

Appendix 3
Physical Science and Chemistry Modeling Workshops
Participation in Professional Activities in Past 12 Months in IRC Pre-Survey and Post-Survey¹

	Pre-Survey				Post-Survey ^a			
	Physical Science Year 1 N=16	Physical Science Year 2 N=10	Chemistry N=17	TOTAL N=43	Physical Science Year 1 N=14	Physical Science Year 2 N=6	Chemistry N=13	TOTAL N=33
a) Attended any national or state science teacher association meetings?	18.8	0.0	5.9	9.3	50.0	33.3**	15.4	33.3*
b) Taught any in-service workshops or courses in science or science teaching?	25.0	10.0	5.9	14.0	7.1	16.7	15.4	12.1
c) Received any local, state, or national grants or awards for science teaching?	25.0	20.0	5.9	16.3	28.6	0.0	7.7	15.2
d) Participated in a local, state, or national physical science conference?	43.8	0.0	17.6	23.3	21.4	16.7***	0.0	12.1

¹Percent of participants who responded "Yes" to each statement. Percentages are based on those with valid response to item.

^aStatistically significant differences highlighted are between follow-up responses compared to their pre-treatment responses for participants who responded to both surveys.

*Statistically significant difference with p-value < .10.

**Statistically significant difference with p-value < .05.

***Statistically significant difference with p-value < .01.

Appendix 4

Physical Science and Chemistry Modeling Workshops

Teacher Opinions and Attitudes in OBR Pre-Survey and Post-Survey ¹

	Pre-Survey				Post-Survey ^a			
	Physical Science Year 1 N=15	Physical Science Year 2 N=11	Chemistry N=18	TOTAL N=44	Physical Science Year 1 N=14	Physical Science Year 2 N=6	Chemistry N=13	TOTAL N=33
a) I have a good understanding of fundamental core content in my discipline.	86.7	90.9	77.8	84.1	92.9	100.0	100.0	97.0
b) I have a good understanding of relating classroom activities to Ohio's Academic Standards.	93.3	81.8	72.2	81.8	100.0	100.0	92.3*	97.0
c) I have a good understanding of authentic assessment methods used to measure student performance.	64.3	90.9	50.0	65.1	92.9*	100.0	69.2	84.8
d) I have a good understanding of effective questioning techniques and its use in the classroom.	73.3	90.9	77.8	79.5	100.0*	100.0	84.6	93.9
e) I have a good understanding of the methods necessary to teach math and/or science concepts effectively.	73.3	90.9	72.2	77.3	100.0*	100.0	100.0	100.0**
f) I believe I am an effective teacher.	93.3	90.9	83.3	88.6	100.0	100.0	92.3	97.0
g) I am excited about teaching in my subject area.	93.3	90.9	83.3	88.6	92.9	100.0	92.3	93.9
h) I am interested in networking with teachers and other professionals.	93.3	90.9	88.9	90.9	100.0	100.0	100.0	100.0

¹Percent of participants who indicated that they "Strongly Agree" or "Agree" with each statement. Percentages are based on those with valid response to item.

^aStatistically significant differences highlighted are between follow-up responses compared to their pre-treatment responses for participants who responded to both surveys.

*Statistically significant difference with p-value < .10.

**Statistically significant difference with p-value < .05.

Appendix 5

Physical Science and Chemistry Modeling Workshops Teacher Opinions and Attitudes in IRC Pre-Survey and Post-Survey¹

	Pre-Survey				Post-Survey ^a			
	Physical Science Year 1 N=16	Physical Science Year 2 N=10	Chemistry N=17	TOTAL N=43	Physical Science Year 1 N=14	Physical Science Year 2 N=6	Chemistry N=13	TOTAL N=33
a) Virtually all students can learn to think scientifically.	93.3	100.0	100.0	97.6	100.0	100.0	100.0	100.0
b) Students learn science best in classes with students of similar abilities.	40.0	60.0	47.1	47.6	28.6	66.7	30.8	36.4
c) I enjoy teaching science.	100.0	90.0	100.0	97.7	100.0	100.0	92.3	97.0
d) I organize my curriculum around the textbook.	37.5	30.0	0.0	20.9	28.6	33.3	7.7	18.2
e) The teacher should consistently use activities which require students to do original thinking.	87.5	90.0	88.2	88.4	100.0	100.0	100.0	100.0
f) Teachers should know the answers to most questions students ask about science.	68.8	60.0	47.1	58.1	53.8	66.7	38.5	50.0
g) Students should never leave science class feeling confused or stuck.	25.0	20.0	29.4	25.6	0.0	50.0	7.7	12.1
h) An important issue is not whether students' answers to any science question are correct but whether students can explain their answers.	62.5	80.0	52.9	62.8	85.7	83.3	100.0**	90.9**
i) Some people are good at science and some just are not.	31.3	30.0	5.9	20.9	14.3	16.7	7.7	12.1
j) Learning for all students is enhanced by incorporating the contributions of different cultures.	75.0	80.0	64.7	72.1	92.9	83.3	76.9	84.8*
k) Good science teachers show students the correct way to answer questions they will be tested on.	37.5	10.0	41.2	32.6	7.1	50.0	8.3**	15.6*

¹Percent of participants who indicated that they "Strongly Agree" or "Agree" with each statement. Percentages are based on those with valid response to item.

^aStatistically significant differences highlighted are between follow-up responses compared to their pre-treatment responses for participants who responded to both surveys.

*Statistically significant difference with p-value < .10.

**Statistically significant difference with p-value < .05.

Appendix 6

Physical Science and Chemistry Modeling Workshops

School Support of Science Instruction and Teacher as a Resource¹

	Pre-Survey				Post-Survey ^a			
	Physical Science Year 1 N=16	Physical Science Year 2 N=10	Chemistry N=17	TOTAL N=43	Physical Science Year 1 N=14	Physical Science Year 2 N=6	Chemistry N=13	TOTAL N=33
a) Most science teachers at my school would like to use an "inquiry" style of teaching.	62.5	40.0	76.5	62.8	64.3	66.7	69.2	66.7
b) Most science teachers in my school contribute actively to making decisions about the science curriculum.	81.3	20.0	76.5	65.1	85.7	50.0*	69.2	72.7
c) Most science teachers in my school regularly share ideas and materials related to science instruction.	81.3	40.0	94.1	76.7	85.7	50.0*	84.6	78.8
d) Most science teachers in my school regularly observe each other teaching classes as part of sharing and improving instructional strategies.	6.3	0.0	17.6	9.3	14.3	0.0	0.0	6.1
e) I regularly serve as a resource for other science teachers in my school.	93.8	40.0	70.6	72.1	76.9	83.3	58.3	71.0
f) I regularly serve as a resource for other science teachers in my district.	25.0	10.0	17.6	18.6	35.7	33.3	8.3	25.0
g) My principal is supportive of innovative approaches to teaching science.	87.5	90.0	82.4	86.0	100.0	83.3	84.6	90.9

¹Percent of participants who indicated that they "Strongly Agree" or "Agree" with each statement. Percentages are based on those with valid response to item.

^aStatistically significant differences highlighted are between follow-up responses compared to their pre-treatment responses for participants who responded to both surveys.

^bStatistically significant difference with p-value < .10.

Appendix 7

Physical Science and Chemistry Modeling Workshops

Opinions about Preparedness in IRC Pre-Survey and Post-Survey ¹

	Pre-Survey				Post-Survey ^a			
	Physical Science Year 1 N=16	Physical Science Year 2 N=10	Chemistry N=17	TOTAL N=43	Physical Science Year 1 N=14	Physical Science Year 2 N=6	Chemistry N=13	TOTAL N=33
a) Manage a class of students who are using hands-on/manipulative materials.	93.8	100.0	94.1	95.3	100.0	83.3	90.9	93.5
b) Use cooperative learning groups.	68.8	100.0	100.0	88.4	85.7	83.3	72.7	80.6
c) Implement inquiry or discovery learning.	62.5	100.0	52.9	67.4	100.0***	83.3	81.8**	90.3***
d) Present the applications of science concepts.	75.0	100.0	88.2	86.0	92.9	100.0	81.8	90.3
e) Phrase questions to encourage more open-ended investigations.	37.5	80.0	64.7	58.1	92.9**	100.0	81.8	90.3***
f) Use computers as an integral part of science instruction.	68.8	80.0	47.1	62.8	64.3	83.3	54.5	64.5
g) Use handheld computers as an integral part of science instruction.	43.8	20.0	29.4	32.6	42.9	66.7	54.5	51.6
h) Use handheld computers for networking or administrative purposes.	18.8	20.0	11.8	16.3	28.6	66.7	36.4	38.7
i) Use science equipment as an integral part of science instruction.	93.8	100.0	82.4	90.5	85.7	100.0	100.0	93.5
j) Teach groups that are heterogeneous in ability.	81.3	70.0	76.5	76.7	85.7	83.3	90.9*	87.1
k) Teach students from a variety of cultural backgrounds.	62.5	50.0	64.7	60.5	71.4	50.0	72.7	67.7
l) Inform students of career opportunities in science.	50.0	40.0	58.8	51.2	76.9	50.0	36.4	56.7
m) Use performance-based assessment in science.	31.3	50.0	35.3	37.2	78.6*	83.3	63.6*	74.2***
n) Use portfolios to assess student progress in science.	12.5	20.0	5.9	11.6	28.6	33.3	45.5**	35.5*
o) Encourage participation of females in science.	87.5	70.0	94.1	86.0	78.6	100.0	72.7	80.6
p) Encourage participation of underrepresented minorities in science.	68.8	40.0	70.6	62.8	64.3	50.0	54.5	58.1

¹Percent of participants who indicated "Very Well Prepared" or "Prepared but Want More." Percentages are based on those with valid response to item.

^aStatistically significant differences highlighted are between follow-up responses compared to their pre-treatment responses for participants who responded to both surveys.

*Statistically significant difference with p-value < .10.

**Statistically significant difference with p-value < .05.

***Statistically significant difference with p-value < .01.

Appendix 8
Physical Science and Chemistry Modeling Workshops
Teacher Classroom Practices in OBR Pre-Survey in IRC Pre-Survey and Post-Survey¹

	Pre-Survey				Post-Survey ^a			
	Physical Science Year 1 N=15	Physical Science Year 2 N=11	Chemistry N=18	TOTAL N=44	Physical Science Year 1 N=14	Physical Science Year 2 N=6	Chemistry N=13	TOTAL N=33
a) Classroom interaction involves a dialogue among teacher and students.	66.7	81.8	70.6	72.7	78.6	100.0	76.9	81.8
b) Students generally work independently.	20.0	0.0	0.0	9.1	7.1	0.0	0.0*	3.0
c) Instruction emphasizes broad coverage of information with little depth.	20.0	9.1	5.9	11.4	14.3*	0.0	7.7	9.1
d) Student role is to apply inquiry and problem solving skills to discover solutions to problems.	73.3	81.8	64.7	72.7	92.9**	100.0	76.9	87.9
e) Students generally learn concepts and processes through readings, lectures, and demonstrations.	0.0	0.0	0.0	0.0	0.0***	16.7	7.7	6.1
f) I find it difficult to encourage the efforts and contributions of certain students or groups of students.	20.0	9.1	11.8	13.6	7.1	0.0	7.7	6.1
g) I generally assess students' progress using alternative methods (e.g., open-response questions, hands-on performance, portfolios, observation).	6.7	9.1	23.5	13.6	28.6	66.7	38.5	39.4

¹Percent of participants who indicated that the specified classroom teaching approach was a close match (value of 4 or 5) with their position. Percentages are based on those with valid response to item.

^aStatistically significant differences highlighted are between follow-up responses compared to their pre-treatment responses for participants who responded to both surveys.

*Statistically significant difference with p-value < .10.

**Statistically significant difference with p-value < .05.

***Statistically significant difference with p-value < .01.

Appendix 9

Physical Science and Chemistry Modeling Workshops

Weekly Classroom Activities in IRC Pre-Survey and Post-Survey¹

	Pre-Survey				Post-Survey ^a			
	Physical Science Year 1 N=16	Physical Science Year 2 N=10	Chemistry N=17	TOTAL N=43	Physical Science Year 1 N=14	Physical Science Year 2 N=6	Chemistry N=13	TOTAL N=33
a) Listen and take notes during presentation by teacher	81.3	50.0	82.4	74.4	71.4	33.3	63.6**	61.3
b) Watch the teacher demonstrate a scientific principle	75.0	60.0	64.7	67.4	50.0	50.0	45.5	48.4
c) Work in pairs/teams/small groups	86.7	80.0	94.1	88.1	100.0	83.3	100.0	96.8
d) Read a science textbook	68.8	30.0	29.4	41.9	50.0	16.7	36.4	38.7
e) Participate in dialogue with the teacher to develop an idea	75.0	70.0	70.6	72.1	92.9	83.3	90.9	90.3
f) Make conjectures and explore possible methods to solve a scientific problem	37.5	50.0	47.1	44.2	85.7*	66.7	81.8	80.6**
g) Do hands-on/manipulative activities	81.3	80.0	94.1	86.0	100.0	83.3	100.0	96.8
h) Write their reasoning about how to solve a scientific problem	25.0	40.0	47.1	37.2	64.3*	83.3	72.7	71.0**
i) Work in class on a project that takes a week or more	6.3	0.0	0.0	2.3	0.0	16.7	0.0	3.2
j) Learn by inquiry	31.3	60.0	35.3	39.5	78.6**	66.7	80.0**	76.7***
k) Use worksheets from textbooks	56.3	20.0	29.4	37.2	53.8	50.0	36.4	46.7
l) Use teacher-created lessons	87.5	80.0	88.2	86.0	85.7	100.0	100.0	93.5
m) Engage in reflective thinking/writing about what they are learning	37.5	70.0	23.5	39.5	42.9**	50.0	63.6**	51.6**
n) Use computers	12.5	30.0	23.5	20.9	21.4	50.0	36.4	32.3
o) Use science equipment (e.g., measurement tools and graphing calculators)	75.0	60.0	76.5	72.1	85.7	83.3	90.9	87.1

¹Self-report by teacher indicating that activity occurred "Once or twice a week" or "Almost daily." There was no missing data for this set of items.

^aStatistically significant differences highlighted are between follow-up responses compared to their pre-treatment responses for participants who responded to both surveys.

*Statistically significant difference with p-value < .10.

**Statistically significant difference with p-value < .05.

***Statistically significant difference with p-value < .01.