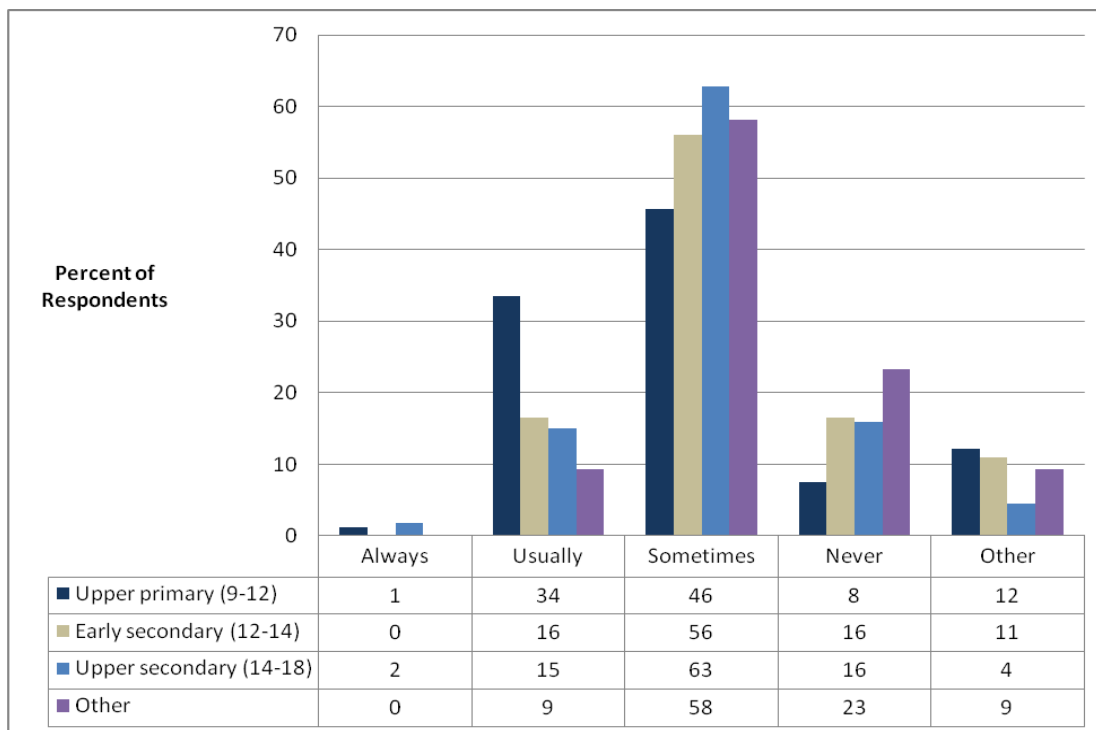


Figure 25. Extent to which teachers use *Maths by Email Hands-On Activities* in their classrooms.

Teacher respondents were also invited to elaborate on their use of the newsletter with their students, with the following prompt question: *Please describe briefly a specific example of your use of Maths by Email with students, including your impressions of how it went.*

This question prompted a wide range of responses, with varying levels of detail provided, so that it is not always explicit which components of the newsletter were used, the age of the students concerned, the duration of the example, and so on. As might be expected in a survey of this nature, some respondents are more expansive than others; some chose to describe a single example, while others described a regular and ongoing example. It is clear, however, that there is a range of responses on all of these dimensions. The entire file of responses will be sent to the publishers; in this section, a brief summary of respondent impressions are offered, together with a selection of examples.

The analysis below focuses attention on the reported impressions of teachers on the question of ‘how it went’. For the most part, these impressions comprise teachers responding to how their students reacted to their attempts to make use of materials in the newsletter. These are necessarily self-reports, of course, but provide important data regarding teacher’s reactions to the value of *Maths by Email*, as those same impressions will presumably affect their advice to colleagues about the newsletter and their own decisions to continue to make use of it.

In reporting responses from this perspective, it is also clear that a range of student ages, schooling contexts, levels of teaching and components of *Maths by Email* are involved in the examples chosen below. For this reason, a more substantial analysis of these dimensions is regarded as unnecessary,

and is slightly risky in any event, because of wide differences in the amount of information that respondents have chosen to provide.

### *Student reactions*

Despite the question phrasing, not all respondents in fact gave their impressions of the reactions of their students to the experiences with *Maths by Email*, with some responses focussing only on describing the ways in which they had used the newsletter with their students.. There were 113 responses that did choose to include some form of evaluative response, summarised in Figure 26.

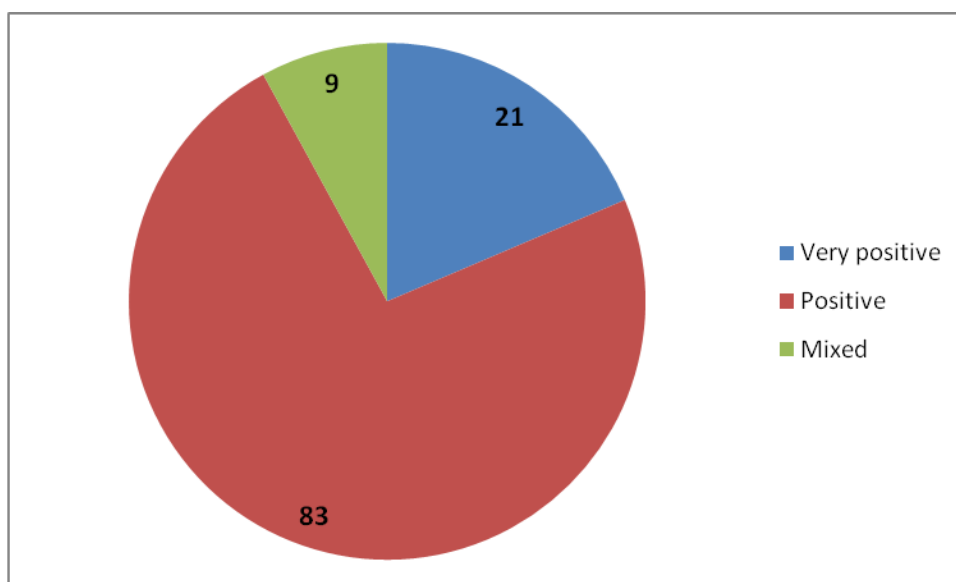


Figure 26. Students' responses to *Maths by Email*.

It is clear from Figure 26 that the overwhelming majority of the reported impressions were positive, with a substantial number being very positive and only a few being less than enthusiastic (and then generally for only some students). There is no reason to think that respondents have felt unable to report negative experiences, although it seems plausible that survey respondents are likely to be generally positive about *Maths by Email*. Regardless of the reasons, there is strong evidence here that teachers have found some of the *Maths by Email* materials of value in their work with students.

To clarify the classification of responses into the three categories shown in the figure, here are some examples of responses in each category:

#### *Very positive responses*

Some responses were especially positive about the classroom experiences with their students, with a range of ways of reporting these. Here are some examples.

*Activity climb through a hole in a piece of paper. Students were engaged and challenged to think outside the square, also encouraged good teamwork skills. was a terrific maths lesson, that didn't require a lot of preparation with resources.*

*Feature articles e.g. Complexity Theory (discussion, students use websites, or imaginations, to find other examples, present, explain and justify them to the class as other examples). Highly successful as it allowed students to experience important real life applications of mathematical science. Great to have kids discussing, asking questions about maths - questioning others' justifications of examples of*

*complexity theory. this type of investigation lets kids experience the real joy of mathematical investigation. A great success.*

*Tessellation activity - perfect lesson. Students were totally engaged in the activity and understood the concept. Thank you.*

*I am a homeschooling mum (hence I am a teacher) and I discuss many of the topics with my daughter (10yo). we have started to make the activity part of our maths studies. We used the logic problems activity and my daughter loved it! The explanations were clear and logical and she is now a big fan of logic problems.*

*I used the trilateration/ gps activity when my grade 5 class were learning about the parts of a circle-- I used a page from the local street directory as the basis - the boys in particular loved it. More recently, I tried the "thumb war" activity with a grade 3 class---- it was NOISY but fun.*

*I used the tiling activity from 17 August with a selected group of 5/6 students. The boys in particular were fully engaged and all students produced some truly beautiful results which are still displayed around the school.*

*The use of the brain teaser is wonderful. Kids love it!*

*We looked at the traffic light web activity. The students really enjoyed the activity and it kept my more advanced students engaged for a long time.*

#### *Positive responses*

Most responses reported positive impressions of the experiences with students for the example chosen. The following examples reflect the rich assortment of ways in which teachers have felt that different components of the newsletter have been successfully used with a range of students, over a range of ages and in a range of ways to evoke positive responses.

*I used the logic puzzles with a year 8 and a year 9 class. It was successful and I have added them to my repertoire of teaching activities.*

*Locusts are a real concern in our area at the moment so it generated interest that mathematicians are working to solve the problem and not just scientists.*

*This service is used for my children who homeschool. Some of the activities are used and the children always get enjoyment out of it as it isn't 'boring' maths.*

*Brain teasers are a fantastic plenary activity and sometimes get sent home for parents as well.*

*I used the making of 3D structures with jubes and tooth picks and it was well received by the students.*

*I always take the latest copy to class to share with my students. This works well as the class is "resistant" to school, but they don't see Maths by Email as school work so they learn to love maths.*

*I used a weblink to a site which visually represented a trillion dollars - students very impressed with a visual idea of how much a trillion really is.*

*Using tessellating tiles activity went well. They understood how irregular shapes can tessellate, which they found hard before.*

*I put the brainteaser in the school newsletter as a competition for the students. The newsletter competition is a hit and the students love emailing me for hints and showing me all their working out to get the points.*

*Made the imperial pie - excellent activity and yummy - for my maths extension Yr 1 and 2 class.*

*A brain teaser was given as a ticklish problem last period on Friday and many went away discussing maths.*

#### *Mixed responses*

For 9 respondents, student reactions were somewhat mixed. Although the impressions were not wholly negative, they acknowledged the difficulties of reaching and engaging all students with a particular activity, and the reality for some students to need more help than others, so that responses were more clearly lukewarm than those reported earlier. The following comprises the entire set of responses that were classified in this way, reproduced here in their entirety in view of their small number.

*Posting brainteasers on the board for early finishers ... some students successfully work problems out and some do not even try!*

*Extension for brighter/more capable students - brainteaser or online activity. Usually goes well but would be better for students to be able to complete with less adult help.*

*Did the algorithmic test of how to determine if a number was divisible by nine and tried to develop one for other numbers. Activity was good but my under performing Year 10 class were largely unimpressed.*

*Did an activity as a challenge task - it was difficult as my kids are younger but some found it very interesting.*

*Used the article about how maths has influenced the design of rollercoasters. Used the websites that went with it, but my students were struggling to understand the concept let alone the maths.*

*I sometimes give the brain teasers to my older students, some of whom enjoy the exercise.*

*Mostly use the main article to broaden students' ideas about maths in the community -usually some interest but often maths becomes too difficult for lower secondary.*

*A number puzzle and it extended their mathematical thinking though they needed some guiding.*

*Mainly "did you know that...." Then ask students to "Google" a few of the topics, but they rarely do.*

Together, these responses reflect a reality known to all teachers that there is no panacea for attracting and retaining students' interest and attention, and that there are also idiosyncracies in interpreting events in classrooms. This is a small number of lukewarm or mixed responses, in a context in which respondents were free to provide as much evidence as they wished of both positive and negative responses of students to their work involving *Maths by Email*. It seems reasonable to infer that the reception by students of their teachers' efforts to make educational use of the newsletter has been positive.

Teacher subscriber-respondents were also asked to appraise *Maths by Email* for its alignment with the maths curriculum, its degree of difficulty (challenge) for 9- to 13-year-olds and the extent to which it engages or enriches maths for 9- to 13-year-olds. As shown in Table 18, 6 in 10 teachers judged *Maths by Email* as *moderately aligned* with the maths curriculum for 9-13-year-olds. Another 26% of teacher respondents judged it as *very aligned*, and 8% were not able to judge. The views of these teacher subscribers on the alignment of *Maths by Email* with school curriculum were relatively consistent across the levels of schooling most relevant for respondents.

Table 18. Extent to which teacher subscribers appraise *Maths by Email* language and ideas as consistent with curriculum for 9-13-year-olds, difficult or challenging for 9-13-year-olds; and enriching or engaging for 9-13-year-olds.

Alignment with curriculum for 9-13 year olds		Level of School				Total
		Upper primary (9-12)	Early secondary (12-14)	Upper secondary (14-18)	Other	
Not consistent/aligned	Count	11	10	7	3	31
	%	6.0%	10.3%	6.0%	6.4%	7.0%
Moderately consistent/aligned	Count	107	60	67	24	258
	%	60.1%	62.9%	57.3%	53.2%	59.2%
Very consistent/aligned	Count	52	22	29	10	113
	%	29.0%	22.7%	24.8%	21.3%	25.7%
Not able to judge	Count	8	4	14	9	35
	%	4.9%	4.1%	12.0%	19.1%	8.1%
<b>Challenging ideas and language for 9-13 year olds</b>						
Not difficult	Count	11	10	8	5	34
	%	6.6%	10.2%	7.0%	12.5%	8.1%
Moderately difficult	Count	131	71	77	29	308
	%	72.7%	73.5%	67.0%	60.4%	70.0%
Very difficult	Count	28	11	10	3	52
	%	15.3%	11.2%	8.7%	6.3%	11.7%
Not able to judge	Count	9	5	20	10	44
	%	5.5%	5.1%	17.4%	20.8%	10.1%
<b>Engaging or enriching for 9-13 year olds</b>						
Not engaging/enriching	Count	2	3	2	2	9
	%	1.1%	3.1%	1.7%	4.2%	2.0%
Moderately engaging/enriching	Count	90	56	55	18	219
	%	49.7%	58.8%	47.0%	37.5%	49.7%
Very engaging/enriching	Count	79	32	40	17	168
	%	44.3%	33.0%	34.2%	37.5%	38.4%
Not able to judge	Count	8	5	20	10	43
	%	4.9%	5.2%	17.1%	20.8%	9.9%

In terms of challenge, Table 18 also shows that 7 in 10 teachers find the newsletter’s language and ideas *moderately difficult*. Unsurprisingly, a higher proportion of teachers associated with upper primary schooling (15%) found the language and ideas *very challenging* as compared to early secondary (11%) and upper secondary (9%).

Lastly, as shown in Table 18, a plurality of teachers overall find *Maths by Email* *moderately engaging* or *enriching* (50%). Another 38% find *Maths by Email* *very engaging* for 9- to 13-year-olds. Again, in comparison to early secondary (33%) and upper secondary (34%) teachers, a higher proportion of upper primary teachers (44%) thought *Maths by Email* *very engaging* for students in the 9-13-year-old range.

### Analysis Question 15: What advice do subscribers have for changes to *Maths by Email*?

Respondents were asked: *What changes to the content of Maths by Email would you like to see in future editions?*

Of the 889 survey participants, only 353 responded to this question; 349 of these provided informative responses. These are summarised in Figure 27 below.

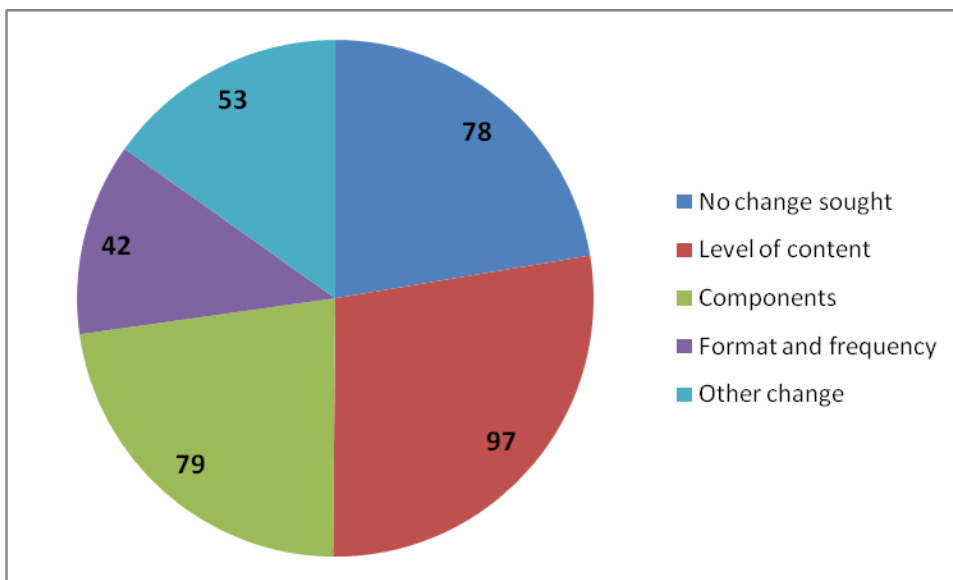


Figure 27. Categories of respondents suggested changes to *Maths by Email*.

#### No change

Perhaps surprisingly, in view of the wording of the question, almost a quarter (22%) of respondents to this question did *not* in fact propose changes, with typical responses like the following:

*It's all good.*

*From my perspective, the current format is fine.*

*I like all the sections. Keep up the good work!!*

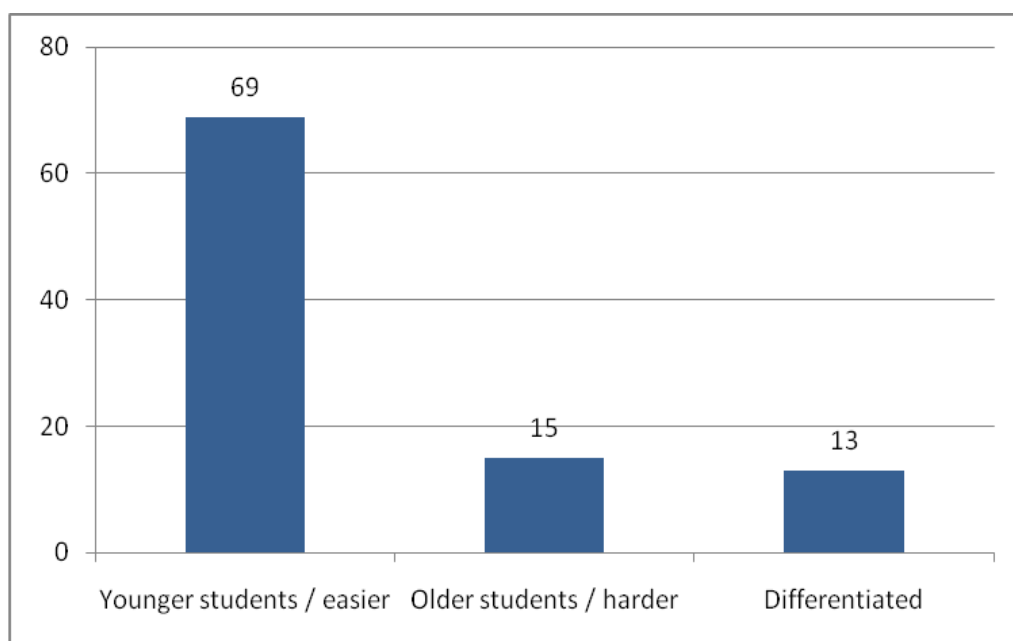
*None, I'm very happy with the content currently.*

*It's fine as it is; if you put more into it, I'm probably less likely to read it!*

It seems reasonable to assume that many of the 536 survey respondents who chose not to answer this question were also happy with the present newsletter, but did not feel it was necessary to respond to this question in order to communicate that opinion. By this reasoning, the great majority (around 70%) of survey respondents have not suggested any changes to *Maths by Email*.

### **Level of content**

The most frequent topic of responses to the question concerned the level of the material, with 28% of the respondents to the question referring to this in some way. The figure below shows that responses regarding the level were into further classified into three groups.



*Figure 28. Categories of level of content changes suggested by subscribers to Maths by Email.*

The great majority of the 69 suggestions (71%) regarding the level of content were concerned with catering for younger students and making the content more accessible to a wider range of those students. Typical responses of this kind were:

*More content that is instantly usable for Years 4 and 5 primary students.*

*Short and sharp for younger kids.*

*I'd love some activities for younger students.*

*Less degree of difficulty for brain teasers and activities.*

*It would be great to see stuff suited to Joe Blow average in Grade 1.*

*Some easier activities for middle to lower primary.*

*Could you please include some simpler stuff which would be interesting and useful for years 5, 6 and 7. Most of the activities are high-school based.*

Fifteen respondents (15%) suggested a greater emphasis in the other directions, with typical responses like these:

*Maybe some more activities set for upper secondary students.*

*I know it is hard to be all things to all people, but some harder brain teasers would be fun (like AMS puzzle corner).*

*Harder or more in depth topics for older students.*

*More high level maths.*

*Features on calculus.*

Another thirteen respondents (13%) suggested that explicit attention should be given to a range of levels. The following are typical of these responses:

*Differentiated activities, suitable for different year levels.*

*Try and have some activities for a broader age range. E.g. some for primary age and also some for older students.*

*Activities for different age groups related to the same concept.*

*Senior school section and junior school section.*

To some extent, of course, respondents are likely to prefer that the newsletter content is rendered most appropriate for the student age group with which they are affiliated, so that a range of this kind is not surprising. On balance, however, it would seem that there is a stronger sentiment amongst subscribers to cater to the needs of younger rather than older students, although few respondents gave an impression that they would suggest that the focus be too narrowly restricted.

### **Components**

Respondents who offered advice about changes to particular newsletter components covered a wide range. Figure 29 shows how the 79 responses were spread. (Although some responses referred to more than one component, each response is represented only once below, with the main features used to classify a response as referring to a particular component.)

The most frequent component for which changes were suggested was the *Brainteaser*, or puzzle, with most of the 31 respondents suggesting that there be more of these. Typical responses included:

*More brain teasers, puzzles and interesting facts.*

*More teasers.*

*Some harder versions of the brain teasers alongside the existing ones.*

*More puzzles and brainteasers they are my favourites.*

*More puzzles.*

*More brain teasers! Perhaps each time it came out there could be an explanation for a theorem or something like that, maybe relating to the brain teasers?*



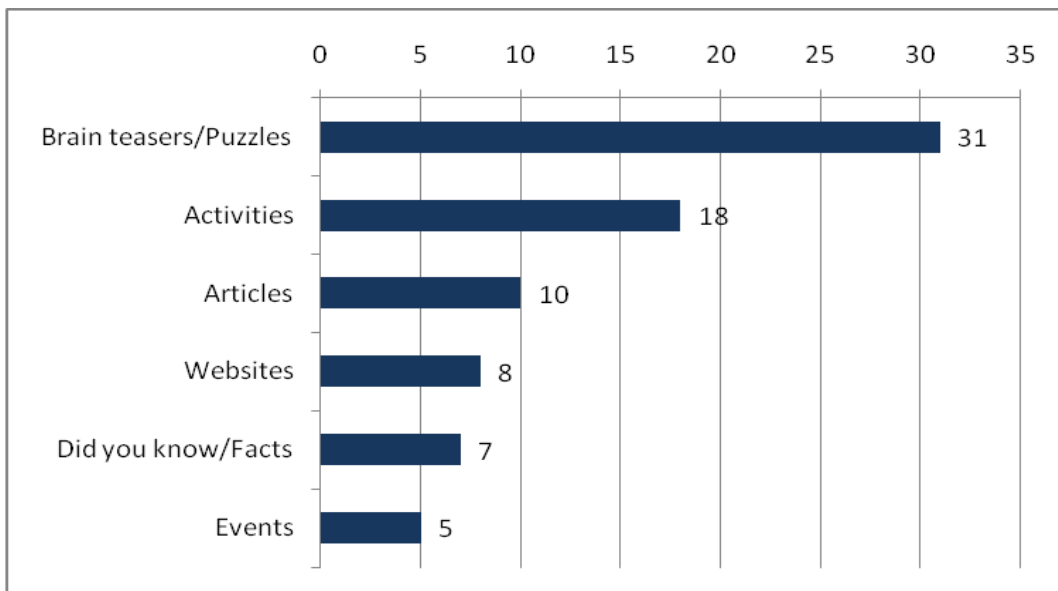


Figure 29. Various components of *Maths by Email* suggested for change.

Although this was the most frequent component for which specific changes were suggested, it is perhaps timely to recall that only 31 suggestions were made from 890 respondents, so that it would be unwise to over-react to such advice. While puzzles and brainteasers frequently have some entertainment value, it is also the case that they frequently do not encourage deeper mathematical thinking; indeed, it has been suggested that a defining characteristic of a mathematical puzzle is that it does not lead to further interesting mathematics.

There were 18 suggestions for changes to Activities. While many of these respondents merely advised that there should be more hands-on activities, other opinions were offered as well, as the sample responses below indicate:

*More student based activities.*

*Activities that are more home schooling friendly that is ones that we don't have to necessarily go out and buy things.*

*Interesting and inventive maths games for hands-on activities.*

*Activities and suggestions for mathematical investigations that can be given directly to students in Years 7 to 9.*

*I want some artistic activities.*

The ten responses that suggested changes regarding the Articles also offered a range of opinions, as these samples show:

*More and/or longer articles.*

*Shorter articles.*

*More articles for teachers.*

*Less hands-on activities and more articles about maths.*

*More feature articles and maths in architecture.*

The eight responses that focused on Websites also reflected a range of opinions, as these examples indicate:

*More interesting websites.*

*More websites to visit.*

*Less links (and therefore less distractions....)*

Seven respondents offered advice regarding Facts (such as Did You Know?). Here are three examples:

*More did you know.*

*Keep fun and interesting. I prefer tidbits easily understood with the option of digging deeper provided in the email.*

*Quiz questions like in the Science by Email emails.*

Finally, five respondents made reference to the Events (which are usually unavoidably local). Here are three of them:

*Living in Tasmania, there are few events I can feasibly attend.*

*Events aren't anywhere near where I live, so they are of no interest to me.*

*I would love to see some of your in-person events available for viewing online, either like You-Tube or live streaming.*

Overall, it seems that a strength of *Maths by Email* is the diversity of content in successive issues. While it seems unreasonable to attempt to meet all of the needs and wants of a wide group of potential readers, some of which contradict each other, the provision of a variety of material in the form of a set of components seems likely to offer a good compromise.

### ***Format and frequency***

Of respondents offering suggestions for changes, 42 referred in some way to the format of the newsletter, including its frequency of occurrence. Figure 30 shows a further breakdown of these comments into three broad groups.

The 29 suggestions for changes in format addressed a range of aspects, some of which are reflected in the sample comments below:

*I would like to see it look more like the online version.*

*More images.*

*Some sort of summary towards the top of the email telling what is contained.*

*Less clutter.*

*More colours.*

*Breaking up the text more, so that it doesn't look like one, long, boring, email.*

*PRINT friendly version?*

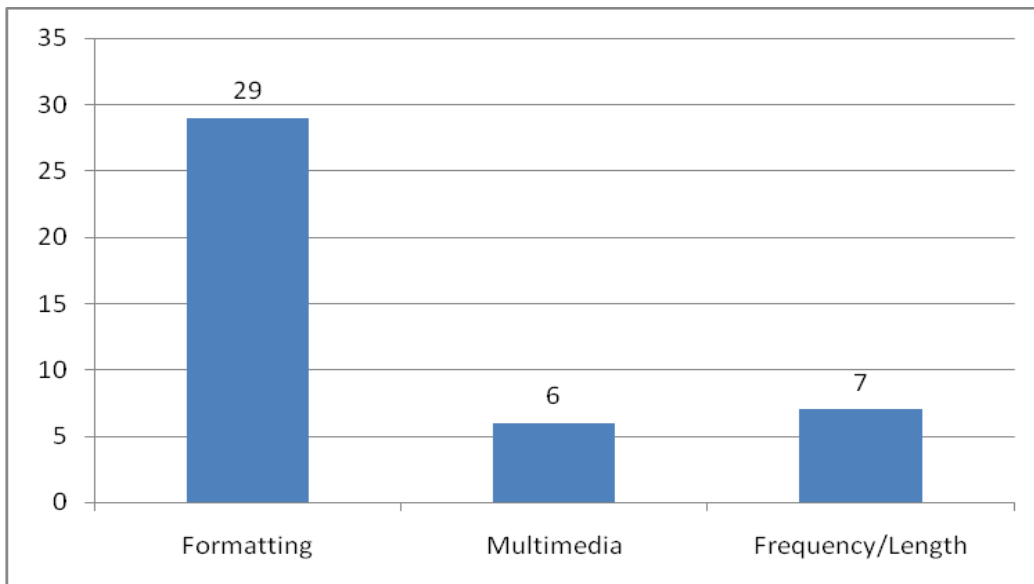


Figure 30. Suggested changes to format and frequency by subscribers to *Maths by Email*.

Some of the requests made regarding formats suggest that the respondents are not familiar with their computers or, in some cases, are unaware of the online activity archive. In addition, different email clients will handle the same information differently. Nonetheless, it may be advisable for the publishers to scrutinise respondents' comments with a view to looking afresh at the physical design of the newsletter.

In response to the question on changes, six respondents suggested that multimedia elements be added to the newsletter in the form of games, interactives or videos. Here are three of the suggestions:

*What else can you do. Maybe add some learning objects or video showing actual mathematicians or teachers demonstration a concept – best practise (sic).*

*Interactive computer games.*

*More short videos that can be shown in class.*

Such requests might be better met by linking to appropriate websites, as has already been done in several issues during 2010, however, rather than including material of this kind in the newsletter. The costs of production would make such undertakings very difficult.

Finally, seven respondents referred to the length or frequency of the newsletter, with all wanting it to be either longer or more frequent. The following are typical of these:

*I would like it to be weekly. It provides some very interesting ideas.*

*More content.*

Overwhelmingly, respondents to the survey have not suggested that it be more frequent or larger, so that it seems reasonable to interpret both the length (four pages) and the frequency (fortnightly) to be appropriate. Increasing either of these would clearly have significant implications for the cost of production and the maintenance of quality.

### Other suggested changes

An assortment of other suggestions for change were offered by 53 respondents. Some of these can be classified into groups, while most cannot, as shown in Figure 31.

Ten respondents referred in some ways to alignment of *Maths by Email* to particular mathematics curricula, including the forthcoming Australian Curriculum: Mathematics. Some of the comments of this kind include:

*A specific link to National Curriculum.*

*NAPLAN style questions and what types of common misconceptions students have around different types of questions.*

*I like to see links which reflect NSW syllabus content framed in an interesting way.*

*Links to VELS.*

While such sentiments are perhaps understandable, given the constraints under which teachers work, it seems unwise to devote too much energy to making such links, but rather a better strategy to expect teachers (including homeschooling parents) to make such links themselves. It is clearly inappropriate to make explicit links to particular state curricula (as two of the above respondents have suggested), and it is perhaps unwise to attempt more linking than is presently provided on the activity archive on the web (where activities are loosely linked to content strands of the proposed Australian Curriculum: Mathematics.) Again, it is noteworthy that very few respondents have sought these kinds of links.

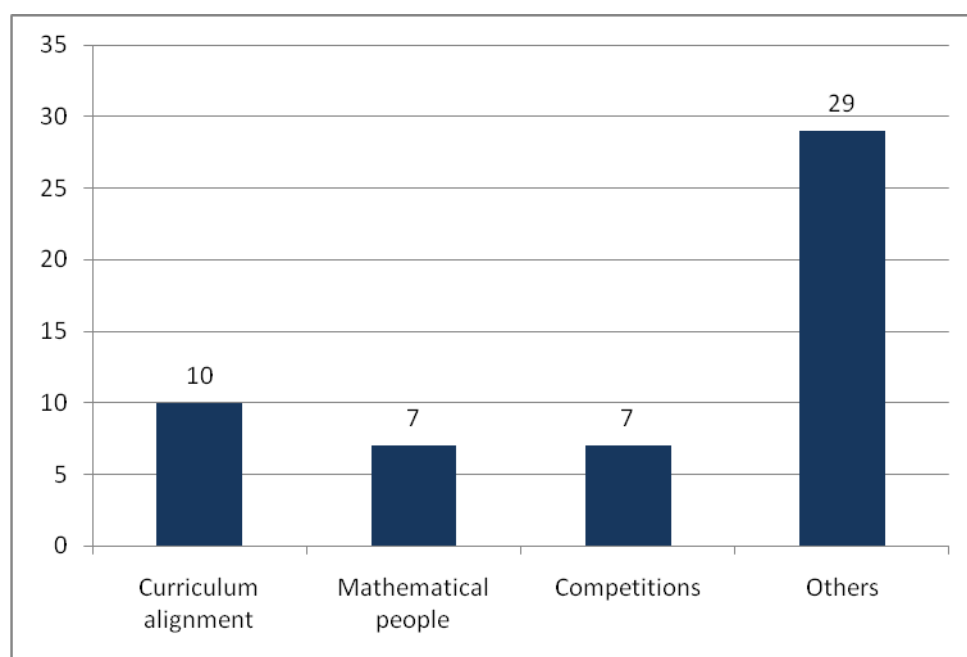


Figure 31. Other types of change suggested for *Maths by Email*.

Seven respondents suggested a direct connection to the history of mathematics and to mathematicians, past and present, directly or indirectly, as these illustrative comments reflect:

*Feature articles on mathematicians; both modern and historical to share how their discoveries influence the jobs of today and the world we live in.*

*A Meet the Mathematician section – a very short bio, in plain English.*

*Quick biographies of people who've used mathematics in creative ways.*

To a large extent, it seems that mathematicians and users of mathematics are already featured in the newsletter, especially when modern applications are described, so that a continuance of present practices may satisfy these respondents to an extent. However, the idea of focussing attention on the people involved might be relatively easy to do and support the wider aim of *Maths by Email* of encouraging students to consider careers that involve mathematics.

Seven respondents referred to the idea of competitions of some sort in *Maths by Email*. Illustrative responses include the following:

*I would like to see more competitions.*

*Maybe student competitions?*

It is not clear how well considered such suggestions are, as it would place very considerable strain on resources for there to be a competition element in *Maths by Email*, assuming that a process of determining 'winners' would be needed. In addition, significant disquiet would be likely to result from projecting mathematics as a form of competitive activity (with most participants likely to be regarded as losers), and we would not suggest that this is a good path to follow.

Other suggestions cover a range of areas, and are worthy of scrutiny to consider future directions. Some of those offered include:

*More mathematical art.*

*Students opinion, how they do things in the classroom...*

*Group involvement topics (class room).*

*Maybe incorporate more statistics material, especially using Australian data.*

*Maths in the news.*

*More awesomeness...*

*Careers related to maths and science.*

*Capacity for students to ask questions.*

Some of the suggestions offered are a little cryptic, and some others may require resources beyond what *Maths by Email* is likely to be able to obtain. Many suggestions are idiosyncratic to one or two respondents only. However, collectively the suggestions provide some interesting food for thought, and it is recommended that the editor and publishers consider the advice offered with an open mind for ideas to improve the newsletter. Overall, it is clear that, while many respondents would seem to be relatively happy with the current mixtures of topics, formats and perspectives, there are also suggestions offered that would seem to give opportunities for increasing the effectiveness of the newsletter.

## Further comments

In case the survey did not address the full range of their feedback, respondents were invited to provide other comments in response to the general invitation: *Please use the space below to add any further comments or advice you may have about Maths by Email.*

Of the 201 who chose to do so, 179 provided informative responses. These are summarised in Figure 32..

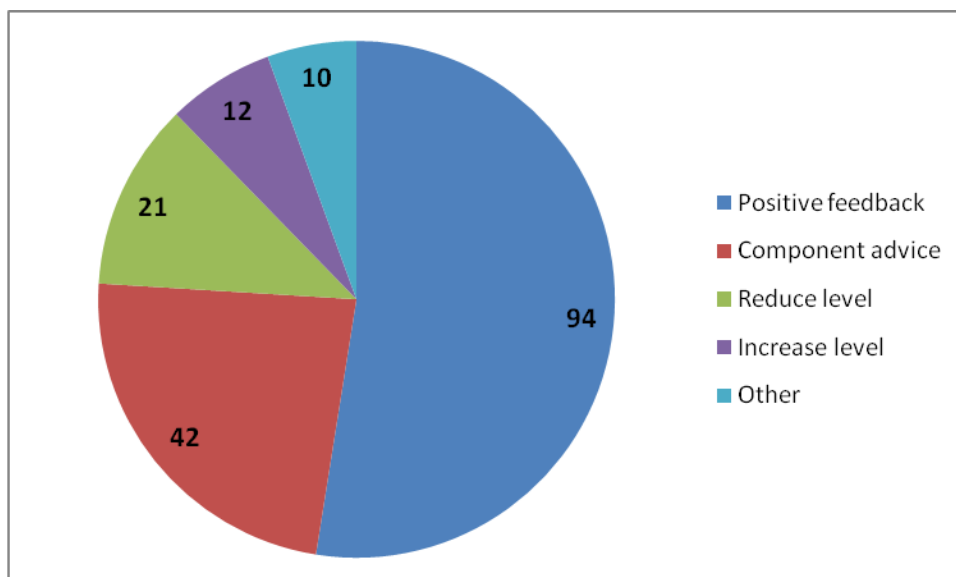


Figure 32. Subscriber respondents' further comments about *Maths by Email*.

### **Positive feedback**

The majority of further comments (53%) were restricted to offering positive and general feedback of various kinds. Typical responses in this category included:

*This is a great resource both for my students and myself. I love it! Thanks.*

*Thank you for sending stimulating activities and ideas.*

*My family look forward to maths by email, each of us having our own favourite section. We always read the entire newsletter, and are usually amazed by the way maths is applied in the community.*

*It's a fabulous tool. Well done and keep up the good work. It's good to see the relevance of maths in daily life. And it helps the children to look at the subject with new eyes and therefore more interest and less dread.*

### **Component advice**

This category included the 23% of comments that referred specifically to only some of the components or offered specific advice on improvements. Many of these comments also expressed positive reactions to the newsletter in various ways. Examples of responses include::

*The archive of activities on the website is great. I'd like a searchable archive of other parts of maths by email as well.*

*I would love more stuff for homeschooling families.*

*It's great. I don't have time to do the hands-on activities, but I love the article and brain teasers!  
Good job!*

*Add in a mathematically based joke of the week or cartoon.*

*Although I am not a teacher, I do sometimes use the math puzzlers in the office to challenge other people. I also forward Maths by Email to my daughter who is training to be a teacher.*

*It could be smaller but more often.*

*There should be more activities!*

*You should put more videos that can make maths more interesting.*

### **Reduce level**

There were 12% of the responses proposing more focus on younger students, those less comfortable with English or students with less conspicuous mathematical talent. Examples in this category included:

*The WAY maths is used is very interesting, new and inspiring to the 9-12 age group but even the simple explanations of HOW the ideas are applied is beyond my students (and sometimes – me!) That does not, however, stop it from being interesting.*

*I'd love more for younger students.*

*As a primary teacher educator I pass on ideas to my students. Unfortunately their mathematical skills and understandings are on a par with middle primary and their confidence and attitude towards mathematics is sadly lacking.*

*I teach indigenous language speaking students, so the English used is usually beyond them.*

*I would love to see more aimed at 9-12 year olds.*

*Subject matter is usually something that would appeal to 9-13 year olds, but the presentation of the information takes it beyond what the 'average' student can cope with.*

*Often I reword ideas to present to others – students I deal with are ESL.*

### **Increase level**

In contrast to the previous group, 7% of the responses suggested an increase in the level of focus of the newsletter, or expressed support for a higher level focus, for a range of reasons. Some of these responses include:

*Section for older people and more pictures/photos.*

*Sometimes more challenging problems for students to attempt to extend them would be good. Some of the brain teasers students have done similar before.*

*Overall, this is quite good. I would still prefer something that requires an in-depth view and a little "nutting-out", but one must always please the masses first.*

*Student who enjoy Maths like the emails.*

*Make it more challenging.*

*Excellent free service for those who love and are good at maths and sometimes school doesn't provide for adequately.*

Detailed responses to this question have been separately forwarded to the publishers.

## Discussion and recommendations

The final survey findings and respondent comments presented in the preceding section provide data on a number of analysis questions identified. In this section, we provide a brief interpretation of some of these data, together with some recommendations, while also recognising that other data are self-explanatory and do not require detailed interpretation to be useful. As noted earlier, the emphasis of this report is placed on the final survey data, with the first survey regarded as providing initial formative advice.

In interpreting the first set of survey data, it was important to recognise that respondents had seen only (at most) the first five or six issues of *Maths by Email* at the time of responding to the survey, so that there were risks that they might have been especially influenced by a particular one of those issues. In addition, there are always risks of a novelty effect with a new venture, rendering longer-term interpretations hazardous. While it is expected that many respondents to the second survey were also respondents to the first survey, and thus will have been subscribers for much of 2010, data on that point are not available. Finally, all respondents have subscribed to *Maths by Email* voluntarily and have then volunteered to respond to the survey, so that there are interpretive risks associated with self-selection.

With these caveats in mind, it is clear that the issues of *Maths by Email* in its first year of operation have been well received overall by subscribers, that the newsletter is designed well to achieve its various aims and that it is providing material to suit a range of audiences, in addition to the target group of 9-13 year olds. Despite ample opportunity for a range of opinions from subscribers to be provided to the evaluation, there have been remarkably few concerns or negative opinions expressed about the newsletter, and a good deal of praise from a range of communities.

### *Respondents and subscribers*

Analysis Questions 1 and 11 can be considered together. As anticipated by the designers, Figure 1 shows that the main group of subscribers responding comprises teachers, spread across both primary and secondary school, with parents the next largest group, followed by students. Figure 4 shows that the group of respondents reflects well the subscriber base, except for a slight overrepresentation of subscribers from New South Wales and Victoria. As suggested in the first survey, the subscriber base is roughly proportional to the population of the states, with the exception of NSW, which is a little underrepresented, for reasons unknown to the evaluators. It is also noteworthy from Figure 3 that Victorian teachers are overrepresented in the survey, accounting for 37% of the respondents who were teachers.

Thus, although the survey was not completed by a random sample of respondents, and is inevitably skewed a little by the effects of volunteers, it provides a reasonable basis to draw conclusions about the effectiveness of the *Maths by Email* newsletter over 2010, drawing from a wide range of subscribers across the groups of interest.

It is noteworthy that the main mechanism for finding out about *Maths by Email* seems to come from CSIRO activities, as shown in Figure 16, which seems likely to reflect positively on other CSIRO activities, notably *Science by Email*. There would seem to be a good case for wider publicity of



*Maths by Email*, such as through the various professional mathematics teacher associations, state and national, as these seem likely to come to the attention of different teachers (especially). Some of these associations have significant memberships among primary teachers and schools, who may be under-represented in the *Science by Email* database in some states. In addition, in view of the principal target group of 9-12 year old students, key national associations (such as The Australian Primary Principals Association) and their state counterparts may also offer good opportunities for publicising the newsletter.

Similarly, the CSIRO might find it helpful to approach parent groups directly to explore ways of bringing *Maths by Email* to the attention of a wider group of parents. The over-representation of home schooling parents in the sample may reflect a more active search among that group for opportunities for learning outside normal schooling.

The slightly lower subscriber rates for New South Wales shown in Figure 4 may indicate that extra efforts may be needed to ensure adequate publicity in that state, especially amongst teachers.

Overseas survey respondents were located principally in USA, New Zealand and England, and do not constitute a large enough group to be of concern regarding the representativeness of the sample.

**Recommendation:** CSIRO continue to explore wider publicity options for *Maths by Email* to build the subscriber base, particularly in New South Wales and amongst teachers and parents of 9-12 year olds.

### *Reading time*

Considering Analysis Question 2, our impression is that the bulk of the respondents represented in Table 3 and Figure 5 report spending what seems an appropriate amount of time reading the fortnightly newsletter, broadly consistent with the data from the first survey. It seems unlikely that those who report spending five minutes or less reading issues are gaining full advantage of the material, and also surprising that a comparable number claim to be spending up to an hour reading it. (In fact, it seems more likely that this latter group are doing things other than reading for a good deal of the hour, including some mathematical activity, some web reading and some practical activities.)

Analysis Question 9 explores what subscribers do with the newsletter after receiving it. As Figure 14 shows, the majority of readers save the email or print a hard copy, presumably to read at a later time or to refer to other people, also suggesting that the material is of lasting benefit.

Very few respondents suggested that issues of the newsletter should be longer, although some did suggest some differentiation of material for different levels (which would have the effect of making it longer). Overall, the data suggest that the level of the material and length of the newsletter are about right.

**Recommendation:** No change in the length of the newsletter is needed as a response to the information about reading time and response to the newsletter.

### *Accessibility*

Analysis Question 3 is concerned with accessibility, which has been interpreted in terms of language and conceptual level of the material. Some of the very early newsletter issues were of concern to the evaluation team, from the perspective of the accessibility of the material to a 9-12 year-old group. Table 4 indicates that the problems related to familiarity of language were more

evident in the upper primary group than elsewhere (not surprisingly, as these are the youngest students). The responses from teachers summarised in Table 18 suggest that the language and ideas of the material for an audience of 9-13 year olds was regarded as moderately difficult by around 70% of the teachers at each level. Similarly, the most frequent comments regarding the level of the content made by those suggesting changes for the future suggested more emphasis on easier material and for younger students, as noted in Figure 28.

Feedback regarding accessibility of newsletters has been regularly provided over the year, and it seems that a reasonable balance has been achieved and maintained in most issues. As noted in the earlier report, it seems prudent to continue to bear the level of the audience in mind, recognising that some material needs to be more challenging than the present school curriculum for 9-12 year olds and that material that is new to students will inevitably involve new linguistic terms to some extent. It is inevitable to an extent that a newsletter which sometimes reports modern mathematical activity will sometimes use terms and access ideas which are challenging to a young audience (at least), so that special care is needed to reduce the accessibility problems involved, but they cannot be expected to be eliminated entirely.

The evolving practice of identifying more challenging (harder) material (such as websites) explicitly in the newsletter seems worthy of continuing, to help the various reader groups.

**Recommendation:** Efforts continue to be made to monitor the level of accessibility of material in *Maths by Email*, especially to the principal target age group of 9-13 year olds.

#### *Newsletter components*

Analysis Question 8, addressed in Table 11 and Figure 13, indicates that the hands-on activities, the feature articles and the brain teasers continue to be the most popular components of the newsletters, with the web sites a distant fourth and events being clearly the least favoured.

The placement of events in this sequence is not surprising, as events are necessarily local in focus, and hence most subscribers are likely to regard any particular event as inaccessible to them. However, it seems appropriate that *Maths by Email* provide the service of informing communities of local events of likely interest to them, despite their comparable unpopularity.

Several analysis questions and respondent comments concentrated on particular components of *Maths by Email*. In most cases, the findings themselves provide clear feedback on key aspects of these, so brief comments only are offered at this stage.

Regardless of the relative popularity of different components, it seems likely that the diversity of components of *Maths by Email* helps to ensure that each issue has some material of interest to almost all readers. The survey data do not present a good case for the removal of any of the present components.

**Recommendation:** The component structure of *Maths by Email* be retained.

#### *Feature articles*

In addressing Analysis Question 4, Tables 6 and 7 make it clear that the Feature Articles have continued to be read by the great majority of respondents, and been found to be interesting, so that it is clear that these have been well targeted to the audience groups. It is at first a little surprising in Figure 8 that as many as 46% of respondents report that the articles are only 'sometimes' new to them. However, this may be because many articles contain *some* ideas with which readers are

already familiar as well as some new material, or new perspectives on older material. In addition, very few respondents have reported that Feature articles are mostly not new or mostly not interesting. Likewise, the consensus among the various school groups who are regular readers of the Feature articles, presented in Figure 9, seems to be that around 80% regard the articles as interesting most of the time or usually. Taken collectively, the data do not seem to suggest that the focus or style of the articles is in need of serious attention. Reports from the evaluation team and comments from respondents have noted with approbation the connection of themes for newsletter issues with contemporary matters of the day (such as Easter, the World Cup Finals and locust plagues).

Writing articles that are accessible and appealing to the wide range of school students from 9-year olds to 18-year olds is a significant challenge, so that Table 7 needs to be interpreted in this light, as suggesting that the target has generally been well met over the first year of operations of *Maths by Email*.

**Recommendation:** The nature and style of the Feature Articles be continued, with diverse topics selected, some choice of timely themes where possible and connection of other newsletter components to the articles made where appropriate.

### *Hands-on activities*

Data related to Analysis Question 5 similarly suggest that the hands-on activities have been well targeted to the audience over the course of 2010, and have a good measure of appeal to older students as well as to younger students in the target 9-12 age group. In particular, Figure 10 suggests that around three quarters of each of the three year groups try the activity *sometimes* or *usually*, which seems acceptable. Table 9 suggests that the activities do not generally require more sophisticated materials than those likely to be available at home, and the evaluation team has responded positively to the regular provision of downloadable materials to make the activities easy to undertake.

Table 17 and Figure 25 provide specific information about teacher use of the hands-on activities, with about four fifths of teachers of 9-12 year-olds reporting that they run the activities in class *sometimes* or *usually*. Given that most classes of 9-12 year olds are not streamed, but include a wide spectrum of students, these data suggest a high level of penetration of the activities in this key age group. Reported use of the activities is similarly high in other school groups, suggesting that the activities address a wide age group including 9-12 year olds.

As noted earlier, this component of *Maths by Email* is the most popular with respondents most interested in the 9-12 year-old group and also popular with other groups. The survey data do not suggest a major change of direction is necessary, although some respondents, in commenting on changes for the future have requested activities for younger children and raised the prospect of differentiated activities for a range of levels.

**Recommendation:** No change to the nature or style of hands-on activities is suggested.

### *Brain Teasers*

Data related to Analysis Question 6 in Table 10 strongly suggest that the *Brain Teasers* are suitable for all school levels, with most showing around 90% of respondents agreeing that these are mostly or very suitable for the various groups. Earlier comments by the evaluation team suggested that careful placement of answers to brain teasers is needed and attention is needed to ensure that answers, while unavoidably brief, provide some mathematical argument.

The most frequent suggestions from respondents for future changes that referred to a particular component were related to *Brain Teasers*, as shown in Figure 29. Part of the attraction of these seems to be that they are short and sharp, with many teachers responding that they shared them widely in various ways. By their nature, mathematical puzzles can be engaging, although it is perhaps questionable whether they engage people in longer term thinking about important mathematics or provide a temporary shot of intellectual stimulation, not unlike the popular Australian pastime of quizzes. *Brain Teasers* provide a useful hook into mathematics, one of the reasons that they also appear in the popular press from time to time. They seem to serve a similar useful purpose in *Maths by Email*, and it is especially helpful when the *Brain Teasers* are connected with more substantial mathematics elsewhere in a particular newsletter.

The survey data do not suggest a strong need for a change of direction with this component, which is clearly working well and received enthusiastically by subscribers.

**Recommendation:** No further change to the nature of *Brain Teasers* is suggested, although when the theme permits a connection between the *Brain Teaser* and other elements of the newsletter, this ought to be exploited.

### *Web sites*

Each issue of the newsletter typically includes a number of web links (in the article and the activity, in addition to the specific web site component.) Consideration of Analysis Question 7, with data in Figure 12, suggests that around 80% of respondents from each of the three school level groups visit websites *sometimes* or *usually* with very few reporting that they visited all the web sites provided. According to data in Table 11, the websites are less popular than the three most popular components of *Maths by Email*, but the data need to be interpreted carefully: they may merely reflect the popularity of the other components, rather than a lack of appeal of this component. It is possible that subscribers may need different forms of encouragement to visit websites, which in the view of evaluators generally repay the efforts and have been well-chosen, it seems likely that they will be selective users of the web, depending on particular topics, the level of the web sites (with some clearly more sophisticated than others) and personal interests. A typical edition of *Maths by Email* has a significant number of web links, only two of which are separately highlighted as web links, with others generally provided in the *Feature Article* and the *Hands-on Activity*.

Evaluator team comments have noted that, while a few web sites have been more suited to older age groups than 9-12 year olds, many web sites have been especially well chosen and fit the increasingly difficult twin goals of both being relatively new and also likely to interest this targeted age group. Over the course of 2010, the newsletter has highlighted well many web resources related to mathematics, even for relatively experienced users of the web.

It is assumed that, in the context of the newsletter being delivered by email, subscribers typically have good access to the Internet and a web browser. Thus, it is a little surprising that Figure 15 reports that only about 5% of respondents read *Maths by Email* online, which might account in part for the respondent behaviour with web sites, and perhaps even the fact that relatively few suggestions were made by respondents regarding web sites. Alternatively, modern email software such as *Outlook* allows easy access to web links from within an email when a user is online.

**Recommendation:** The practice of providing a variety of web sites should continue, with care continuing to be exercised that the needs of the younger age group are met while more sophisticated web links are suitably tagged.

### *Perceived effects of Maths by Email*

Analysis Question 12 directly probed some of the important stated aims of the newsletter, concerned with affecting student attitudes on careers in maths, the beauty of maths, its relevance to the wider world and their interest in maths. This is of course best regarded as a long-term project, and the earlier *Interim Evaluation Report* noted that it would be surprising if opinions of these kinds were thought to change a lot with just a few issues of *Maths by Email*, and probably unrealistic to expect them to do so. So, for example, the first survey data revealed that about two thirds of subscribers did not perceive changes in opinion regarding maths as a career, while as many as one third of respondents, across all school levels, did perceive a more positive response.

The second survey had the potential to avoid the worst aspects of a novelty effect, especially as some respondents (an unknown number, regrettably) were able to report on perceptions of changes over a longer period of time than in the first survey. The survey questions were also changed in the second survey to obtain more information about opinions on mathematics prior to the *Maths by Email* experience.

Tables 12, 13, 14 and 15 and their related graphical representations in Figures 17, 18, 19 and 20 together highlight the mostly positive effects reported by respondents. While it is perhaps a little surprising that the newsletter attracted any subscribers with negative opinions on maths-related careers, the relevance or beauty of maths, the data suggest that the great majority of these were positively affected by the experience, as demonstrated graphically in the four figures.

As the discussion of the data in Analysis Question 12 describes in detail, these positive affects were certainly not confined to those with negative opinions originally, but were clearly evident in those groups who started with neutral and positive opinions as well. The opinions of subscribers were reported to be more positive than originally by at least 40% in all groups, which is a very substantial change over the course of less than a calendar year, and a strong testament to the beneficial effects of the newsletter.

In interpreting the data provided, the reader's attention is drawn to the clear ceiling effects likely to be involved here. It might be expected that (volunteer) subscribers to *Maths by Email* began with positive opinions on maths-related careers, the relevance of maths and the beauty of maths, as well as an interest in mathematics. Indeed, the data suggest that at least two thirds described themselves in that way in the second survey. For many such respondents, it may be unrealistic to expect that these views about mathematics might become more positive, as they are already as positive as they can be. For such subscribers, data reporting that the newsletter has a neutral effect should not be interpreted as unsuccessful, but rather a recognition that their very positive views about mathematics have been sustained by their experience with *Maths by Email*.

While these data are very encouraging, in terms of the stated aims of the newsletter, there may be a case for a more direct treatment of the matter of careers in mathematics-related areas. A few respondents offered advice about including material about mathematical people, reflected in Figure 31. To some extent, this is already the case, with regular references to individual mathematicians and users of mathematics (such as CSIRO research staff) made in *Maths by Email* over 2010. But there might be a case for considering ways of highlighting people with careers in the mathematical sciences in the newsletter, to add to the human face of mathematics, frequently absent in school materials. This is a regular feature of *PLUS* online magazine in the UK (for an older audience), to which the publishers are referred as an example.

**Recommendation:** The data suggest that *Maths by Email* is having a strongly positive affect on views of mathematics with its present format. Nonetheless, consideration might be given to increasing the focus on people with careers in mathematics to further support the affective aims.

### *Teacher use of Maths by Email*

Analysis Question 14 canvasses a number of aspects of teacher use and appraisal of the newsletters. Teachers are of course the major single group of users of *Maths by Email* and their opinions are important to this evaluation. While teacher views about *Maths by Email* are a major part of responses to the survey (as a majority of respondents were teachers), some survey questions were restricted to those identifying themselves as teachers to focus attention on their opinions. Consistent with the earlier survey, the data in Tables 16 and 17 indicate that there is a substantial multiplier effect of teachers accessing the *Maths by Email* newsletters, as most teachers tend to make use of the materials with their students. This is especially so for teachers of upper primary students in the 9-12 year-old group, while a little less so for teachers of older students.

Around half of the teachers responding to the survey provided information about their use of the newsletter with other people, summarised in Figure 23. It is clear that the multiplier effect takes many forms, with teachers distributing information to others in a range of ways as well as using the newsletter as a stimulus to conversations of various kinds.

Table 17 and Figure 25 highlight the extent to which teachers make use of the activities, especially with the targeted age group of students around the upper primary school years. It is clear that the newsletter provides a welcome contribution to classroom activities for many subscribing teachers. Similarly, many of the positive and very positive comments provided by teachers refer to the use of activities. In addition, with better publicising it seems likely that teachers will continue to make good use of the activity archive on the web to good effect.

Teacher comments also make clear that other newsletter components are used with students, colleagues and others in a range of other ways, especially the *Brain Teasers* and the *Feature Articles*. The collection of teachers' descriptions of their successful use of materials from *Maths by Email* offers many examples of productive and enjoyable educational activity in classrooms. Significantly, there were remarkably few mixed or even negative comments reported by teachers about their use of the newsletter with students.

Many respondents generally reported that they were happy with the newsletter in its present form. A significant proportion of those suggesting a change in content have requested more attention to the needs of younger students, as reflected in Figure 28 with some others suggesting some differentiation of content (such as activities at different levels). It would seem difficult to do this without increasing either the length or the frequency of the newsletter, or shifting its focus. From the perspective of teachers, it seems important that the focus on 9-12 year olds in developing content for the newsletter be maintained at least, difficult as this frequently is in light of the mathematical content involved, to avoid the ever-present risk that the material will become too advanced for too many students. The present balance seems to work well, in this respect.

**Recommendation:** Teacher responses to the present balance of components and focus of materials are very positive and no significant change is recommended.

### *Delivery mechanism*

Analysis Question 10 provides the only data directly relevant to the issue of how *Maths by Email* is delivered (and received). The evaluation team are unaware of any difficulties associated with email delivery, although are surprised at the relatively low use of the online version shown in Figure 15, which mirrors the previous data from the first survey. Partly because the name of the newsletter demands it, but also for practical reasons, the continued focus on email delivery of the newsletter seems to be appropriate, and accommodating of a variety of subscriber email practices.

Production of an online version should also continue, despite its limited apparent use, as it provides a good alternative for some users and potentially allows for future flexibility of access. The lack of an online archive of issues is a little surprising, and the evaluation team are unaware of the policy reasons for this, although note that a similar decision has been made for the successful companion *Science by Email* newsletter, so that there may be good strategic reasons for it. Figure 14 makes it clear that most readers keep their email copies of *Maths by Email* (again, in similar fashion to the reported practices in the first survey) and that very few seem inclined to delete it, so that an online archive of issues would seem on the surface to make good sense, and is routinely used by some other agencies internationally providing regular materials to users. (A good example at a more sophisticated level is the *Plus* magazine (<http://plus.maths.org/>) in the UK). Those using public email providers (such as *Hotmail* or *Google Mail*) may be less efficient or even not permitted to keep their copies, however, compared with those with home subscriptions using *Outlook*. Readers accessing the online version to *Maths by Email* only have access to the present version, so that those who use a bookmark would seem to have all the benefits of a subscription, except a more difficult task to save issues for later use.

The installation of an online archive of the Hands-on Activities is a good initiative, and its classification into broad groupings consistent with the forthcoming Australian Curriculum: Mathematics will be helpful to teachers looking for materials for their classroom work. (Only a few respondents referred to this archive, which might suggest that it is not yet well known to existing subscribers, who may not have occasion to access the subscription page on which it is mentioned?) Indeed, other things being equal, it is more likely that typical teachers will be seeking an activity or other kind of classroom resource to fit a particular program need than that they will have space in their regular program for an external injection such as *Maths by Email*, so an archive that can be searched, or at least easily browsed, may be most welcome.

The online activity archive may itself be a useful means to attract new subscribers, and it seems prudent for the publishers to make suitable groups aware of its availability (even to non-subscribers).

Questions directly related to the funding of *Maths by Email* have not been directly addressed in this evaluation. However, a small number of respondents chose to comment in the Other Comments section of the second survey expressing hopes that the newsletter can continue, and recognising that resources are needed for this to happen. (Perhaps prompted by an oblique reference to the continuation of the newsletter in an email encouraging respondents to the survey?) In the absence of data, advice ought to be given sparingly, but it would seem to the evaluators to be a risky strategy to expect schools or individuals to pay a subscription for the publication, without a great deal of careful thought and some targeted data. The costs of dealing with the subscription processes may consume a substantial amount of the subscriptions and of course many subscribers may be either unwilling or unable to pay for the newsletter. For these reasons, our advice is that it would be wise to retain the newsletter as a free subscription for at least the immediate future.

**Recommendation:** No change at this stage, although the issue of online access and storage warrants further discussion and some better publicising of the activity archive to existing subscribers may be necessary.

## Conclusions

Both sets of survey responses to the *Maths by Email* have generally been very positive, suggesting that the newsletter format and its contents have been well designed to suit the intended target group of 9-12 year-old students, while also being well received by older students and by teachers generally. No major changes of direction are recommended as a result of the reader survey and the

evaluation team feedback on details of issues, but rather a process of continued improvement and monitoring is endorsed.

Over the course of its first year of operation, the newsletter seems to be meeting its stated aims well, providing a welcome resource for teachers, parents and others, as well as significantly impacting on subscriber views about the relevance, interest, beauty and importance of mathematics, and hence its attractiveness as a career factor.

While the subscriptions have grown over the course of the year, there would seem to be space for substantial further growth in the future, perhaps through significant liaison with appropriate organisations of relevance to teachers and students in the important middle years of schooling.

The sponsors, publisher, editors and advisors are to be congratulated on this new initiative, which certainly seems worthy of continuing into the future.



# Appendix A: *Maths by Email* Online Survey

(CODING)

## Participant Consent

- I have read the information about the nature and scope of this survey. Any questions I have about the survey have been answered to my satisfaction.
- I agree to take part in this research. By submitting the survey on-line I give my consent for the results to be used in the research.
- I am aware that this survey is strictly confidential. I know that I may change my mind and withdraw my consent to participate at any time. I understand that all information provided is treated as confidential by the researchers and will not be released to a third party unless required to do so by law.
- I understand that the findings of this study may be published but that no information which can identify me specifically will be published.

.....

1. For *Maths by Email*, which level of school is most relevant to you? (RADIO BUTTON)

Upper primary, about ages 9-12; (1)

Early secondary, about ages 12-14; (2)

Upper secondary, about ages 14-18; (3)

Other (briefly specify) (4)

2. How long do you normally spend reading *Maths by Email*? (RADIO BUTTON)

Typically 5 minutes or less(1)

Typically between 5 and 15 minutes(2)

Usually more than 15 minutes but less than an hour(3)

Usually more than one hour(4)

(5)Other (specify: \_\_\_\_\_)

3. In *Maths by Email*, how often is the mathematical language *familiar* to you personally? (RADIO BUTTON)

Mostly unfamiliar(1)

Sometimes familiar(2)

Usually familiar(3)

Familiar most of the time(4)

4. In *Maths by Email*, how often are the mathematical ideas *understandable* to you personally? (RADIO BUTTON)

Mostly not understandable(1)

Sometimes understandable(2)

Usually understandable(3)

Understandable most of the time(4)

5. Each issue of *Maths by Email* has a feature article at the beginning. How often do you read the article? (RADIO BUTTON)

Never(1)

Sometimes, but not a lot(2)

Usually, if I have time(3)

Always(4)

6. How often does the article *contain material that is new* for you personally? (RADIO BUTTON)

Mostly not(1)

Sometimes(2)

Usually(3)

Most of the time(4)

7. How often is the article *interesting* for you personally? (RADIO BUTTON)

Mostly not(1)

Sometimes(2)

Usually(3)

Most of the time(4)

8. Each issue of *Maths by Email* has a hands-on activity. How often do you try the hands-on activities yourself? (RADIO BUTTON)

Never(1)

Sometimes, but not a lot(2)

Usually, if I have time(3)

Always(4)

(5)Other (specify: \_\_\_\_\_)

9. How often are the activities *new* for you personally? (RADIO BUTTON)

Mostly not(1)

Sometimes(2)

Usually(3)

Most of the time(4)

(5)Other (specify: \_\_\_\_\_)

10. How often do you have the necessary materials to do the activities? (RADIO BUTTON)

Mostly not(1)

Sometimes(2)

Usually(3)

Most of the time(4)

(5)Other (specify: \_\_\_\_\_)

11. How often are the activities interesting for you personally? (RADIO BUTTON)

Mostly not(1)

Sometimes(2)

Usually(3)

Most of the time(4)

(5)Other (specify: \_\_\_\_\_)

12. Each issue of *Maths by Email* has a *Brain Teaser*. How *suitable* are these for you personally? (RADIO BUTTON)

Very suitable(4)

Mostly suitable(3)

Not usually suitable(2)

Not at all suitable(1)

13. Each issue of *Maths by Email* has some Websites highlighted. How often do you go to these Websites? (RADIO BUTTON)

Never(1)

Sometimes, but not a lot(2)

Usually, but not always(3)

Always(4)

Other (specify: \_\_\_\_\_)

14. Which component of *Maths by Email* do you like the most? (RADIO BUTTON)

Feature Article(1)

Activities(2)

Brain Teasers(3)

Websites(4)

Events(5)

*Did You Know?* (6)

15. Which component of *Maths by Email* do you like the least? (RADIO BUTTON)

Feature Article(1)

Activities(2)

Brain Teasers(3)

Websites(4)

Events(5)

*Did You Know?* (6)

16. What do you typically do with *Maths by Email* after receiving it? (MULTI-MATRIX)

Delete it after reading it(1)

Save the email(2)

Print a hard copy of the email(3)

(4)Forward it to other people (how many usually?\_\_\_\_\_) (DATA IN 2<sup>ND</sup> COLUMN, raw figures)

**For the following 4 items, please indicate how *Maths by Email* has influenced your views.**

How has *Maths by Email* affected your: (Q17-20)

17. Opinion on careers involving maths? (MULTI-MATRIX)

18. Opinion on the relevance of maths?

19. Opinion on the beauty of maths?

20. Interest in maths?

My opinion was:

Positive (3)

Neutral (2)

Negative (1)

and has:

become more positive (3)

not changed (2)

become more negative (1)

21. What email client do you use to read Maths by Email? (RADIO BUTTON)

Yahoo Mail(1)

Hotmail(2)

Gmail(3)

Other web-based client(4)

Outlook(5)

Apple Mail(6)

Lotus Notes(7)

Thunderbird(8)

iPhone(9)

Other

I read the online version(10)

I don't know(11)

22. Would you recommend to other people a subscription to *Maths by Email*? (RADIO BUTTON)

Yes(1)

No(2)

Other (specify: \_\_\_\_\_)

23. What changes to the content of *Maths by Email* would you like to see in future editions? (COMMENT)

#### **Additional Questions for Teachers**

24. Are you a Teacher? (RADIO BUTTON)

Yes(1)

No(2) (Skip questions 25-31)

25. How often do you use *Maths by Email* with other people, such as students or colleagues? (RADIO BUTTON)

Never(1)

Sometimes, but not a lot(2)

Usually, if I have time(3)

Always(4)

(5)Other (specify: \_\_\_\_\_)

26. How often do you run the Maths by Email activity with students in a classroom setting? (RADIO BUTTON)

Never(1)

Sometimes, but not a lot(2)

Usually, if I have time(3)

Always(4)

(5)Other (specify: \_\_\_\_\_)

27. In what ways do you use *Maths by Email* with other people? (COMMENT)

28. Please describe briefly a specific example of your use of *Maths by Email* with students, including your impressions of how it went? (COMMENT)

29. To what extent are the mathematical ideas and language in *Maths by Email* consistent (or aligned) with your school's curriculum for students about ages 9-13? (RADIO BUTTON)

Not aligned/consistent(1)

Moderately consistent(2)

Very consistent(3)

30. To what extent are the mathematical ideas and language in *Maths by Email* difficult (or challenging) for 9 to 13 year olds? (RADIO BUTTON)

Not difficult(1)

Moderately difficult(2)

Very difficult(3)

31. To what extent are the mathematical ideas and language in *Maths by Email* engaging (or enriching) for 9 to 13 year olds? (RADIO BUTTON)

Not engaging/enriching(1)

Moderately engaging/enriching(2)

Very engaging/enriching(3)

32. Please use the space below to add any further comments or advice you may have about *Maths by Email*. (COMMENT)