*Chemistry in the K–8 Classroom*
*A Survey Report*

**Prepared for**

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# Chemistry in the K–8 Classroom, Dreyfus Funding Phase I

Report of results for teacher survey, data collection August 2006

## Executive summary

**Background**

In support of chemistry manual development, a survey was conducted with teachers of grades K–8 to learn more about the teaching of science in the classroom and the resources teachers have available to them. The outcomes of this survey will help inform manual development.

Survey responses were grouped by grade and geographic region. Teachers reported the grades they taught and were grouped into the following categories: K–2, 3–5, 6–8, multi-category, and "no grades reported." Teachers also reported the geographic region where they taught: rural, suburban, or urban. Rural teachers were considered separately; suburban and urban teachers were grouped together.

**Primary findings from the surveys**

*What scientific equipment did teachers have available?*

Overall, teachers had limited access to science equipment. Excluding computers, more than 10% of teachers did not have access to any of the science equipment listed in the survey. Equipment shortages were more pronounced in the lower grades (K–2, 3–5); that is, teachers in the higher grades (6–8) were more likely to have graduated cylinders, safety goggles, and sinks. For more detail on teacher access to scientific equipment, see the full report.

*How much money did teachers spend each year on classroom science activities?*

One-half of teachers in all categories spent $100 or less on classroom science activities annually. However, as a group, teachers in higher grades tended to spend more on science activities. That is, the majority of K–2 and 3–5 teachers spent an average of $100 or less annually on classroom science activities, but only 22% of 6–8 teachers spent in this range. The 6–8 teachers were more likely to spend between $101 and $200 annually (33% of teachers in this grade group).

*How much time did teachers have for teaching science activities?*

The focus of this question was to determine the length of teachers' class periods. The majority of all teachers (59%) had class periods that ranged between 31 and 60 minutes in length. However, teachers in the higher grades were more likely to have longer class periods. That is, a higher percentage of 6–8 teachers had class periods lasting from 31–60 and 61–90 minutes than did K–2 and 3–5 teachers.

When asked in a separate question how much time they could spend specifically on science activities, teachers reported durations that closely mirrored the durations of their class periods. That is, the majority of teachers across the grades reported they could spend 31–60 minutes on these activities (66% overall).

*What challenges did teachers face when conducting science activities in the classroom?*

The most significant challenge to teachers was the time it took to prepare and clean up an activity, with nearly 90% of teachers (133 out of 147) finding this to be a challenge. The second most challenging aspect for teachers was activity expense, with 87% of teachers (128 out of 147) or more saying that this presented at least somewhat of a challenge.

*What were teachers' bilingual needs for hands-on activities?*

Across the grades, 60–65% of teachers said they would find bilingual student activity sheets useful for hands-on activities. Of these teachers, a large majority (85%; 80 out of 94) reported that Spanish would

be the most helpful language for them and for their students on student procedure sheets. Russian was reported as the next most helpful language with 21% of these teachers (20 out of 94) requesting it.

*What were teachers' sources for science inquiry activities?*
Most teachers across the grades reported that they design their own science inquiry activities (82% overall), modify activities in activity books (78% overall), or modify activities from other teachers (64%). That is, before teachers use science inquiry activities, they modify them.

*Which assessment tools were most helpful to teachers for assessing students during hands-on science activities?*
Teachers were asked to report on both the tools and methods they would find most helpful for assessment. In rank order, the four most helpful assessment tools for teachers were: a list of sample questions to ask students, sample results or possible student answers, already-printed student data collection tables, and student worksheets to fill out. The only exception to this ranking was within the K–2 teacher responses; while they agreed that a list of sample questions to ask students would be the most helpful assessment method, they ranked the remaining assessment tools in the following order: already-printed data collection tables, student worksheets to fill out, and a list of sample questions to ask students.

When asked to report on specific methods (observing the student working, verbally asking the student or class questions, evaluating the students' written work), teachers used these three methods widely. However, teachers of grades 6–8 tended to rely on a combination of methods to assess students, while K–2 teachers observed students more and evaluated written work less. Some K–2 teachers even said they "never" evaluate students' written work (14%).

*What types of cross-curricular connections would teachers find helpful for chemistry activities?*
Overall, teachers expressed interest in cross-curricular connections in general. One teacher remarked, "Since we have so much material to cover, especially [in] benchmark years, anything across the curriculum is very much appreciated. I am also more likely to use something that will help me across the curriculum."

From the list provided, teachers overall expressed the greatest interest in math and earth science/geology. Teachers were also asked to list additional cross-curricular connections they would find helpful. While suggestions were varied, teachers expressed an interest in real-world and current events connections. As one teacher stated, "Anything that connects learning with real life application would be helpful."

*What else was important to teachers when conducting classroom chemistry activities?*
Teachers listed a wide range of issues relating to classroom chemistry activities. The ideas they expressed fell roughly into six categories: logistically easy, engaging/interesting for students, teacher familiarity, curriculum focused, subject-area focused, and multi-user. The most widely shared view among teachers was that activities need to be logistically easy (76% overall). As one teacher said, "Keep it simple. Keep it cheap. Keep it high interest."

# Full report

## Introduction

These evaluation activities were conducted to support OMSI's efforts to develop classroom chemistry activities for K–8 teachers (funded by the Dreyfus Foundation). A survey was conducted of K–8 teachers to find out more about teachers' resources and practices when it comes to teaching science in the classroom. This document presents the survey results.

## Methods

*Participants*
OMSI sent a Web-based survey to 846 K–8 teachers that had been involved in OMSI workshops in the past three years and had provided an e-mail address. Ninety-three of these e-mails "bounced" back unopened. A reminder e-mail was sent to the same teachers, except those who had already responded or whose e-mail had bounced. This reminder was sent to 662 teachers, 40 of those e-mails bounced back. Thus, a total of 753 teachers received the survey e-mail.

A total of 158 teachers responded to the survey (21% response rate). Survey respondents included fourteen K–2 teachers, sixty-five 3–5 teachers, and forty-eight 6–8 teachers. There were an additional 16 teachers that taught in multiple grades and 15 teachers that did not report what grade they taught. An effort was made to recruit participants in urban, suburban, and rural schools. Fifty-two rural teachers and ninety-three urban/suburban teachers completed the survey. By completing the survey and providing OMSI with their contact information, teachers were entered in a drawing for a $50 gift certificate to the OMSI Science Store.

Table 1. Number of teachers surveyed by group.

| Teacher groups | Teacher Totals By Group | Rural Teachers | Sub/urban Teachers | No Grade/Region Reported |
|---|---|---|---|---|
| **All Teachers** | 158 (100%) | 52 (33%) | 93 (59%) | 13 (8%) |
| **K–2** | 14 (9%) | 1 | 13 | -- |
| **3–5** | 65 (41%) | 26 | 39 | -- |
| **6–8** | 48 (31%) | 18 | 30 | -- |
| **Multi-grade** | 16 (10%) | 7 | 9 | -- |
| **No grade reported** | 15 (9%) | 0 | 2 | 13 |

*Survey procedure*
The survey was administered via a Web-based program called "Survey Monkey." The survey consisted of 14 questions related to science activities in the classroom and background questions about each teacher's school. The survey is in Appendix A; information on how to access the electronic version of this survey is in Appendix D. The survey was e-mailed to teachers on August 3, 2006, asking them to respond by August 8, 2006. The survey deadline was extended and a reminder e-mail was sent to teachers on August 16, 2006, asking them to reply by August 23, 2006. The survey e-mails are in Appendices B and C.

## Survey Results

**Survey question 1**
**Which of the following scientific equipment do you have access to?**
Participants were given a table listing ten types of science equipment (beakers, computers, graduated cylinders, hot plate, measuring spoons, Petri dishes, plastic or latex gloves, safety goggles, sink, test tubes) and asked to report the availability of each according to the following categories: enough for each group, not enough for each group, and none. The full responses to this question are summarized in Table 2.

Overall, it was clear that teachers had limited access to science equipment (10%). Across the grades, only a minority of teachers reported having enough equipment for each group of students (with the exception of safety goggles and plastic gloves). For each piece of equipment, sizable minorities reported having no access. For example, only 11% of teachers reported having access to hot plates.

Equipment shortages were more pronounced in the lower grades. Teachers in grades K–2 and 3–5 were less likely to have enough equipment. For example, when considering chemical glassware, 65% of 6–8 teachers had enough beakers and test tubes for each group of students, while for 3–5 grade teachers, only 26% (beakers) and 17% (test tubes) had enough. Teachers in the higher grades (6–8) were more likely to have graduated cylinders, safety goggles, and sinks. Again, excluding computers, more than 10% of all teachers did not have access to any of this science equipment.

Table 2. Availability of science equipment in the classroom

| Types of science equipment | All Teachers (out of 158) | K–2 (out of 14) | 3–5 (out of 65) | 6–8 (out of 48) | Rural Teachers (out of 52) | Sub/urban Teachers (out of 93) |
|---|---|---|---|---|---|---|
| **Beakers** | | | | | | |
| Enough for each group | 72 (46%) | 8 (57%) | 17 (26%) | 31 (65%) | 18 (35%) | 48 (52%) |
| Not enough for each group | 41 (26%) | 0 | 22 (34%) | 10 (21%) | 13 (25%) | 25 (27%) |
| None | 43 (27%) | 6 (43%) | 24 (37%) | 7 (15%) | 19 (37%) | 20 (22%) |
| **Computers** | | | | | | |
| Enough for each group | 75 (48%) | 4 (29%) | 40 (62%) | 18 (38%) | 23 (44%) | 48 (52%) |
| Not enough for each group | 76 (48%) | 9 (64%) | 24 (37%) | 26 (54%) | 26 (50%) | 41 (44%) |
| None | 6 (4%) | 1 (7%) | 0 | 4 (8%) | 2 (4%) | 4 (4%) |
| **Graduated cylinders** | | | | | | |
| Enough for each group | 79 (50%) | 5 (36%) | 22 (34%) | 34 (71%) | 18 (35%) | 55 (60%) |
| Not enough for each group | 41 (26%) | 2 (14%) | 23 (35%) | 10 (21%) | 17 (33%) | 22 (24%) |
| None | 33 (21%) | 7 (50%) | 17 (26%) | 2 (4%) | 14 (27%) | 14 (15%) |
| **Hot plate** | | | | | | |
| Enough for each group | 18 (11%) | 0 | 3 (5%) | 12 (25%) | 2 (4%) | 15 (16%) |
| Not enough for each group | 79 (50%) | 3 (21%) | 36 (55%) | 23 (48%) | 30 (58%) | 42 (45%) |
| None | 58 (37%) | 10 (71%) | 25 (38%) | 12 (25%) | 19 (37%) | 34 (37%) |
| **Measuring spoons** | | | | | | |
| Enough for each group | 64 (41%) | 8 (57%) | 22 (34%) | 20 (42%) | 24 (46%) | 36 (39%) |
| Not enough for each group | 73 (48%) | 5 (36%) | 35 (54%) | 22 (46%) | 20 (38%) | 48 (52%) |
| None | 17 (11%) | 1 (7%) | 6 (9%) | 6 (13%) | 7 (13%) | 8 (9%) |
| **Petri dishes** | | | | | | |
| Enough for each group | 66 (42%) | 4 (29%) | 18 (28%) | 27 (56%) | 22 (42%) | 40 (43%) |
| Not enough for each group | 34 (22%) | 3 (21%) | 17 (26%) | 9 (19%) | 8 (15%) | 24 (26%) |
| None | 52 (33%) | 6 (75%) | 28 (43%) | 11 (23%) | 20 (38%) | 27 (29%) |
| **Plastic or latex gloves** | | | | | | |
| Enough for each group | 103 (66%) | 10 (71%) | 37 (57%) | 32 (67%) | 33 (63%) | 61 (66%) |
| Not enough for each group | 26 (17%) | 1 (7%) | 14 (22%) | 9 (19%) | 10 (19%) | 15 (16%) |
| None | 26 (17%) | 3 (21%) | 12 (18%) | 7 (15%) | 8 (15%) | 16 (17%) |
| **Safety goggles** | | | | | | |
| Enough for each group | 87 (55%) | 3 (21%) | 32 (49%) | 35 (73%) | 27 (52%) | 55 (60%) |
| Not enough for each group | 43 (27%) | 5 (36%) | 20 (31%) | 8 (17%) | 16 (31%) | 23 (25%) |
| None | 22 (14%) | 5 (36%) | 10 (15%) | 4 (8%) | 8 (15%) | 11 (12%) |
| **Sink** | | | | | | |
| Enough for each group | 71 (45%) | 7 (50%) | 22 (34%) | 24 (50%) | 19 (37%) | 44 (47%) |
| Not enough for each group | 72 (46%) | 5 (36%) | 34 (52%) | 22 (46%) | 29 (58%) | 40 (43%) |
| None | 12 (8%) | 2 (14%) | 7 (11%) | 4 (8%) | 3 (6%) | 8 (9%) |
| **Test tubes** | | | | | | |
| Enough for each group | 66 (42%) | 5 (36%) | 11 (17%) | 31 (65%) | 18 (35%) | 42 (45%) |
| Not enough for each group | 43 (27%) | 2 (14%) | 26 (40%) | 9 (19%) | 15 (29%) | 25 (27%) |
| None | 42 (27%) | 5 (36%) | 25 (38%) | 7 (15%) | 18 (35%) | 21 (23%) |

**Survey question 2**

**How much money do you spend each year on classroom science activities?**

Overall, 50% of teachers spent $100 or less annually on classroom science activities. Teachers in higher grades tended to spend more on science activities: 75% of K–2 teachers spent an average of $100 or less annually on classroom science activities, 58% of 3–5 teachers spent this amount, while only 22% of 6–8 teachers spent in this range. The largest group of 6–8 teachers (33%) spent between $101 and $200 annually. Fifty-five percent of rural teachers spent between $1 and $100 annually. On average, 6–8 grade teachers were the highest spenders, averaging $272.50 per teacher; K–2 teachers spent an average of $112.50 each, 3–5 teachers spent $128.82, and rural teachers spent $194.61.

Table 3. Dollars spent annually on classroom science activities

| Number of dollars spent | All Teachers (out of 107) | K–2 Teachers (out of 12) | 3–5 Teachers (out of 50) | 6–8 Teachers (out of 36) | Rural Teachers (out of 36) | Sub/urban Teachers (out of 70) |
|---|---|---|---|---|---|---|
| **0** | 2 (2%) | 0 | 1 (2%) | 1 (3%) | 1 (3%) | 1 (1%) |
| **1–100** | 54 (50%) | 9 (75%) | 34 (68%) | 8 (22%) | 20 (56%) | 34 (49%) |
| **101–200** | 25 (23%) | 1 (8%) | 9 (18%) | 12 (33%) | 8 (22%) | 16 (23%) |
| **201–300** | 11 (10%) | 1 (8%) | 1 (2%) | 8 (22%) | 1 (3%) | 10 (14%) |
| **301–400** | 5 (5%) | 1 (8%) | 2 (4%) | 2 (6%) | 1 (3%) | 4 (6%) |
| **401–500** | 5 (5%) | 0 | 2 (4%) | 2 (6%) | 3 (8%) | 2 (3%) |
| **501–600** | 2 (2%) | 0 | 1 (2%) | 1 (3%) | 1 (3%) | 1 (1%) |
| **601+** | 3 (3%) | 0 | 0 | 2 (6%) | 1 (3%) | 2 (3%) |

**Survey question 3**

**If you have class periods, how long are they?**

The majority of teachers (61% overall) had class periods that ranged between 31 and 60 minutes in length; this was true across the grades. It was less common for K–2 teachers to have formal class periods; most teachers in this grade group did not report a class length time. Of the five that did report a time frame, three fell into the 31- to 60-minute category. Fifty-two percent of teachers of grades 3–5 had classes that ranged from 31 to 60 minutes in length; most other teachers in this grade group reported that they did not have class periods. Rural teachers and teachers of grades 6–8 had the highest percentages of teachers with class periods from 31 to 60 minutes in length, reporting at 64% each. It was clear that as the grades increased, there was a higher probability that teachers would have more formalized and longer class periods.

Table 4. Length of class periods

| Number of minutes | All Teachers (out of 108) | K–2 (out of 5) | 3–5 (out of 40) | 6–8 (out of 45) | Rural Teachers (out of 39) | Sub/urban Teachers (out of 69) |
|---|---|---|---|---|---|---|
| **1–30** | 2 (2%) | 0 | 2 (5%) | 0 | 0 | 2 (3%) |
| **31–60** | 66 (61%) | 3 (60%) | 21 (53%) | 29 (64%) | 25 (64%) | 38 (55%) |
| **61–90** | 17 (16%) | 0 | 1 (3%) | 14 (31%) | 4 (10%) | 13 (19%) |
| **91+** | 1 (<1%) | 0 | 0 | 0 | 0 | 1 (1%) |
| **No class periods** | 21 (19%) | 2 (40%) | 13 (33%) | 1 (2%) | 7 (18%) | 14 (20%) |
| **Flexible time frame (teacher's discretion/self-contained class)** | 4 (4%) | 0 | 3 (8%) | 1 (2%) | 3 (8%) | 1 (1%) |

**Survey question 4**

**Including set up and clean up, how long can you typically spend with your class on a science activity?**

The length of time teachers could spend with their classes for science activities closely mirrored the length of teachers' class periods; the majority of teachers across the grades reported between 31- and 60-minute time frames for these activities (66% overall). The percentages were even higher when assessing teachers' time frames by grade. Seventy-nine percent of K–2 teachers spent between 31 and 60 minutes on science activities with their classes; the remainder (21%) spend 30 minutes or less. For 3–5 grade teachers, 73% spent 31 to 60 minutes, while only 49% of 6–8 grade teachers spent that amount of time. Another 21 percent of 6–8 grade teachers spent between 61 and 90 minutes with their students on science activities. The percentage of rural teachers who spent between 31 and 60 minutes on science activities was also high (72%).

Table 5. Length of science activities

| Amount of time for a science activity | All Teachers (out of 145) | K–2 Teachers (out of 14) | 3–5 Teachers (out of 64) | 6–8 Teachers (out of 47) | Rural Teachers (out of 50) | Sub/urban Teachers (out of 92) |
|---|---|---|---|---|---|---|
| 1–30 | 7 (5%) | 3 (21%) | 1 (2%) | 3 (6%) | 2 (4%) | 5 (5%) |
| 31–60 | 95 (66%) | 11 (79%) | 47 (73%) | 23 (49%) | 36 (72%) | 56 (61%) |
| 61–90 | 25 (17%) | 0 | 12 (19%) | 10 (21%) | 7 (14%) | 18 (20%) |
| 91–120 | 3 (2%) | 0 | 0 | 2 (4%) | 1 (2%) | 2 (2%) |
| 121+ | 4 (3%) | 0 | 2 (3%) | 2 (4%) | 0 | 4 (4%) |
| No limit | 4 (3%) | 0 | 1 (2%) | 1 (2%) | 1 (2%) | 3 (3%) |
| Multi-day/period | 7 (5%) | 0 | 1 (2%) | 6 (13%) | 3 (6%) | 4 (4%) |

**Survey question 5**

**What are your most significant challenges to conducting science activities in the classroom?**

Time restraints (related to preparation, set up and clean up) posed the most prominent challenge for teachers (91%). The second most challenging aspect for teachers was related to expense, with 87% of all teachers saying that this presented a challenge. The third most challenging aspect for teachers was using inquiry in the classroom with 51% of all teachers reporting this was a challenge.

Finally, the topics that presented a challenge to fewer teachers, but still a significant minority, were classroom management, administrative/school support, and language barriers (40%, 26%, and about 24%, respectively).

Table 6. Challenges to conducting science activities in the classroom

| Challenges | All Teachers (out of 147) | K–2 Teachers (out of 14) | 3–5 Teachers (out of 64) | 6–8 Teachers (out of 48) | Rural Teachers (out of 51) | Sub/urban Teachers (out of 93) |
|---|---|---|---|---|---|---|
| **Time to prepare/set up/clean up** | | | | | | |
| Very significant challenge | 67 **(46%)** | 7 (50%) | 36 (56%) | 15 (31%) | 28 (55%) | 38 (41%) |
| Somewhat of a significant challenge | 66 **(45%)** | 7 (50%) | 26 (41%) | 28 (58%) | 18 (35%) | 46 (50%) |
| Not a significant challenge | 12 (8%) | 0 | 5 (8%) | 5 (10%) | 4 (8%) | 8 (9%) |
| N/A | 2 (1%) | 0 | 0 | 0 | 1 (2%) | 1 (1%) |
| Expense | | | | | | |
| Very significant challenge | 52 **(35%)** | 6 (43%) | 19 (30%) | 18 (38%) | 26 (51%) | 25 (27%) |
| Somewhat of a significant challenge | 76 **(52%)** | 7 (50%) | 37 (58%) | 26 (54%) | 20 (39%) | 55 (59%) |
| Not a significant challenge | 18 (12%) | 1 (7%) | 8 (13%) | 4 (8%) | 5 (10%) | 12 (13%) |
| N/A | 1 (<1%) | 0 | 0 | 0 | 0 | 1 (<1%) |
| Using inquiry | | | | | | |
| Very significant challenge | 14 **(10%)** | 1 (7%) | 10 (16%) | 3 (6%) | 7 (14%) | 7 (8%) |
| Somewhat of a significant challenge | 62 **(42%)** | 8 (57%) | 24 (38%) | 23 (48%) | 22 (43%) | 39 (42%) |
| Not a significant challenge | 71 (48%) | 5 (38%) | 30 (47%) | 22 (46%) | 22 (43%) | 47 (51%) |
| N/A | 0 | 0 | 0 | 0 | 0 | 0 |
| Classroom management | | | | | | |
| Very significant challenge | 8 **(5%)** | 2 (14%) | 3 (5%) | 3 (6%) | 1 (2%) | 7 (8%) |
| Somewhat of a significant challenge | 51 **(35%)** | 5 (38%) | 22 (34%) | 18 (38%) | 15 (29%) | 36 (39%) |
| Not a significant challenge | 87 (59%) | 7 (50%) | 39 (61%) | 26 (54%) | 35 (69%) | 49 (53%) |
| N/A | 1 (<1%) | 0 | 0 | 1 (2%) | 0 | 1 (1%) |
| Administrative/school support | | | | | | |
| Very significant challenge | 6 **(4%)** | 1 (7%) | 0 | 4 (8%) | 4 (8%) | 2 (2%) |
| Somewhat of a significant challenge | 33 **(22%)** | 3 (21%) | 16 (25%) | 10 (21%) | 14 (27%) | 18 (19%) |
| Not a significant challenge | 102 (69%) | 10 (71%) | 46 (72%) | 31 (65%) | 31 (61%) | 69 (74%) |
| N/A | 6 (4%) | 0 | 2 (3%) | 3 (6%) | 2 (4%) | 4 (4%) |
| Language barriers | | | | | | |
| Very significant challenge | 2 **(<1%)** | 0 | 0 | 2 (4%) | 0 | 2 (2%) |
| Somewhat of a significant challenge | 34 **(23%)** | 3 (21%) | 15 (23%) | 13(27%) | 10 (20%) | 24 (26%) |
| Not a significant challenge | 95 (65%) | 11 (79%) | 44 (69%) | 26 (54%) | 33 (64%) | 60 (65%) |
| N/A | 15 (10%) | 0 | 4 (6%) | 7 (15%) | 7 (14%) | 7 (8%) |

**Survey question 5b**
**What OTHER challenges do you face?**

Overall, resource limitations represented the largest category of additional challenges faced by teachers when conducting science activities in the classroom. The largest factor for teachers across the grades was a lack of storage space for science activity materials. Other issues included lack of equipment/materials, lack of physical space for conducting activities, and lack of information/activities. View full results in Table 7.

For teachers of grades K–2, resource limitations and characteristics of activities ranked equally as additional challenges. Teachers remarked that finding activities that are age-appropriate is a challenge.

Teachers of grades 3–5, 6–8, and rural teachers faced challenges related to the execution of activities, in addition to other, more general ones. Specifically, these teachers said it was difficult to find activities that challenge students or have a wow factor, that fit the curriculum, and that have cross-curricular connections. They also said it was not easy to honor benchmarks and testing as well as teach or manage large classes.

While teacher training limitations represented the smallest category of challenges for teachers overall, 17% of teachers reported challenges of this nature. It should be noted that teachers expressed a need for activity explanations to be clear. A number of teachers also expressed concerns with their personal limitations regarding activity content. Some teachers noted that they did not have any formal science training.

Table 7. Other challenges faced by teachers in conducting science activities in the classroom

| OTHER Challenges | All Teachers (out of 82) | K–2 Teachers (out of 7) | 3–5 Teachers (out of 36) | 6–8 Teachers (out of 28) | Rural Teachers (out of 34) | Sub/urban Teachers (out of 48) |
|---|---|---|---|---|---|---|
| **Resource limitations** | **75 (91%)** | **4 (57%)** | **31 (86%)** | **17 (61%)** | **36 (105%)** | **36 (75%)** |
| Lack of storage space | 27 | 1 | 13 | 10 | 11 | 0 |
| Lack of equipment/materials | 19 | 1 | 7 | 6 | 8 | 9 |
| Lack of physical space | 14 | 0 | 3 | 7 | 8 | 6 |
| Cost | 8 | 1 | 2 | 4 | 5 | 3 |
| Lack of information/activities | 6 | 1 | 5 | 0 | 3 | 3 |
| Lack of time | 1 | 0 | 1 | 0 | 1 | 15 |
| **Activity limitations** | **33 (40%)** | **4 (57%)** | **12 (33%)** | **10 (36%)** | **12 (35%)** | **21 (44%)** |
| Lack of ideas that challenge students/wow factor | 7 | 0 | 2 | 3 | 3 | 4 |
| Do not fit curriculum | 6 | 0 | 2 | 3 | 3 | 3 |
| Need cross-curricular connections | 5 | 1 | 3 | 1 | 3 | 2 |
| Need to be age-appropriate | 5 | 2 | 2 | 0 | 1 | 4 |
| Need to be hands-on | 4 | 0 | 1 | 2 | 1 | 3 |
| Need to be modifiable (student level, space/time limitations, etc.) | 3 | 1 | 0 | 0 | 0 | 3 |
| Need to have assessment built-in | 1 | 0 | 1 | 0 | 0 | 1 |
| Need to be inquiry-based | 1 | 0 | 1 | 0 | 1 | 0 |
| Need to incorporate technology | 1 | 0 | 0 | 1 | 0 | 1 |
| **Systemic limitations** | **23 (28%)** | **0** | **10 (27%)** | **10 (36%)** | **10 (29%)** | **12 (25%)** |
| State requirements/testing/goals | 8 | 0 | 4 | 3 | 3 | 4 |
| Class size | 7 | 0 | 3 | 3 | 4 | 3 |
| Student knowledge/preparedness | 4 | 0 | 2 | 2 | 2 | 2 |
| Cultural/ideological barriers | 1 | 0 | 0 | 1 | 0 | 1 |
| **Teacher training limitations** | **14 (17%)** | **2 (29%)** | **7 (19%)** | **3 (11%)** | **3 (9%)** | **11 (23%)** |
| Clear explanations for teacher | 7 | 2 | 4 | 0 | 1 | 6 |
| Need additional training (reported lack of teacher knowledge/expertise | 4 | 0 | 2 | 1 | 2 | 2 |
| Need additional helpers who are knowledgeable about science | 1 | 0 | 0 | 1 | 0 | 1 |
| Flexible lesson plans | 1 | 0 | 0 | 1 | 0 | 1 |
| Glossary of terms | 1 | 0 | 1 | 0 | 0 | 1 |

**Survey question 6**

**In your class, how useful would you find bilingual student procedure sheets for hands-on activities?**

Across the grades, more than 60–65% of teachers said that bilingual student procedure sheets would be useful for hands-on activities.

Table 8. Usefulness of bilingual student procedure sheets for hands-on activities

| Usefulness | All Teachers (out of 147) | K–2 Teachers (out of 14) | 3–5 Teachers (out of 64) | 6–8 Teachers (out of 48) | Rural Teachers (out of 51) | Sub/urban Teachers (out of 93) |
|---|---|---|---|---|---|---|
| **Very useful** | 29 (20%) | 1 (7%) | 16 (25%) | 11 (23%) | 8 (16%) | 21 (23%) |
| **Somewhat useful** | 63 (43%) | 8 (57%) | 25 (39%) | 19 (40%) | 25 (49%) | 36 (39%) |
| **Not at all useful** | 55 (37%) | 5 (36%) | 23 (36%) | 18 (38%) | 18 (35%) | 36 (39%) |

**Survey question 6b**

**Other than English, what language(s) would be most helpful to you and your students on student procedure sheets?**

An overwhelming majority of teachers across the grades (85% overall) reported that Spanish would be the most helpful language for themselves and their students on student procedure sheets. All teachers of grades K–2 (100%) reported that Spanish-language sheets would be useful and over 80% of teachers in the other grades agreed. The next most widely requested language for student procedure sheets was Russian (21% overall). A total of 13 individual languages were requested, with the addition of various Pacific Island dialects and the suggested use of pictures. The third most widely requested language was "Chinese" (with some teachers specifying Cantonese and Mandarin).

Table 9. Languages for student procedure sheets

| Language | All Teachers (out of 94) | K–2 Teachers (out of 9) | 3–5 Teachers (out of 44) | 6–8 Teachers (out of 29) | Rural Teachers (out of 35) | Sub/urban Teachers (out of 57) |
|---|---|---|---|---|---|---|
| **Spanish** | 80 (85%) | 9 (100%) | 36 (81%) | 25 (86%) | 31 (89%) | 47 (82%) |
| **Russian** | 20 (21%) | 1 (11%) | 6 (14%) | 8 (28%) | 5 (14%) | 14 (25%) |
| **"Chinese"** | | | | | | |
| "Chinese" | 5 | 0 | 2 | 1 | 2 | 2 |
| Cantonese | 1 | 0 | 0 | 1 | 0 | 1 |
| Mandarin | 1 | 0 | 0 | 1 | 0 | 1 |
| **Chukese** | 3 | 0 | 0 | 1 | 0 | 1 |
| **Korean** | 3 | 0 | 1 | 1 | 1 | 2 |
| **Vietnamese** | 3 | 0 | 0 | 3 | 0 | 3 |
| **French** | 2 | 0 | 0 | 1 | 0 | 2 |
| **Hmong** | 2 | 0 | 1 | 1 | 0 | 2 |
| **Somali** | 2 | 0 | 1 | 1 | 0 | 2 |
| **Farsi** | 1 | 0 | 0 | 1 | 0 | 1 |
| **Japanese** | 1 | 0 | 0 | 0 | 0 | 0 |
| **Pacific Island Dialects** | 1 | 0 | 0 | 1 | 0 | 1 |
| **Ukrainian** | 1 | 0 | 1 | 0 | 0 | 1 |
| **Pictures** | 2 | 0 | 2 | 0 | 1 | 1 |

**Survey question 7**

**When you do science inquiry activities with your class, what is your source for the activity? (Please select all that apply.)**

Most teachers across the grades reported that they either design their own science inquiry activities (82% overall), modify activities that they find in activity books (78% overall), or modify activities from other teachers (64%). It is clear that when teachers use science inquiry activities, they modify them. Only one teacher reported not using science inquiry activities with his/her class.

Table 10. Sources for science inquiry activities

| Source | All Teachers (out of 145) | K–2 Teachers (out of 14) | 3–5 Teachers (out of 64) | 6–8 Teachers (out of 47) | Rural Teachers (out of 50) | Sub/urban Teachers (out of 93) |
|---|---|---|---|---|---|---|
| **Myself**—I design them | 119 (82%) | 11 (79%) | 53 (83%) | 38 (81%) | 42 (84%) | 75 (81%) |
| **Activity books**—but I modify them | 115 (78%) | 9 (64%) | 51 (80%) | 39 (83%) | 40 (80%) | 74 (80%) |
| **Other teachers**—I modify theirs | 94 (64%) | 9 (64%) | 42 (66%) | 31 (66%) | 32 (64%) | 61 (66%) |
| **Activity books**—but I DON'T modify them | 26 (18%) | 1 (<1%) | 11 (17%) | 11 (23%) | 11 (22%) | 14 (15%) |
| **Not applicable**—I don't do science inquiry activities with my class | 1 (<1%) | 0 | 0 | 1 (<1%) | 1 (<1%) | 0 |

**Survey question 8**
**In a chemistry activity guide, which of the following assessment tools would be most helpful? (Please choose TWO.)**
While teachers generally found all of the following assessment tools to be helpful, overall, teachers said that a "list of sample questions to ask students" would be the most helpful assessment tool for a chemistry activity guide.

For example, for K–2 teachers, a strong majority (79%) reported this as the most helpful assessment tool from the list. K–2 teachers cited the next most helpful tool as "already printed student data collection tables." For teachers of grades 3–5 and 6–8 and rural teachers, the top two most helpful assessment tools were a "list of sample questions" and "sample results or possible student answers," with between 60 and 66% of teachers finding these tools helpful.

Although a lesser number, well over a quarter of all teachers cited "student worksheets to fill out" as a helpful assessment tool. "Sample results or possible student answers" was the only tool that less than 25% of the group cited as helpful, and this was by the K–2 teachers (21%).

Table 11. Assessment tools that teachers find helpful for chemistry activity guides

| Assessment tools | All Teachers (out of 145) | K–2 Teachers (out of 14) | 3–5 Teachers (out of 64) | 6–8 Teachers (out of 47) | Rural Teachers (out of 50) | Sub/urban Teachers (out of 93) |
|---|---|---|---|---|---|---|
| **List of sample questions to ask students** | 95 (66%) | 11 (79%) | 41 (64%) | 31 (66%) | 30 (60%) | 63 (68%) |
| **Sample results, possible student answers** | 84 (58%) | 3 (21%) | 40 (63%) | 30 (64%) | 32 (64%) | 51 (55%) |
| **Already printed student data collection tables** | 74 (51%) | 6 (43%) | 35 (55%) | 22 (47%) | 25 (50%) | 48 (52%) |
| **Student worksheets to fill out** | 61 (42%) | 5 (38%) | 29 (45%) | 19 (40%) | 21 (42%) | 40 (43%) |

**Survey question 9**
**When you formally assess (for a grade) a student's understanding of hands-on science activities, how often do you use the following methods?**
Overall, teachers used all three methods surveyed. However, it is clear that while teachers of grades 6–8 tended to rely on a combination of methods to assess students, teachers of grades K–2 observed students more and evaluated their written work less. Some K–2 teachers said that they "never" evaluated students' written work (14%).

Table 12. Frequency of use of methods for formal assessment of student understanding of hands-on science activities

| Assessment methods | All Teachers (out of 144) | K–2 Teachers (out of 14) | 3–5 Teachers (out of 64) | 6–8 Teachers (out of 47) | Rural Teachers (out of 50) | Sub/urban Teachers (out of 93) |
|---|---|---|---|---|---|---|
| **Observing the student working** | | | | | | |
| Always | 85 (59%) | 12 (86%) | 43 (67%) | 19 (40%) | 27 (54%) | 56 (60%) |
| Usually | 46 (32%) | 1 (7%) | 18 (28%) | 20 (43%) | 20 (40%) | 26 (28%) |
| Occasionally | 13 (9%) | 1 (7%) | 3 (5%) | 7 (15%) | 3 (6%) | 10 (11%) |
| Never | 0 | 0 | 0 | 0 | 0 | 0 |
| **Verbally asking the student or class questions** | | | | | | |
| Always | 63 (44%) | 9 (64%) | 29 (45%) | 16 (34%) | 20 (40%) | 42 (45%) |
| Usually | 48 (33%) | 3 (21%) | 27 (42%) | 13 (28%) | 18 (36%) | 30 (32%) |
| Occasionally | 28 (19%) | 2 (14%) | 8 (13%) | 13 (28%) | 11 (22%) | 17 (18%) |
| Never | 3 (2%) | 0 | 0 | 3 (6%) | 1 (2%) | 2 (2%) |
| **Evaluating the students' written work** | | | | | | |
| Always | 49 (34%) | 1 (8%) | 19 (30%) | 22 (47%) | 15 (30%) | 33 (35%) |
| Usually | 69 (48%) | 8 (57%) | 34 (53%) | 20 (43%) | 28 (56%) | 41 (44%) |
| Occasionally | 23 (16%) | 3 (21%) | 11 (17%) | 4 (9%) | 7 (14%) | 16 (17%) |
| Never | 2 (1%) | 2 (14%) | 0 | 0 | 0 | 2 (2%) |

**Survey question 10**

**We can provide sample cross-curricular connections for each chemistry activity. How helpful would you find connections to the following areas?**

Overall, teachers expressed support for cross-curricular connections in general, with the two strongest areas of interest being math and earth science/geology. However, teachers found all cross-curricular connections to be helpful. As one teacher stated, "anything that connects learning with real life application would be helpful."

Table 13. Helpfulness of potential cross-curricular connections for chemistry activities

| Potential cross-curricular connections | All Teachers (out of 146) | K–2 Teachers (out of 14) | 3–5 Teachers (out of 64) | 6–8 Teachers (out of 47) | Rural Teachers (out of 51) | Sub/urban Teachers (out of 93) |
|---|---|---|---|---|---|---|
| **Mathematics** | | | | | | |
| Helpful | 135 (92%) | 13 (93%) | 64 (100%) | 39 (83%) | 48 (94%) | 85 (91%) |
| Not helpful | 3 (<1%) | 1 (7%) | 0 | 2 (<1%) | 1 (<1%) | 2 (<1%) |
| **Earth Science/Geology** | | | | | | |
| Helpful | 130 (89%) | 13 (93%) | 60 (94%) | 39 (83%) | 44 (86%) | 84 (90%) |
| Not helpful | 8 (<1%) | 0 | 3 (<1%) | 5 (1%) | 5 (<1%) | 3 (<1%) |
| **Biology/Life Science/Genetics** | | | | | | |
| Helpful | 129 (88%) | 13 (93%) | 55 (86%) | 41 (87%) | 43 (84%) | 84 (90%) |
| Not helpful | 11 (<1%) | 1 (7%) | 8 (13%) | 2 (<1%) | 5 (<1%) | 6 (<1%) |
| **Technology/Computers** | | | | | | |
| Helpful | 119 (82%) | 10 (71%) | 55 (86%) | 35 (74%) | 38 (75%) | 79 (85%) |
| Not helpful | 16 (1%) | 4 (29%) | 7 (11%) | 5 (1%) | 8 (16%) | 8 (<1%) |
| **Language Arts/Reading** | | | | | | |
| Helpful | 117 (80%) | 12 (86%) | 57 (89%) | 31 (66%) | 41 (80%) | 75 (81%) |
| Not helpful | 11 (<1%) | 1 (7%) | 3 (<1%) | 5 (1%) | 2 (<1%) | 9 (<1%) |
| **History/Social Sciences** | | | | | | |
| Helpful | 113 (77%) | 11 (79%) | 57 (89%) | 29 (62%) | 40 (78%) | 71 (76%) |
| Not helpful | 18 (12%) | 2 (14%) | 6 (<1%) | 7 (15%) | 5 (<1%) | 13 (14%) |
| **Health** | | | | | | |
| Helpful | 112 (77%) | 12 (86%) | 51 (80%) | 31 (66%) | 33 (65%) | 77 (83%) |
| Not helpful | 16 (1%) | 2 (14%) | 8 (13%) | 5 (1%) | 9 (18%) | 7 (<1%) |
| **Physics** | | | | | | |
| Helpful | 99 (68%) | 9 (64%) | 43 (67%) | 33 (70%) | 34 (67%) | 64 (69%) |
| Not helpful | 25 (17%) | 3 (21%) | 13 (20%) | 8 (17%) | 11 (22%) | 14 (15%) |
| **Art/Music** | | | | | | |
| Helpful | 89 (61%) | 10 (71%) | 47 (73%) | 21 (45%) | 29 (57%) | 59 (63%) |
| Not helpful | 35 (24%) | 3 (21%) | 11 (17%) | 14 (30%) | 11 (22%) | 24 (26%) |

**Survey question 10b**
**What OTHER cross-curricular connections would be helpful?**

Teachers expressed interest in a variety of different cross-curricular connections and general skill areas that would be helpful to them for chemistry activities. However, there was no one area of additional connections that unified the teachers. Teachers in grades 6–8 and rural teachers said that real-world skills and life skills (such as cooking) would be helpful connections. Other suggestions included using inquiry and having activities be "hands-on."

Teachers cited six different subject areas (in addition to a request for non-literacy based activities) where they thought cross-curricular connections would be helpful. Additional cross-curricular connections are outlined in Table 14.

Table 14. OTHER helpful cross-curricular connections for chemistry activities

| OTHER cross-curricular connections | All Teachers (out of 25) | K–2 Teachers (out of 4) | 3–5 Teachers (out of 13) | 6–8 Teachers (out of 4) | Rural Teachers (out of 6) | Sub/urban Teachers (out of 18) |
|---|---|---|---|---|---|---|
| **General skill areas** | **11 (44%)** | **1 (25%)** | **2 (15%)** | **6 (150%)** | **2 (33%)** | **8 (44%)** |
| Real-world | 3 | 0 | 0 | 2 | 1 | 2 |
| Life skills (including cooking) | 3 | 0 | 0 | 3 | 1 | 2 |
| Inquiry | 2 | 0 | 1 | 1 | 0 | 2 |
| Advanced and not-so-advanced extensions | 1 | 0 | 1 | 0 | 0 | 1 |
| Hands-on | 1 | 1 | 0 | 0 | 0 | 1 |
| Multi-grade standards | 1 | 0 | 0 | 0 | 0 | 0 |
| **Subject-specific skill areas** | **9 (36%)** | **2 (50%)** | **5 (38%)** | **0** | **1 (17%)** | **8 (44%)** |
| Current events (international focus) | 2 | 0 | 1 | 0 | 0 | 2 |
| Spanish | 2 | 0 | 2 | 0 | 1 | 1 |
| Energy conservation/ environmental science | 1 | 1 | 0 | 0 | 0 | 1 |
| Ethical topics | 1 | 0 | 1 | 0 | 0 | 1 |
| NOT reading/literacy specific | 1 | 1 | 0 | 0 | 0 | 1 |
| Vocabulary/Grammar | 1 | 0 | 0 | 0 | 0 | 1 |
| Writing | 1 | 0 | 1 | 0 | 0 | 1 |

**Survey question 14**

**Is there anything else you want us to know as we design classroom chemistry activities?**

Teachers listed a wide range of issues relating to classroom chemistry activities. The ideas they expressed fell roughly into six categories: logistically easy, engaging/interesting for students, teacher training needs, curriculum focused, subject-area focused, and multi-user. The most widely shared view among teachers was that activities need to be logistically easy (76% overall). View Table 15 for full list of responses.

Logistical ease in activities encompasses everything from where to obtain supplies to physical space for conducting the activity to set up and clean up of the activity. The most important aspect was obtaining materials. Multiple teachers requested that materials be readily available at a grocery store, and, if they were more specialized products, one teacher recommended that activities "list sources where we can buy materials that are not commonly found in local stores." A rural teacher commented, "Rural classrooms have a very difficult time getting many of the chemicals required for labs. It would be very useful to have price estimation and resources for obtaining supplies." It was also suggested that there be a "list [of] needed materials for all experiments at the beginning of each experiment/unit."

Teachers also wanted the activities to be straightforward, citing safety (including use of non-toxic chemicals) and ease of set up/clean up as key factors. As one teacher stated, "Keep it simple. Keep it cheap. Keep it high interest."

Table 15. Classroom chemistry activities—feedback from teachers

| Teacher feedback on classroom chemistry activities | All Teachers (out of 76) | K–2 Teachers (out of 8) | 3–5 Teachers (out of 35) | 6–8 Teachers (out of 25) | Rural Teachers (out of 29) | Sub/urban Teachers (out of 46) |
|---|---|---|---|---|---|---|
| **Logistically easy** | **58 (76%)** | **6 (75%)** | **26 (74%)** | **20 (80%)** | **28 (97%)** | **30 (65%)** |
| Materials readily available | 13 | 1 | 6 | 4 | 7 | 6 |
| Material sources (where to buy) | 9 | 1 | 3 | 3 | 4 | 5 |
| Safety (including limited toxic) | 7 | 1 | 0 | 6 | 3 | 4 |
| Simple | 6 | 1 | 4 | 1 | 3 | 3 |
| Cost (free/inexpensive) | 4 | 0 | 1 | 2 | 1 | 3 |
| User-friendly | 2 | 0 | 2 | 0 | 0 | 2 |
| Easy-to-interpret | 2 | 0 | 2 | 0 | 1 | 1 |
| Materials list for each activity | 2 | 0 | 2 | 0 | 2 | 0 |
| Student procedure sheets | 2 | 0 | 2 | 0 | 1 | 1 |
| Directions clear for students | 2 | 0 | 1 | 1 | 2 | 0 |
| Requires minimal resources (i.e., no sink, etc.) | 2 | 0 | 1 | 1 | 1 | 1 |
| Easy set up/clean up | 2 | 0 | 0 | 1 | 2 | 0 |
| CD of resources | 1 | 0 | 0 | 1 | 0 | 1 |
| Physical space (limited) | 1 | 1 | 0 | 0 | 0 | 1 |
| Storage space (limited) | 1 | 0 | 1 | 0 | 0 | 1 |
| Teacher procedure sheets (including time, etc.) | 1 | 1 | 0 | 0 | 0 | 1 |
| Time | 1 | 0 | 1 | 0 | 1 | 0 |
| **Engaging/interesting for students** | **23 (30%)** | **4 (50%)** | **12 (34%)** | **4 (16%)** | **7 (24%)** | **15 (33%)** |
| Age/grade appropriate | 6 | 1 | 4 | 1 | 4 | 2 |
| Wow factor/fun | 5 | 1 | 3 | 1 | 1 | 4 |
| Real-life connections | 4 | 1 | 1 | 2 | 0 | 4 |
| Hands-on | 3 | 1 | 1 | 0 | 1 | 2 |
| Home extensions | 2 | 0 | 2 | 0 | 0 | 2 |
| Bilingual (especially Spanish) | 1 | 0 | 1 | 0 | 0 | 1 |
| Limited “wait time” (10 minute max) | 1 | 0 | 0 | 1 | 1 | 0 |
| Themed | 1 | 0 | 0 | 0 | 0 | 0 |
| **Curriculum focused** | **14 (18%)** | **0** | **5 (14%)** | **9 (36%)** | **7 (24%)** | **7 (15%)** |
| Inquiry-based | 5 | 0 | 1 | 4 | 1 | 4 |
| Reflect state standards | 3 | 0 | 1 | 2 | 1 | 2 |
| Specific science skill building | 2 | 0 | 0 | 2 | 1 | 1 |
| Interdisciplinary/cross-curricular | 1 | 0 | 1 | 0 | 1 | 0 |
| Unit-specific | 1 | 0 | 0 | 1 | 1 | 0 |
| Curriculum-based | 1 | 0 | 1 | 0 | 1 | 0 |
| Ideas for using activity as work samples | 1 | 0 | 1 | 0 | 1 | 0 |
| **Teacher training needs** | **12 (16%)** | **0** | **5 (14%)** | **6 (24%)** | **5 (17%)** | **7 (15%)** |
| Science explanation for teachers not trained in science | 5 | 0 | 4 | 1 | 4 | 1 |
| Inquiry guide for teachers | 3 | 0 | 0 | 3 | 1 | 2 |
| Online teacher blog | 2 | 0 | 0 | 1 | 0 | 2 |
| Give answers to questions | 1 | 0 | 1 | 0 | 0 | 1 |
| Teacher night/teacher training workshops | 1 | 0 | 0 | 1 | 0 | 1 |

(Table 15 continues on next page.)

Table 15, con't. Classroom chemistry activities—feedback from teachers

| Teacher feedback on classroom chemistry activities, con't. | All Teachers (out of 76) | K–2 Teachers (out of 8) | 3–5 Teachers (out of 35) | 6–8 Teachers (out of 25) | Rural Teachers (out of 29) | Sub/urban Teachers (out of 46) |
|---|---|---|---|---|---|---|
| **Subject-area focused** | **9 (12%)** | **1 (13%)** | **5 (14%)** | **3 (12%)** | **1 (3%)** | **8 (17%)** |
| AIMS and Gems as models | 1 | 0 | 1 | 0 | 0 | 1 |
| Chemistry activities related to earth science (middle) | 1 | 0 | 0 | 1 | 0 | 1 |
| Chemistry for 6th at high and low | 1 | 0 | 0 | 1 | 1 | 0 |
| Chemistry related to water cycle (elementary) | 1 | 0 | 1 | 0 | 0 | 1 |
| Kits based around Salem-Keizer "Bridges" animals | 1 | 1 | 0 | 0 | 0 | 1 |
| OMSI earth science class (of same caliber as the chemistry and biology classes) | 1 | 0 | 1 | 0 | 0 | 1 |
| Performance tasks (for physics, life and earth science) | 1 | 0 | 1 | 0 | 0 | 1 |
| Space and weather | 1 | 0 | 0 | 1 | 0 | 1 |
| Wetlands-specific; outdoor activities | 1 | 0 | 1 | 0 | 0 | 1 |
| **Multi-user** | **5 (7%)** | **1 (13%)** | **1 (3%)** | **2 (8%)** | **1 (3%)** | **4 (9%)** |
| Student level (high/low) | 3 | 1 | 1 | 1 | 0 | 3 |
| Independent or in groups | 1 | 0 | 0 | 1 | 1 | 0 |
| Multi-age | 1 | 0 | 0 | 0 | 0 | 1 |

## **Appendix A:** Classroom chemistry activities survey

1. Which of the following scientific equipment do you have access to?

| | None | Not enough for each group | Enough for each group |
|---|---|---|---|
| Beakers | | | |
| Computers | | | |
| Graduated cylinders | | | |
| Hot plate | | | |
| Measuring spoons | | | |
| Petri dishes | | | |
| Plastic or latex gloves | | | |
| Safety goggles | | | |
| Sink | | | |
| Test tubes | | | |

2. How much money do you spend each year on classroom science activities?

| |
|---|
| |

3. If you have class periods, how long are they?

| |
|---|
| |

4. Including set up and clean up, how long can you typically spend with your class on a science activity?

| |
|---|
| |

5. What are your most significant challenges to conducting science activities in the classroom?

| | Not a significant challenge | Somewhat of a challenge | Very significant challenge | Not applicable |
|---|---|---|---|---|
| Using inquiry | | | | |
| Classroom management | | | | |
| Administrative/school support | | | | |
| Time to prepare/set up/clean up | | | | |
| Language barriers | | | | |
| Expense | | | | |

What OTHER challenges do you face?

| |
|---|
| |

6. In your class, how useful would you find bilingual student procedure sheets for hands-on activities?

| Not at all useful | Somewhat useful | Very useful |
|---|---|---|

6b. Other than English, what language(s) would be most helpful to you and your students on student procedure sheets?

7. When you do science inquiry activities with your class, what is your source for the activity? (Please select all that apply.)

Myself – I design them.
Other teachers – I modify theirs.
Activity books – but I modify them.
Activity books – but I DON'T modify them.
Not applicable – I don't do science inquiry activities with my class.

8. In a chemistry activity guide, which of the following assessment tools would be most helpful? (Please choose TWO).

Student worksheets to fill out
Already-printed student data collection tables
List of sample questions to ask students verbally
Sample results, possible students answers

9. When you formally assess (for a grade) a student's understanding of hands-on science activities, how often do you use the following methods:

| | Always | Usually | Occasionally | Never |
|---|---|---|---|---|
| Evaluating the students' written work | | | | |
| Verbally asking the student or class questions | | | | |
| Observing the student working | | | | |

10. We can provide sample cross-curricular connections for each chemistry activity. How helpful would you find connections to the following areas?

| | Helpful | Not helpful |
|---|---|---|
| History/Social Studies | | |
| Physics | | |
| Health | | |
| Language Arts/Reading | | |
| Mathematics | | |
| Earth Science/Geology | | |
| Art/Music | | |
| Technology/Computers | | |
| Biology/Life Science/Genetics | | |

What OTHER cross-curricular connections would be helpful?

11. What grade(s) do you teach?

K
1
2
3
4
5
6
7
8
Other

12. Which of these word best describes your school?

Rural
Suburban
Urban

13. What is your school's ZIP code?

14. Is there anything else you want us to know as we design classroom chemistry activities?

# Appendix B

**August 3, 2006**

Dear Friend of OMSI,

At OMSI we are conducting a **short survey** of Oregon K-8 teachers in order to design a **book of classroom chemistry activities.**

By taking the survey, you can register to **win a $50 gift certificate to the OMSI Science Store,** so please **complete the survey** by August 8th.

Thank you!

You received this email because you are a teacher who has provided us with your email address during an OMSI workshop. To request further information about the project, or to send us your questions or comments, please contact us at: jashcraft@omsi.edu or 503-797-4670.

Unsubscribe me from this survey list.

Oregon Museum of Science and Industry | 1945 SE Water Avenue | Portland, OR 97214 | 503-797-OMSI

# Appendix C

**August 16, 2006**

Dear Friend of OMSI,

At OMSI we are conducting a **short survey** of Oregon K-8 teachers in order to design a **book of classroom chemistry activities.**

If you've already completed the survey, **thank you!**
If not, **take the survey** today!

By taking the survey, you can register to **win a $50 gift certificate to the OMSI Science Store,** so please **complete the survey** by August 23rd.

Thank you!

You received this email because you are a teacher who has provided us with your email address during an OMSI workshop. To request further information about the project, or to send us your questions or comments, please contact us at: jashcraft@omsi.edu or 503-797-4670.

Unsubscribe me from this survey list.

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