Rio Connection: Increasing Continuity throughout the Science Curricula

YEAR THREE EVALUATION

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Prepared By
The Voinovich School of Leadership and Public Affairs

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Rio Connection: Increasing Continuity throughout the Science Curricula

Executive Summary

This Executive Summary addresses the Ohio University Voinovich School of Leadership and Public Affairs' Year Three evaluation findings on the Rio Connection: Increasing Continuity throughout the Science Curricula project. The project is a three-year Math-Science Partnership among the University of Rio Grande (URG), The Gallia-Vinton Educational Service Center (GV-ESC), Gallia County Local School District (GCLSD), and Wellston City School District (WCSD). The purpose of the partnership is to connect Kindergarten through twelfth grade teachers with math and science faculty at nearby colleges and universities in order to facilitate ongoing, high-quality professional development in the math and science content areas required by Ohio's New Learning Standards. Collaborating with faculty at URG and the GV-ESC and utilizing a coaching professional development model, GCLSD and WCSD science teachers were provided professional development and individual coaching in life science content knowledge, curriculum mapping and teaching pedagogy. Teachers had the opportunity to collaborate with Rio STEM faculty and science coaches throughout the school year, as well as with other teachers during the professional development workshop and through planned co-teaching lessons across grade bands, if desired.

The primary finding of the Year Three evaluation follow:

- Across coaching and workshop days, 2,275 hours of professional development were provided to 56 teachers, averaging over 40 hours per teacher.
- Teacher scores on life science content tests are high at both pre- and post-test, making statistically significant increases difficult to achieve. Still, scores increased from 41.4 at pre-test to 42.1 at post-test (29 matched tests).
- 90% of teachers report an increase in life science knowledge because of the workshop days.
- Students of participating teachers show statistically significant gains from pre-tests (M=15.7, SD=3.97) to post-test (M=16.4, SD=4.32), t(187=-2.997, p=.003).
- Each project year, measures for familiarity with and usage of model-based and inquiry-based teaching strategies show improvement and overall progress.
- Nearly half of teachers who took a post-assessment participated in co-teaching (15 teachers). Of those, 53% report the experience was extremely valuable.
- In the final year of the project, 100% of teachers report being somewhat or very familiar with their grade level content standards, and 93% report being somewhat or very familiar with the content standards of adjacent grade levels.

Rio Connection: Increasing Continuity throughout the Science Curricula Year Three Evaluation

Introduction

As part of the 2001 reauthorization of the Elementary and Secondary Education Act, the U.S. Department of Education (ODE) created the Mathematics and Science Partnership (MSP) program with the goal of increasing the academic achievement of students in mathematics and science by enhancing content knowledge and teaching skills of classroom teachers.[1] ODE administers the Ohio program. The program requires partnerships between high-need school districts and the Science, Technology, Engineering, and Mathematics (STEM) faculty in institutions of higher education. The intent of the partnership requirement is to link Kindergarten through twelfth grade teachers with math and science faculty at nearby colleges and universities in order to facilitate ongoing, high-quality professional development in the math and science content areas required by Ohio's Academic Content Standards.

In 2013, in preparation to apply for an MSP grant from ODE, the University of Rio Grande and the Gallia-Vinton Educational Service Center (GV-ESC) collaborated with Gallia County Local School District (GCLSD) and Wellston County School District (WCSD) to develop a professional development project for science and math teachers in grades Kindergarten through twelve.

As a result of the successful planning efforts, the collaboration received an MSP grant from ODE, with the GV-ESC to serve as the fiscal agent and Dr. Jacob White and Dr. Rob Hopkins, both from the University of Rio Grande, to serve as Co-Principal Investigators. In the summer of 2013, a planning team comprised of administrators, science coaches, faculty from the University of Rio Grande, and representatives from the Gallia-Vinton ESC convened at the University of Rio Grande. The project planners developed the primary goal of the project:

> The overarching goal of the project is to support both districts' effective transition to curricula that are aligned with Ohio's New Learning Standards in physical science in Year One, earth and space science in Year Two, life science in Year Three, and to provide continuity with respect to student learning progression.

The five project objectives in Year Three include:
1.) Increase familiarity with new state standards in science
2.) Review and revise current district curricula maps
3.) Increase pedagogical knowledge and usage of inquiry-based science instruction
4.) Increase life science content knowledge
5.) Increase in-district collaboration of teachers across grade bands

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[1] U.S Department of Education (2014). Mathematics and Science Partnerships. Academic Improvement and Teacher Quality Programs: http://www2.ed.gov/programs/mathsci/index.html

This report evaluates the project's progress toward these five objectives and provides an evaluation of Year Three implementation and outcomes.

Project Description

The implementation plan included professional development for science teachers with a focus on scientific inquiry in all years, physical science in Year One (2013/2014), earth and space science in Year Two (2014/2015), and life science in Year Three (2015/2016). In the fall of 2015, GCLSD and WCSD science teachers were provided five day-long science professional development sessions held at the University of Rio Grande. The focus of the sessions was life science, pedagogy, and curriculum development. Figure 1 lists the topics covered during the sessions. During the breakout afternoon sessions which were led by the Principal Investigators for two days and by coaches for two days, teachers would go over lessons or activities appropriate to their grade band, often receive supplies, and consider how the activities address the Ohio New Learning Standards and cognitive demands.

Figure 1. Content of Day-long Professional Development Sessions	
Day 1	**Morning**: Overview of life science content and cognitive demand in Ohio's New Learning Standards. **Afternoon**: Activity on developing trait frequency histograms to identify types of natural selection and understand adaptations
Day 2	**Morning**: Photosynthesis, food webs, habitat requirements, and an activity of optimal foraging. **Afternoon**: Activity on using simulations in the classroom.
Day 3	**Morning**: Formation of biomes and species-environment interaction, adaptation, acclimations, and an activity on how Red Maples respond to a water gradient. **Afternoon**: Coach-led activities on general ecology, environment, and life cycles.
Day 4	**Morning**: Mendelian genetics, cell theory, meiosis/mitosis, gene expression simulation. **Afternoon**: Coach-led activities on cell biology.
Day 5	**Morning**: Test specification review, lesson sharing/shifting, curriculum mapping and lesson planning. **Afternoon**: Evaluation Activities

A new supplement to the workshop in Year Two was the development of the Gallia-Vinton ESC/University of Rio Science Resource Web Page which is under development to include Year Three material. This page allows teachers any-time access to material such as workshop presentation PowerPoints for each of the three years, curriculum maps, interactive classroom

activities, links to the Ohio Science Standards, and many other resources (http://gvesc-rioscience.wikispaces.com/).

A total of 53 teachers attended at least one professional development workshop day. Most teachers, 30 total, attended all five days, nine attended four days, four attended three days, one attended two days, and nine attended one day. This is an average of 31.5 hours per teacher, although the majority of teachers, 74%, received four to five full workshop days. Workshop attendees were asked to sign in with a unique identifier each day; therefore, this can be considered a minimum count in the case that any participants missed the sign-in sheet on any workshop day.

In addition to the daylong professional development sessions, four coaches were engaged to assist the science teachers with a variety of professional development activities individually or collectively (in department meetings or other situations providing support benefiting multiple teachers). A coaching log was provided for each of the coaches to keep track of their activities, plan next steps and document time spent implementing individual (i.e. preconference, instruction, feedback, content support, etc.) and crosscutting activities (i.e. attending grade level or department meetings, collaboration with administration, content support/organization, etc.) with specific teachers.

Along with workshop days, 28 teachers also took part in coaching. Three teachers participated in coaching but not the workshop days, totaling 31 teachers working with the four coaches. Teachers met with the coaches on a one-on-one basis to work on activities that were broken into five main categories: content support, instruction, preconference, feedback, and other. The total number of support hours provided by the coaches was 603, which averaged to 19.5 hours per teacher. This increased from Year Two, where 31 teachers received an average of 10.2 hours per teacher, and from Year One where 36 teachers received an average of 16 hours per teacher. In the most recent year, the number of hours per teacher ranged from 2.4 to 65.2 hours. Content support was the most common activity. All participants received some level of coaching on this topic. Content support was followed closely by instruction, which was utilized by 27 participants.

Across coaching and workshop days in Year Three, 2,275 hours of professional development were provided to 56 total teachers, for an average of over 40 hours per-teacher.

Year Three Evaluation Overview
Staff at Ohio University's Voinovich School of Leadership and Public Affairs serve as the external evaluators for the project. This report focuses on implementation and outcome evaluation findings for the third year of the project. In addition to this report, throughout the year the evaluators provided the Co-Principal Investigators, Jacob White, Ph.D., and Robert Hopkins II,

Ph.D., with summaries of various evaluation activities, including teacher survey results, teacher group interview findings, and coach interview findings. Full reports from the first and second years of the program are available.

Methodology

During the third year, the evaluators used a variety of methods to assess implementation and outcomes of the project, including:

- Analysis of pre- and post-tests of participating GCLSD and WCSD teachers' life science content knowledge, and comparison of these results to teachers in a comparison district also located in southeast Ohio;
- Analysis of pre- and post-tests of GCLSD and WCSD fourth and sixth grade science student content tests, and comparison of participating students' content knowledge to students in a comparison district also located in southeast Ohio;
- Analysis of teacher professional development satisfaction and preparedness surveys;
- Analysis and summary of a coach focus group;
- Review of documents including curriculum maps, attendance sheets from all professional development sessions and corresponding agendas, and coaching logs; and
- Observation of selected professional development sessions.

Evaluation Findings

Evaluation Question One: Does the project result in a statistically significant increase in life science content knowledge of participating teachers and are the participating districts' science teachers' gains in content knowledge greater than those of matched districts' science teachers?

Summary: Teacher content knowledge scores were high at pre- and post-assessment, but slight improvement was made. When asked if the professional development had increased their knowledge of life science content, 36 of 40 (90%) indicated that their knowledge had increased.

Analysis: Participating science teachers in the two districts were administered a pre- and post-test of life science content knowledge. The pre-test was administered at the beginning of the first professional development workshop, and the post-test was administered at the end of the academic year.

The instrument chosen for the teacher science content knowledge assessment was the MOSART or Misconceptions-Oriented Standards-Based Assessment Resources for Teachers: Life Science.[2] The MOSART tests were developed by researchers in the Science Education Department of the Harvard-Smithsonian Center for Astrophysics. They were developed

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[2] President and Fellows of Harvard College (2011). Project MOSART. National Science Foundation

specifically for National Science Foundation-funded Math-Science Partnership projects, field tested, and made publicly available.

Attrition Analysis

Data analysis for this report follows the criterion established in *A Guide for Reporting on Evaluations for the US Department of Education Mathematics and Science Partnerships*[3].

Participating teachers as well as a group of teachers in a comparison district completed the pre- and post-tests. The table below shows the attrition rate for the two groups. Because some participating teachers came from nearby districts only for the workshop days and did not complete the program, fewer post-tests than pre-tests were gathered. One teacher who did not take the pre-test did take the post-tests, therefore the number of matched tests is 29. Due to teacher availability, only five comparison teachers were used in this analysis.

Figure 2. Attrition Rates of Participating and Comparison Teachers		
	Baseline Sample	End of Year Sample
Participating Teachers	41 teachers	31 teachers
Comparison Teachers	5 teachers	5 teachers

Although this evaluation is not held to the attrition criterion, the overall attrition rate was calculated, and is 21.7%.

Baseline equivalence is calculated using the pre-test results from the analytic sample, or the sample used in the analysis, shown in Figure 3. This quasi-experimental design is subject to the baseline equivalence of groups criteria. The difference in means is 1.81, with the participating group having a slightly higher mean. The difference in means is over 5% (.1799) of the pooled standard deviation, which is 3.6. The difference in means is also over 25% (.805) of the standard deviation, which does not meet the criteria.

Figure 3. Baseline Measure Results			
	N	Average at Baseline	Standard Deviation at Baseline
Participating Teachers	29	41.41	3.397
Comparison Teachers	5	39.60	4.775

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[3] Bobronnikov, E., Sahni, S.D., Fernandes, M., & Bozzi, L. (2015). *A Guide for Reporting on Evaluations for the US Department of Education Mathematics and Science Partnerships (MSP).* Abt Associates Inc. Cambridge, MA.

Teacher Content Knowledge Analysis

Matched pre- and post-test data is available for 29 participating teachers. A Paired Samples T-Test was conducted to evaluate the impact of the professional development on teachers' life science content knowledge. The tests did not reveal a statistically significant change in the scores for life science from pre- test (M=41.41, SD=3.39) to post-test (M=42.14, SD=3.54) t(28)=-1.603 p=.120. It should be noted that the average pre-test shows a very high score (41.4), and therefore positive change is difficult to see.

Figure 4. Gallia and Wellston Science Teachers Content Knowledge Test Scores			
	n	Pre-test *M* (SD)	Post-test *M (SD)*
Life Science (49 points)	**29**	**41.41 (3.40)**	**42.14 (3.54)**

Qualitative Analysis of Teacher Content Knowledge Gain

After the five professional development days, teachers were given a satisfaction survey in which they were asked about their experience. When asked if the professional development had increased their knowledge of life science content, 36 of 40 (90%) indicated that their knowledge had increased. When asked to share what they liked best about the professional development program, several indicated that this increased knowledge was a positive take-away from the workshop. As one teacher wrote, "[I liked] learning new content and ways to convey the content to students." Others reported that the content they received during the class was usable, and that the lessons during the "content area pieces" were instructional.

Evaluation Question Two: Does the project result in an increase in the percentage of students proficient in science within the two districts as measured by the Ohio Achievement Assessment?

Summary: There was a statistically significant increase from 4th and 6th grade students' pre-tests (M=15.7, SD=3.97) to post-tests (M=16.4, SD=4.32), t(187)=-2.997, p=.003. The effect size is .046, which is between a medium and small effect and shows that about 4.6% of the change in scores can be attributed to the intervention.

Analysis: The Year One evaluation report used Ohio Achievement Assessment (OAA) results to show an increase in the percentage of students proficient or above in science from 2013 to 2014 in grades five and eight. Improvements in proficiency levels were found in both districts, but state data cannot be used in this evaluation report due to a change in the instruments (Ohio AIR tests replacing the OAA). Further, test results are not available to school districts at the time of this report. Therefore, the best alternative method for measuring student content knowledge growth was implemented and is described below.

Student Content Knowledge Results

Participating Students

During a professional development workshop session, 4th and 6th grade teachers were provided with student content tests to distribute to one to two of their classes at the beginning and end of the school year. A pre-test and post-test with a matching number was assigned and placed in an envelope with a student name on the outside. Teachers were instructed to take out the pre-test, give it to the student, send those tests to evaluators, then distribute the remaining post-tests in the envelopes to the appropriate students at the end of the year. Post-tests were sent to evaluators and the envelopes with student names were discarded.

The instrument chosen for the student science content knowledge assessment was the MOSART or Misconceptions-Oriented Standards-Based Assessment Resources for Teachers: Life Science.[4] The age-appropriate instrument was used for students.

A paired-sample t-test was conducted to evaluate whether the difference in pre- and post-test scores for the participating districts were statistically significant. There was a statistically significant increase from pre-test (M=15.7, SD=3.97) to post-test (M=16.4, SD=4.32), t(187)=-2.997, p=.003. The effect size is .046, which is between a medium and small effect and shows that about 4.6% of the change in scores can be attributed to the intervention.

Figure 5. Participating Students' Life Science Content Knowledge Test Results

	N	Pre-Test *M (SD)*	Post-Test *M (SD)*
MOSART Life Science Assessment	187	15.7(3.97)	16.4(4.32)*
*Statistically significant change in desired direction			

Comparison District

Teachers from a comparison district also located in southeast Ohio were given the same student content tests to distribute to 4th and 6th grade students using the same de-identified matching technique as the participating teachers.

Baseline equivalence is calculated using the pre-test results from the analytic sample, or the sample used in the analysis. The difference in means is 2.339, with the participating students having a slightly higher mean. The difference in means is over 5% (.20085) of the pooled standard deviation, which is 4.017. The difference in means is also over 25% (1.004) of the pooled standard deviation, which does not meet the baseline equivalence criteria. To further

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[4] President and Fellows of Harvard College (2011). Project MOSART. National Science Foundation

test for baseline differences, an independent-samples t-test was conducted. At pre-test, there was a significant difference in means for the participating districts (M=15.652, SD=3.96), and the comparison district (M=13.313, SD= 4.2, t(235) = 3.602, p >.001).

To control for baseline differences, an independent samples t-test was conducted on change scores for the participating and comparison district. There was not a significant difference in change scores in participating (M=.79, SD=3.61) and comparison (M=-.27, SD=3.31) students t(232)= 1.94, p=.066. Although statistical significance is not found, the participating students' average scores increased while comparison students' scores decreased. Based on these calculations, the comparison group did not show significant improvement.

Evaluation Question Three: Was the project successful in increasing participants' familiarity with and usage of model-based and inquiry-based strategies for the teaching of life science?

Summary: At the end of each of the three years, evaluation measures show positive progress in teacher usage of and familiarity with inquiry-based teaching strategies.

Analysis: Teacher surveys and coach discussions are the data sources used to address this evaluation question. There is evidence of consistent, positive change in teachers' usage of inquiry-based teaching strategies.

In the first two years of the project, teachers were asked how often they use inquiry-based instruction in the classroom on the fall and spring surveys. Response options are "never," "rarely," "sometimes," "frequently," and "always." The Year One post-survey shows 86% of teachers at least sometimes using inquiry-based instruction in the classroom, with the percentage increasing to 89% in the Year Two post-assessment, indicating improvement over time. Teachers completed the Pedagogy of Science Teaching Test (POSTT) in Year Two, again to measure use of teaching strategies by asking teachers to correctly identify strategies used in a classroom vignette. Overall, the percent of correct identification improved from pre- to-post. In order to gain more detail about use of teaching strategies while not repeating the use of the lengthy POSTT, measurement for this indicator was adjusted in the final year.

On pre- and post-surveys in Year Three, teachers were asked what percentage of their current science instruction falls into the categories: didactic direct, active direct, guided inquiry, and open inquiry. Twenty-eight teachers provided responses at both pre- and post-assessment. Their individual change was examined by teaching area, and the table below shows the percentage of teachers who reported increased, equal, or decreased time spent in each teaching area. As shown, there is a general movement toward guided and open inquiry.

Figure 6. Teacher Change in Reported Frequency of Use of Teaching Strategies

	Increase	No Change	Decrease
Open Inquiry	32%◄	39%	29%
Guided Inquiry	54%◄	21%	25%
Active Direct	36%	14%	50%◄
Didactic Direct	29%	21%	50%◄
◄ Desirable change			

Also on the final year post-survey, teachers were asked if they incorporated lessons they revised based on guidance from the professional development. Of 30 teachers answering the question, all but one indicated "yes," suggesting improved teaching strategies.

Qualitative Analysis of Teaching Strategies

Focus groups with science coaches revealed that teachers' strategies have developed, and that teachers are utilizing coaches' expertise to improve their classroom activities. One coach said, "I've seen a lot of things that we've done in the training have been taken back to the class and adjusted or tweaked so that it'll work a little better for the way they teach…. I've seen some things that maybe before they wouldn't have touched on but now they touch on a little bit." Most of the coaches agreed that teacher receptiveness to coaching has increased over the three-year period—though some individual teachers have remained hesitant— which allows coaches to extend additional information and training. One coach reflected, "I have a lot of teachers who have commented that it has been very helpful to them, they enjoyed it, and they were hoping it would be available next year also."

Evaluation Question Four: Is there an increase in collaboration between elementary, middle school, and high school science teachers within each partnering district and how do the teachers characterize the benefits of collaboration across grade bands?

Summary: There are indications of increased teacher collaboration among some teachers and across the grade bands. Teachers especially appreciate the opportunity to share ideas with other teachers and with the Rio Connections project team on a more casual level during the professional development workshop sessions.

Analysis: Teacher surveys and a coach focus group are the data sources used to address this evaluation question. Teachers were provided time during the daylong workshops to collaborate on curriculum mapping, and teachers were also encouraged to develop a lesson and co-teach with a teacher from another grade band, if desired.

Year-End Surveys

In year-end surveys, teachers were asked to indicate how often they currently collaborate with teachers from different grade levels. The majority of the 31 respondents indicated some collaboration with teachers in different grades, as shown in the chart below.

Chart 1. Most teachers report collaboration with science teachers from other grade levels in their district.

Frequently or always collaborate, 39%

Sometimes collaborate, 48%

Never or rarely collaborate, 13%
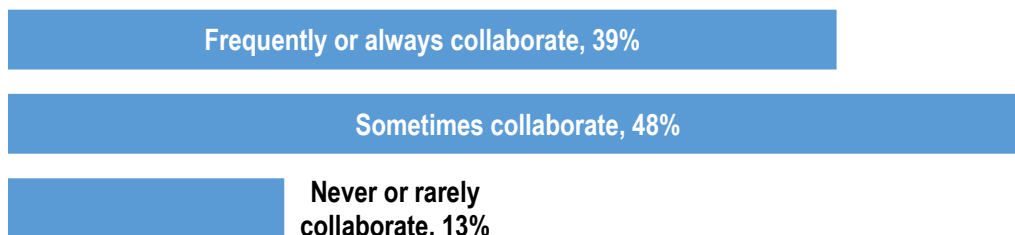
Of the 31 respondents, 15 indicated on the post-survey they had participated in co-teaching as part of the professional development (48%). Of those 15 teachers, 8 (53%) found the co-teaching experience "very valuable." Four teachers (27%) found the experience somewhat valuable and a single respondent found the experience to be not at all valuable.

Workshop Satisfaction Surveys

In the Satisfaction Surveys taken at the end of the week-long workshop earlier in the year, teachers were asked to rate on a one to seven scale (one being "not at all" and seven being "very much") how effectively the professional development allowed them to collaborate with teachers from different grade levels. The average rating to the question by 40 respondents was six, indicating high collaboration outside of their grade band. A follow-up question was to rate the value of this collaboration on the same scale, to which the average rating was 6.2, indicating teachers viewed this collaboration as very valuable.

Teachers were given space to write what they liked best about the professional development series. Of 37 responses, fifteen focused on collaboration, either with teachers, coaches, or with the group as a whole. Among the responses were reports of shared expertise among teachers. One participant indicated, "I like it best when the teachers share their experience and ideas, sharing what works best and sharing materials." Another participant noted, "[what I liked best was] cooperation and collaboration with everyone throughout this professional development series. I enjoyed the insight that everyone had in retrospect within their respected professional career."

Coach Focus Group

Some coaches expressed that their teachers were already collaborating without coaching, but that those who were not doing so voluntarily had not been as receptive to the idea of co-teaching a lesson. Coaches cited additional time commitment, differing priorities, and discomfort in different grade levels as reasons why teachers were hesitant to collaborate. One coach explained, "I think it is very difficult for teachers to leave their classrooms in the hands of someone else, they're just not comfortable going to a different grade level to teach."

Evaluation Question Five: Does the project result in an increase in familiarity of participating teachers regarding the Ohio Revised Science Content Standards in life science at both their respective grade bands as well as adjacent grade bands?

Summary: In the final year of the project, 100% of teachers report being somewhat or very familiar with their grade level content standards, and 93% report being somewhat or very familiar with the content standards of adjacent grade levels.

Analysis: Teachers were asked how familiar they are with state content standards for their grade level, and then for grade bands adjacent to the level they teach on a pre- and post-survey in each year of the project. Response options are "not at all," "somewhat," and "very familiar." The percentage of teachers who showed increased familiarity with their grade level's standards in the first year was 29%, and 24% in the second year. This percentage drops to 23% in the final year (7 of 30 teachers). This drop is expected considering every teacher responded "somewhat" or "very familiar" at *pre-test.* This does not leave room for improvement and shows high familiarity at both pre- and post-test considering 73% of teachers with matched assessments show no change.

Pre- to post-improvement in familiarity with adjacent grade-level content standards was seen in 32% of teachers in the first year and 27% of teachers in the second year. The percent stayed consistent in the final year, where 27% of teachers report increased familiarity (8 of 30). Again, there was not a lot of room for improvement from pre- to post-survey: 77% are somewhat or very familiar at pre-survey and 93% are somewhat or very familiar at post-survey (of 30 matched pre- and post-surveys).

Evaluation Question Six: Was the project successful in creating curriculum maps that are aligned with the Revised Ohio Science Content Standards?

Coaches indicated that curriculum mapping had varying success with teachers. Some coaches indicated that their teachers had already been using curriculum mapping, and that they were effective for their teachers. Other coaches reported that the mapping could use more emphasis

and implementation. One coach reflected, "Right now they're just kind of doing their own thing. The maps are there and they develop them, but they need that foresight of how important it is." Coaches also said that within districts, schools were largely able to utilize the curriculum maps as they pleased and that the process lacked consistency within the districts.

Conclusion

Rio Connection: Increasing Continuity throughout the Science Curricula has provided high quality professional development for three years in the areas of physical science, earth and space science, and life science. Each year, participating teachers show content knowledge gains and progress in implementing inquiry-based teaching strategies. Teachers collaborated with teachers from other grade levels on both an official basis, through a team-taught lesson, and unofficially through idea sharing at the content workshops. Connections between teachers and University of Rio Grande STEM faculty were also made. Each year, science coaches provided in-class support and feedback. By the end of Year Three, teachers report extremely high familiarity with the content standards of their grade level and grade levels adjacent to theirs. Moreover, there is evidence that students benefit from the professional development based on improvements in test scores of participating teachers' students. Overall, teachers in the two participating school districts benefited from the professional development, and student benefits are likely to continue as evidenced by increases in state achievement scores.

TEACHER LIFE SCIENCE PRE TEST

For some questions, there may be more than one correct answer. However, each question has only one best answer. Choose the single best answer from the five choices for each question.

1. Which of the following do trees need to survive?
   a. Water, light and air.
   b. Water and light.
   c. Only air.
   d. Only light.
   e. Only water.

2. A baby girl is born to a farmer and his wife. She is adopted by her country's king and queen. When the girl grows up, who will she most likely look like?
   a. The farmer's wife.
   b. The farmer.
   c. The queen.
   d. Both the king and queen.
   e. Both the farmer and his wife.

3. Which of the following parts of the body are involved in seeing?
   a. Only the eyes.
   b. Only the ears.
   c. Only the brain.
   d. Both the eyes and the ears.
   e. Both the eyes and the brain.

4. Which pair of animals could produce a baby animal together?
   a. A male dog and a female cat.
   b. A male dog and a female dog.
   c. A female dog and a male cat.
   d. Two male cats.
   e. Any female animal and any male animal.

5. Lions are large meat eating animals that get their food by preying on smaller animals. What would happen to the lions in a fenced area if the small animals start to die?
   a. The lions would get larger.
   b. The lions would increase in number.
   c. The lions would start to eat grass.
   d. The lions would start to die.
   e. The lions would have more babies.

6. A leopard living in the desert has fur that is tan with black spots. If that leopard were moved to a snowy mountaintop, what would its fur most likely look like?
   a. All white.
   b. White with black spots.
   c. Tan with black spots.
   d. Tan with spots.
   e. All tan.

GO TO QUESTION 7 >>

7. African elephants are huge animals that need as much as 600 pounds of food each day. What kind of food do you think a large elephant eats?
   a. Mostly small animals.
   b. Mostly large animals.
   c. Mostly grass and leaves.
   d. Mostly rocks and minerals.
   e. Only peanuts.

8. The purpose of the pollen found in flowers is to:
   a. help make new plants.
   b. make humans sneeze.
   c. feed honeybees.
   d. hold the flower together.
   e. blow in the wind.

9. During the winter, a brown bear will most likely react to the colder temperature by:
   a. finding a safe place to stay for the whole winter.
   b. making friends with a human family that will feed and shelter it for the winter.
   c. finding or making a warm winter coat for itself.
   d. following birds to a warmer place for the whole winter.
   e. deciding to make its fur thicker and warmer.

10. Over time, a small tree surrounded by sunflowers grows into a large tree with leafy branches that hang over the sunflowers. What will the sunflowers most likely do as the tree's leafy branches block out more and more sunlight?
    a. Grow as large as the tree to compete for sunlight.
    b. Learn to live without sunlight.
    c. Move to a place where there is more sunlight.
    d. Climb up the tree and live on its branches.
    e. Begin to grow more slowly.

11. A large tree is struck by lightning and it comes crashing down. What will happen to that dead tree after 100 years?
    a. The tree will remain there unless someone moves it.
    b. The tree will remain there forever.
    c. The tree may come back to life after a long period of time.
    d. The tree will be broken down by bacteria and fungi.
    e. The tree and all its parts will disappear forever.

12. Which of the following living things have lungs for breathing?
    a. Whales, humans and seals.
    b. Only humans and whales.
    c. Only humans.
    d. Only whales.
    e. Only seals.

13. Which is one good way for humans to take good care of the environment?
    a. Build cars that use diesel instead of gasoline.
    b. Set aside land where humans can't go.
    c. Take over parks in far away places to make room for solid waste.
    d. Dump liquid wastes only in certain streams.
    e. Drive cars that only use gasoline.

14. Melissa and her parents have dark brown hair. When Melissa grows up, she dyes her hair blond. Melissa has children with someone who has dark brown hair. What color will their children's hair probably be?
    a. Light brown
    b. Dark brown
    c. Blonde
    d. Black
    e. Gray

15. When a cow is hungry, it is most likely to:
    a. get scared.
    b. go to sleep.
    c. eat some food.
    d. drink some water.
    e. do nothing.

16. Many of the land animals that live in a snowy area have white fur because it:
    a. absorbs sunlight better and keeps them warmer.
    b. keeps water out.
    c. is softer.
    d. looks nicer in the snow.
    e. makes them harder to see in the snow.

17. How does a plant get water?
    a. Through photosynthesis.
    b. By using chlorophyll.
    c. Through its roots.
    d. Through its flowers.
    e. Its stem sucks water from the ground.

18. Jodie has a rose bush in a pot on her patio with thorns to protect against animals eating it. Jodie decides to bring the rose bush inside. What most likely happens to the thorns?
    a. They disappear.
    b. More of them appear.
    c. They stay the same.
    d. They get less sharp.
    e. They get sharper.
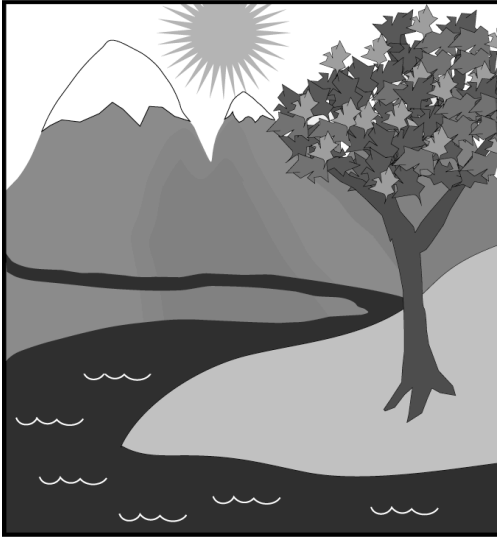
19. Seeds develop from which part of a plant?
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    b. Root
    c. Leaves
    d. Flower
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20. Jesse shaved off the fur on her two long-haired Persian cats. If her cats have kittens together, which of the following is most likely to be true about the kittens?
    a. They will be mostly male kittens.
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    c. They will have short fur.
    d. They will have long fur.
    e. Some kittens will have long fur and some kittens will have short fur.

21. Which of the following would benefit from replanting trees that have been cut down?
    a. Only humans.
    b. Only small animals.
    c. Only insects.
    d. Only microbes.
    e. All organisms would benefit.

22. Take a look at the teeth of two animals shown below. What can you tell about the animals from the pictures?

    a. Both only eat meat.
    b. Both only eat plants.
    c. One is a meat eater; the other is a plant eater.
    d. One is a bird; the other is a mammal.
    e. One swims and the other flies.

23. Some foxes that live in cold climates grow thicker fur during the winter. Why does this happen?
    a. Thicker coats are a natural response to an environmental change.
    b. When it gets colder the foxes decide to grow a warmer coat.
    c. Thicker coats help the foxes swim.
    d. Some foxes want to be like bears.
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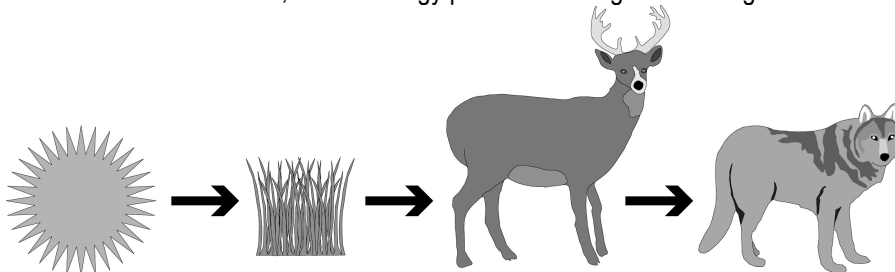**GO TO QUESTION 24 >>**

24. In the picture below, what is alive?

a. The Sun.
b. The mountain.
c. The tree.
d. The river.
e. The snow.

LIFE SCIENCE SURVEY TEST

For some questions, there may be more than one correct answer. However, each question has only one best answer. Choose the single best answer from the five choices for each question.
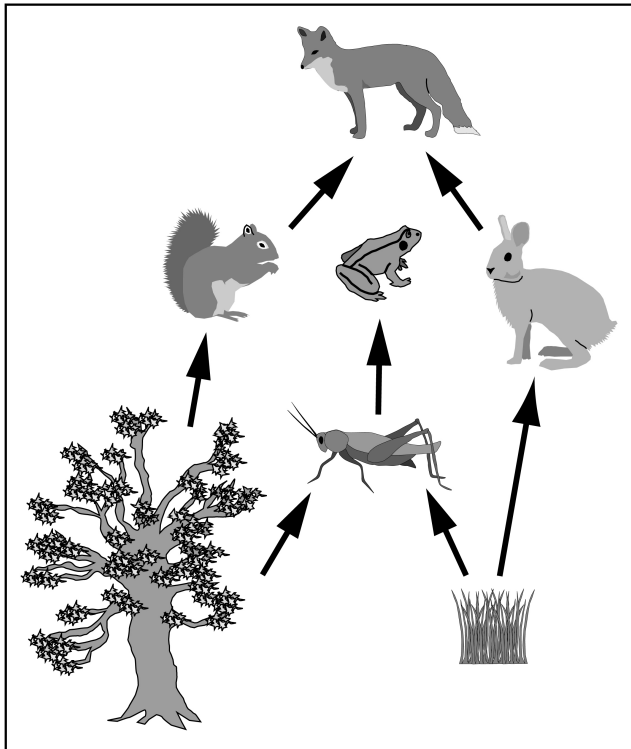
1. Which statement below best describes the relationship between an organism and its cells?
   a. An organism is a container that has cells inside of it.
   b. An organism is a container that has cells covering it.
   c. An organism is one big cell with other cells inside of it.
   d. An organism is made up of one or more cells.
   e. An organism may or may not be made up of cells.

2. Which of the following are composed of cells working together?
   a. Only blood and muscle.
   b. Only blood and bone.
   c. Only muscle and bone.
   d. Blood, muscle and bone.
   e. None of the above.

3. Which of the following can become extinct?
   a. Plants, animals and microorganisms.
   b. Plants and animals, but not microorganisms.
   c. Only plants.
   d. Only animals.
   e. Only microorganisms.

4. In the food chain shown below, how is energy passed from organism to organism?

   a. As light energy.
   b. As chemical energy.
   c. As heat energy.
   d. As electrical energy.
   e. As energy of motion.

5. In a desert ecosystem, small mammals eat plants and snakes eat small mammals. What would probably happen to the amount of plant material if all the snakes suddenly died? At first, the amount of plant material would:
   a. not change because snakes do not eat plants.
   b. not change because other animals would move in to eat the small mammals.
   c. decrease because the number of surviving small mammals would increase.
   d. increase because there would be more room for plants to grow.
   e. decrease because the snakes protect the plants.

GO TO QUESTION 6 >>

1

6. In a forest, which of the following are decomposers, organisms that use waste and dead organisms for food?
    a. Only the trees.
    b. Only the squirrels.
    c. Only the mushrooms.
    d. Both the trees and the squirrels.
    e. Both the trees and the mushrooms.

7. What is skin made of?
    a. A single layer of flat thin cells.
    b. Many layers of flat thin cells.
    c. A single layer of different kinds of cells.
    d. Many layers of different kinds of cells.
    e. One very large thin cell that covers the body.

8. In a forest ecosystem (see picture below), squirrels eat plant material and foxes eat squirrels.

What would probably happen to the amount of plant material in this ecosystem if all the foxes suddenly died? At first, the amount of plant material would:
    a. not change because foxes do not eat plants.
    b. not change because other animals would move in to eat the squirrels.
    c. decrease because the number of surviving squirrels would increase.
    d. increase because there would be more room for plants to grow.
    e. decrease because foxes protect the plants.

GO TO QUESTION 9 >>

9. Infectious diseases are often caused by:
   a. allergies.
   b. vitamin deficiencies.
   c. chemical spills.
   d. germs.
   e. drugs.

10. Why does Henry start to breathe faster when he exercises? The extra oxygen:
    a. helps his muscles to use more energy.
    b. helps him to release sweat.
    c. stops urine from being produced to balance the water lost through sweat.
    d. helps him to hold excess water until he can get to a bathroom.
    e. stops him from overheating.

11. Given the food chain shown below, what energy would be available to the wolf?
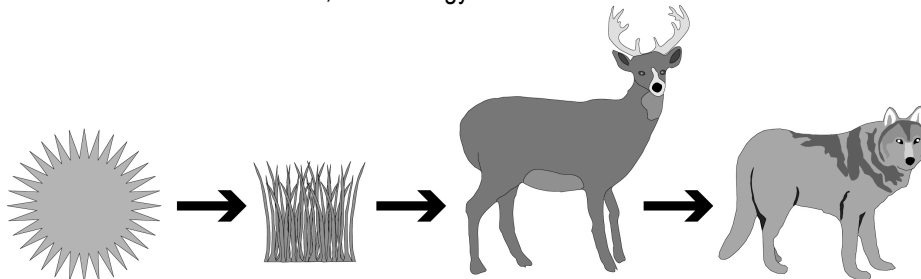
    a. All of the energy from the Sun, grass and deer.
    b. All of the energy from the Sun and grass, minus the energy in the deer.
    c. All of the energy transferred from the Sun to the grass.
    d. Only the energy contained in the grass.
    e. Some of the energy transferred from the Sun to the grass to the deer.

12. Which of the following limit the number of organisms an ecosystem can support?
    a. Only water.
    b. Only minerals.
    c. Only sunlight.
    d. Only water and sunlight.
    e. Water, minerals and sunlight.

GO TO QUESTION 13 >>

3

13. In the picture below, which parts make up a desert ecosystem?
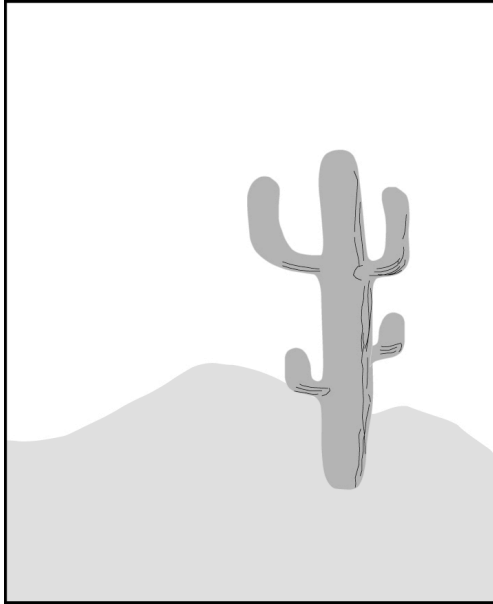
    a. Only the cactus.
    b. Only the sand.
    c. Only the cactus and the sand.
    d. The cactus, sand and sunlight.
    e. A desert is not an ecosystem.

14. In a forest ecosystem foxes feed mostly on a variety of birds and rodents (small furry mammals). What would probably happen to the foxes if a flood destroyed one type of rodent? The foxes would:
    a. eat other rodents and birds.
    b. eat berries.
    c. eat insects.
    d. die.
    e. move elsewhere.

15. The most likely reason that Maria has a cold is that she was:
    a. outside in the cold air.
    b. not wearing a sweater.
    c. infected with a virus.
    d. outside with wet hair.
    e. in sunlight for too long.

16. The flu virus has most likely spread because:
    a. humans are slowly being exterminated.
    b. it keeps adapting to new environments.
    c. flu virus wants to infect people everywhere.
    d. the virus is smarter, faster and stronger than most people.
    e. overcrowding and pollution keep it alive and contagious.

17. Cells inside the human body get energy from:
    a. circulating oxygen in the blood.
    b. breaking down sugars that come from food.
    c. breaking down sugars that they make themselves.
    d. giving off carbon dioxide.
    e. giving off oxygen.

18. Blindness can be caused by damage to which of the following?
    a. Only the eyes.
    b. Only the brain.
    c. Only the spinal cord.
    d. Either the eyes or the brain.
    e. Either the brain or the spinal cord.

19. During a year, the size of the population of deer in a forest is most affected by:
    a. only the amount of rain.
    b. only the amount of sunlight.
    c. only the height of the trees.
    d. both the amount of rain and the height of the trees.
    e. both the amount of rain and sunlight.

20. If two plants reproduce *sexually*, what would the resulting baby plant look like?
    a. If the baby plant is female, it will look like its mother.
    b. If the baby plant is male, it will look like its father.
    c. The baby plant will be a combination of both parents.
    d. Its flowers will look like its mother's, and its stem will look like its father's.
    e. Plants never reproduce *sexually*.

21. Present day giraffes have long necks because:
    a. they stretch them to reach the trees for food.
    b. their ancestors adapted to have long necks over time.
    c. giraffes with the longest necks are the strongest and most perfect.
    d. their neck length increases their body temperature.
    e. their neck length increases their speed.

22. Why do squirrels from the same litter grow up to be different sizes?
    a. Only because they eat different amounts of food.
    b. Only because they want to be different sizes.
    c. Only because they inherited different genes.
    d. Both because they eat different amounts of food and inherited different genes.
    e. Both because they want to be different sizes and inherited different genes.

23. How would a scientist explain the presence of the hard, outer shell in lobsters? Lobsters:
    a. inherit their shell, which evolved over many generations.
    b. learn to grow an outer shell from their parents.
    c. discovered how to grow an outer shell and passed that on to their offspring.
    d. grow an outer shell in response to predators.
    e. prefer an outer shell to an internal skeleton.

GO TO QUESTION 24 >>

24. A pond ecosystem is best defined as:
    a. only the animals that live in the pond.
    b. only the plants that live in the pond.
    c. only the water in the pond.
    d. both the living and the non-living things in and around the pond.
    e. both the animals and the plants that live in and around the pond.

25. Which of the following is **not** made up of cells?
    a. Skin
    b. Blood
    c. Water
    d. Bacteria
    e. Lettuce

TEACHER LIFE SCIENCE POST TEST

For some questions, there may be more than one correct answer. However, each question has only one <u>best</u> answer. Choose the <u>single</u> <u>best</u> <u>answer</u> from the five choices for each question.

1. In the picture below, what is alive?

    a. The Sun.
    b. The mountain.
    c. The tree.
    d. The river.
    e. The snow.

2. A large tree is struck by lightning and it comes crashing down. What will happen to that dead tree after 100 years?
    a. The tree will remain there unless someone moves it.
    b. The tree will remain there forever.
    c. The tree may come back to life after a long period of time.
    d. The tree will be broken down by bacteria and fungi.
    e. The tree and all its parts will disappear forever.

3. Which of the following would benefit from replanting trees that have been cut down?
    a. Only humans.
    b. Only small animals.
    c. Only insects.
    d. Only microbes.
    e. All organisms would benefit.

4. African elephants are huge animals that need as much as 600 pounds of food each day. What kind of food do you think a large elephant eats?
    a. Mostly small animals.
    b. Mostly large animals.
    c. Mostly grass and leaves.
    d. Mostly rocks and minerals.
    e. Only peanuts.

1

5. Jesse shaved off the fur on her two long-haired Persian cats. If her cats have kittens together, which of the following is most likely to be true about the kittens?
   a. They will be mostly male kittens.
   b. They will be mostly female kittens.
   c. They will have short fur.
   d. They will have long fur.
   e. Some kittens will have long fur and some kittens will have short fur.

6. Melissa and her parents have dark brown hair. When Melissa grows up, she dyes her hair blond. Melissa has children with someone who has dark brown hair. What color will their children's hair probably be?
   a. Light brown
   b. Dark brown
   c. Blonde
   d. Black
   e. Gray

7. Jodie has a rose bush in a pot on her patio with thorns to protect against animals eating it. Jodie decides to bring the rose bush inside. What most likely happens to the thorns?
   a. They disappear.
   b. More of them appear.
   c. They stay the same.
   d. They get less sharp.
   e. They get sharper.

8. Many of the land animals that live in a snowy area have white fur because it:
   a. absorbs sunlight better and keeps them warmer.
   b. keeps water out.
   c. is softer.
   d. looks nicer in the snow.
   e. makes them harder to see in the snow.

9. Which is one good way for humans to take good care of the environment?
   a. Build cars that use diesel instead of gasoline.
   b. Set aside land where humans can't go.
   c. Take over parks in far away places to make room for solid waste.
   d. Dump liquid wastes only in certain streams.
   e. Drive cars that only use gasoline.

10. A baby girl is born to a farmer and his wife. She is adopted by her country's king and queen. When the girl grows up, who will she most likely look like?
    a. The farmer's wife.
    b. The farmer.
    c. The queen.
    d. Both the king and queen.
    e. Both the farmer and his wife.

11. Take a look at the teeth of two animals shown below. What can you tell about the animals from the pictures?

   a. Both only eat meat.
   b. Both only eat plants.
   c. One is a meat eater; the other is a plant eater.
   d. One is a bird; the other is a mammal.
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12. Seeds develop from which part of a plant?
   a. Stem
   b. Root
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13. How does a plant get water?
   a. Through photosynthesis.
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   c. Through its roots.
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   e. Its stem sucks water from the ground.

14. Some foxes that live in cold climates grow thicker fur during the winter. Why does this happen?
   a. Thicker coats are a natural response to an environmental change.
   b. When it gets colder the foxes decide to grow a warmer coat.
   c. Thicker coats help the foxes swim.
   d. Some foxes want to be like bears.
   e. Thicker coats are prettier.

15. During the winter, a brown bear will most likely react to the colder temperature by:
   a. finding a safe place to stay for the whole winter.
   b. making friends with a human family that will feed and shelter it for the winter.
   c. finding or making a warm winter coat for itself.
   d. following birds to a warmer place for the whole winter.
   e. deciding to make its fur thicker and warmer.

16. The purpose of the pollen found in flowers is to:
    a. help make new plants.
    b. make humans sneeze.
    c. feed honeybees.
    d. hold the flower together.
    e. blow in the wind.

17. Which pair of animals could produce a baby animal together?
    a. A male dog and a female cat.
    b. A male dog and a female dog.
    c. A female dog and a male cat.
    d. Two male cats.
    e. Any female animal and any male animal.

18. When a cow is hungry, it is most likely to:
    a. get scared.
    b. go to sleep.
    c. eat some food.
    d. drink some water.
    e. do nothing.

19. Which of the following parts of the body are involved in seeing?
    a. Only the eyes.
    b. Only the ears.
    c. Only the brain.
    d. Both the eyes and the ears.
    e. Both the eyes and the brain.

20. Which of the following living things have lungs for breathing?
    a. Whales, humans and seals.
    b. Only humans and whales.
    c. Only humans.
    d. Only whales.
    e. Only seals.

21. A leopard living in the desert has fur that is tan with black spots. If that leopard were moved to a snowy mountaintop, what would its fur most likely look like?
    a. All white.
    b. White with black spots.
    c. Tan with black spots.
    d. Tan with spots.
    e. All tan.

22. Lions are large meat eating animals that get their food by preying on smaller animals. What would happen to the lions in a fenced area if the small animals start to die?
    a. The lions would get larger.
    b. The lions would increase in number.
    c. The lions would start to eat grass.
    d. The lions would start to die.
   e. The lions would have more babies.

4

23. Over time, a small tree surrounded by sunflowers grows into a large tree with leafy branches that hang over the sunflowers. What will the sunflowers most likely do as the tree's leafy branches block out more and more sunlight?
   a. Grow as large as the tree to compete for sunlight.
   b. Learn to live without sunlight.
   c. Move to a place where there is more sunlight.
   d. Climb up the tree and live on its branches.
   e. Begin to grow more slowly.

24. Which of the following do trees need to survive?
   a. Water, light and air.
   b. Water and light.
   c. Only air.
   d. Only light.
   e. Only water.

LIFE SCIENCE SURVEY TEST

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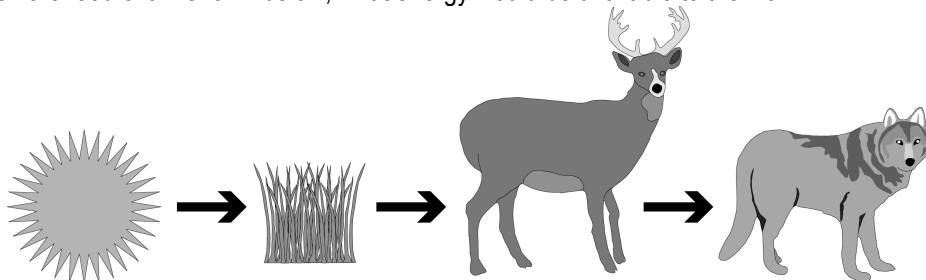
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    d. Only the energy contained in the grass.
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GO TO QUESTION 6 >>

1

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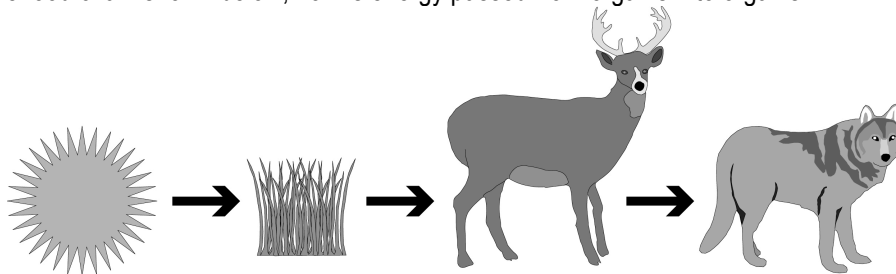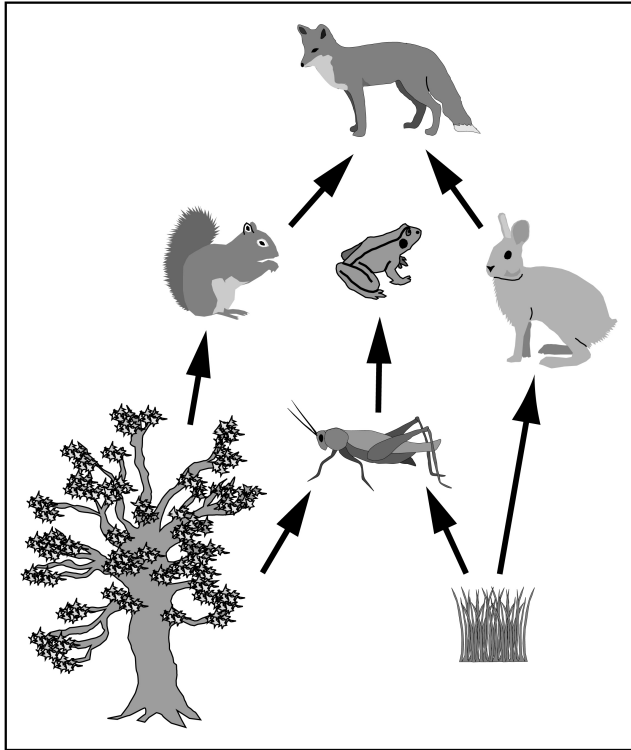

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GO TO QUESTION 15 >>

15. In a forest ecosystem (see picture below), squirrels eat plant material and foxes eat squirrels.

What would probably happen to the amount of plant material in this ecosystem if all the foxes suddenly died? At first, the amount of plant material would:
a. not change because foxes do not eat plants.
b. not change because other animals would move in to eat the squirrels.
c. decrease because the number of surviving squirrels would increase.
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16. Which of the following can become extinct?
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d. germs.
e. drugs.

GO TO QUESTION 18 >>

18. The flu virus has most likely spread because:
    a. humans are slowly being exterminated.
    b. it keeps adapting to new environments.
    c. flu virus wants to infect people everywhere.
    d. the virus is smarter, faster and stronger than most people.
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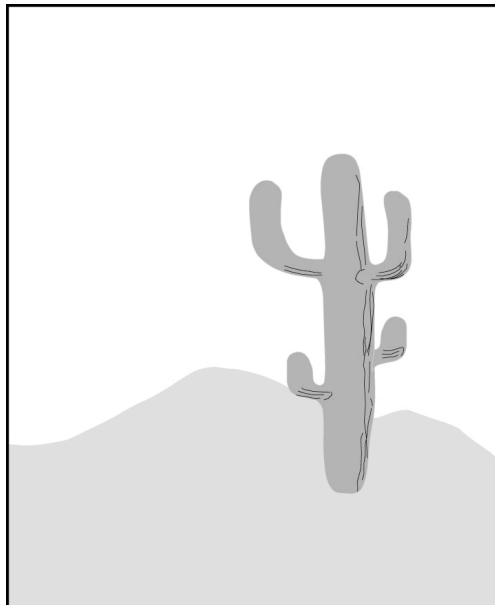
    a. Only the cactus.
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    c. Only the cactus and the sand.
    d. The cactus, sand and sunlight.
    e. A desert is not an ecosystem.

21. Blindness can be caused by damage to which of the following?
    a. Only the eyes.
    b. Only the brain.
    c. Only the spinal cord.
    d. Either the eyes or the brain.
    e. Either the brain or the spinal cord.

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    c. eat insects.
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    a. Only blood and muscle.
    b. Only blood and bone.
    c. Only muscle and bone.
    d. Blood, muscle and bone.
    e. None of the above.

24. What is skin made of?
    a. A single layer of flat thin cells.
    b. Many layers of flat thin cells.
    c. A single layer of different kinds of cells.
    d. Many layers of different kinds of cells.
    e. One very large thin cell that covers the body.

25. Which statement below best describes the relationship between an organism and its cells?
    a. An organism is a container that has cells inside of it.
    b. An organism is a container that has cells covering it.
    c. An organism is one big cell with other cells inside of it.
    d. An organism is made up of one or more cells.
    e. An organism may or may not be made up of cells.

Rio Connections: Increasing Continuity throughout the Science Curricula
Teacher Professional Development Satisfaction Survey

<u>**Unique Personal Identifier**</u> – You will put an identification code on all information you submit for collection as part of the evaluation of this project. Here is how you determine your code that is unique to you:

Unique Identifier	First 2 Letters of Mother's Maiden Name		Your Birth Month		Your Birth Day	
EXAMPLE	**G**	**R**	**1**	**2**	**0**	**5**
Your Unique Identifier						

District:

Today's Date: ____/____/____
        Mon/Day/Year

Instructions: Please take a few moments to tell us your opinions on the **Life Science** Workshops.

1. Overall, how appropriate do you feel this professional development was for your current needs as a teacher?	**1** Not At All	**2**	**3**	**4**	**5**	**6**	**7** Very Much
2. Did the facilitators/presenters provide information that will be useful to you in teaching at your current grade level?		**Yes**		**No**		**Not Sure**	
3. Has the professional development increased your knowledge in life science?	**1** Not At All	**2**	**3**	**4**	**5**	**6**	**7** Very Much
4. How much has your knowledge of the new science content standards increased?	**1** Not At All	**2**	**3**	**4**	**5**	**6**	**7** Very Much
5. Has your knowledge of the content standards for adjacent grade levels increased?	**1** Not At All	**2**	**3**	**4**	**5**	**6**	**7** Very Much
6. How effectively did this professional development series allow you to collaborate with teachers from different grade levels?	**1** Not At All	**2**	**3**	**4**	**5**	**6**	**7** Very Much
7. How valuable do you feel this collaboration experience was?	**1** Not At All	**2**	**3**	**4**	**5**	**6**	**7** Very Much
8. How relevant was the material in regards to instructional methods?	**1** Not At All	**2**	**3**	**4**	**5**	**6**	**7** Very Much
9. Will you implement pedagogical strategies, such as team teaching and inquiry-based instruction, in your classroom?		**Yes**		**No**		**Not Sure**	
10. How confident are you in your ability to implement what you've learned in this series in the classroom?	**1** Not At All Confident	**2**	**3**	**4**	**5**	**6**	**7** Very Confident

11. What did you like best about this professional development series?
12. What did you like least about this professional development series?
13. Do you have any final comments?

Thanks!

STUDENT LIFE SCIENCE PRE TEST

For some questions, there may be more than one correct answer. However, each question has only one <u>best</u> answer. Choose the <u>single</u> <u>best</u> <u>answer</u> from the five choices for each question.

1. Which of the following do trees need to survive?
   a. Water, light and air.
   b. Water and light.
   c. Only air.
   d. Only light.
   e. Only water.

2. A baby girl is born to a farmer and his wife. She is adopted by her country's king and queen. When the girl grows up, who will she most likely look like?
   a. The farmer's wife.
   b. The farmer.
   c. The queen.
   d. Both the king and queen.
   e. Both the farmer and his wife.

3. Which of the following parts of the body are involved in seeing?
   a. Only the eyes.
   b. Only the ears.
   c. Only the brain.
   d. Both the eyes and the ears.
   e. Both the eyes and the brain.

4. Which pair of animals could produce a baby animal together?
   a. A male dog and a female cat.
   b. A male dog and a female dog.
   c. A female dog and a male cat.
   d. Two male cats.
   e. Any female animal and any male animal.

5. Lions are large meat eating animals that get their food by preying on smaller animals. What would happen to the lions in a fenced area if the small animals start to die?
   a. The lions would get larger.
   b. The lions would increase in number.
   c. The lions would start to eat grass.
   d. The lions would start to die.
   e. The lions would have more babies.

6. A leopard living in the desert has fur that is tan with black spots. If that leopard were moved to a snowy mountaintop, what would its fur most likely look like?
   a. All white.
   b. White with black spots.
   c. Tan with black spots.
   d. Tan with spots.
   e. All tan.

GO TO QUESTION 7 >>

1

7. African elephants are huge animals that need as much as 600 pounds of food each day. What kind of food do you think a large elephant eats?
   a. Mostly small animals.
   b. Mostly large animals.
   c. Mostly grass and leaves.
   d. Mostly rocks and minerals.
   e. Only peanuts.

8. The purpose of the pollen found in flowers is to:
   a. help make new plants.
   b. make humans sneeze.
   c. feed honeybees.
   d. hold the flower together.
   e. blow in the wind.

9. During the winter, a brown bear will most likely react to the colder temperature by:
   a. finding a safe place to stay for the whole winter.
   b. making friends with a human family that will feed and shelter it for the winter.
   c. finding or making a warm winter coat for itself.
   d. following birds to a warmer place for the whole winter.
   e. deciding to make its fur thicker and warmer.

10. Over time, a small tree surrounded by sunflowers grows into a large tree with leafy branches that hang over the sunflowers. What will the sunflowers most likely do as the tree's leafy branches block out more and more sunlight?
    a. Grow as large as the tree to compete for sunlight.
    b. Learn to live without sunlight.
    c. Move to a place where there is more sunlight.
    d. Climb up the tree and live on its branches.
    e. Begin to grow more slowly.

11. A large tree is struck by lightning and it comes crashing down. What will happen to that dead tree after 100 years?
    a. The tree will remain there unless someone moves it.
    b. The tree will remain there forever.
    c. The tree may come back to life after a long period of time.
    d. The tree will be broken down by bacteria and fungi.
    e. The tree and all its parts will disappear forever.

12. Which of the following living things have lungs for breathing?
    a. Whales, humans and seals.
    b. Only humans and whales.
    c. Only humans.
    d. Only whales.
    e. Only seals.

GO TO QUESTION 13 >>

13. Which is one good way for humans to take good care of the environment?
    a. Build cars that use diesel instead of gasoline.
    b. Set aside land where humans can't go.
    c. Take over parks in far away places to make room for solid waste.
    d. Dump liquid wastes only in certain streams.
    e. Drive cars that only use gasoline.

14. Melissa and her parents have dark brown hair. When Melissa grows up, she dyes her hair blond. Melissa has children with someone who has dark brown hair. What color will their children's hair probably be?
    a. Light brown
    b. Dark brown
    c. Blonde
    d. Black
    e. Gray

15. When a cow is hungry, it is most likely to:
    a. get scared.
    b. go to sleep.
    c. eat some food.
    d. drink some water.
    e. do nothing.

16. Many of the land animals that live in a snowy area have white fur because it:
    a. absorbs sunlight better and keeps them warmer.
    b. keeps water out.
    c. is softer.
    d. looks nicer in the snow.
    e. makes them harder to see in the snow.

17. How does a plant get water?
    a. Through photosynthesis.
    b. By using chlorophyll.
    c. Through its roots.
    d. Through its flowers.
    e. Its stem sucks water from the ground.

18. Jodie has a rose bush in a pot on her patio with thorns to protect against animals eating it. Jodie decides to bring the rose bush inside. What most likely happens to the thorns?
    a. They disappear.
    b. More of them appear.
    c. They stay the same.
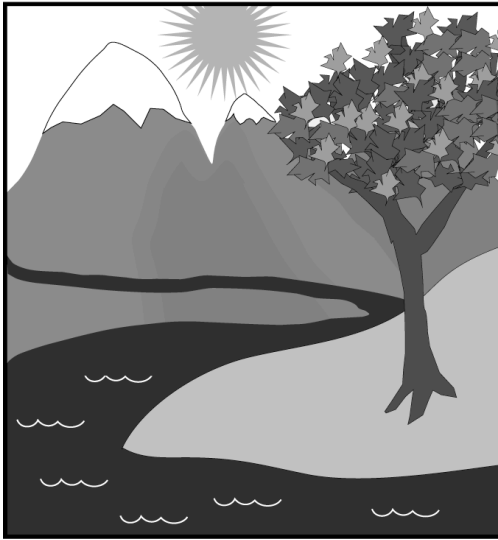   d. They get less sharp.
    e. They get sharper.

19. Seeds develop from which part of a plant?
    a. Stem
    b. Root
    c. Leaves
    d. Flower
    e. Branch

20. Jesse shaved off the fur on her two long-haired Persian cats. If her cats have kittens together, which of the following is most likely to be true about the kittens?
    a. They will be mostly male kittens.
    b. They will be mostly female kittens.
    c. They will have short fur.
    d. They will have long fur.
    e. Some kittens will have long fur and some kittens will have short fur.

21. Which of the following would benefit from replanting trees that have been cut down?
    a. Only humans.
    b. Only small animals.
    c. Only insects.
    d. Only microbes.
    e. All organisms would benefit.

22. Take a look at the teeth of two animals shown below. What can you tell about the animals from the pictures?

    a. Both only eat meat.
    b. Both only eat plants.
    c. One is a meat eater; the other is a plant eater.
    d. One is a bird; the other is a mammal.
    e. One swims and the other flies.

23. Some foxes that live in cold climates grow thicker fur during the winter. Why does this happen?
    a. Thicker coats are a natural response to an environmental change.
    b. When it gets colder the foxes decide to grow a warmer coat.
    c. Thicker coats help the foxes swim.
    d. Some foxes want to be like bears.
    e. Thicker coats are prettier.

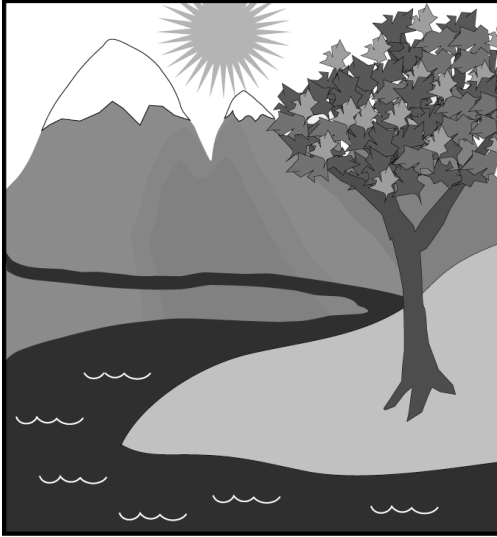**GO TO QUESTION 24 >>**

24. In the picture below, what is alive?

a. The Sun.
b. The mountain.
c. The tree.
d. The river.
e. The snow.

STUDENT LIFE SCIENCE POST TEST

For some questions, there may be more than one correct answer. However, each question has only one best answer. Choose the single best answer from the five choices for each question.

1. In the picture below, what is alive?

   a. The Sun.
   b. The mountain.
   c. The tree.
   d. The river.
   e. The snow.

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GO TO QUESTION 11 >>

11. Take a look at the teeth of two animals shown below. What can you tell about the animals from the pictures?

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    e. Begin to grow more slowly.

24. Which of the following do trees need to survive?
    a. Water, light and air.
    b. Water and light.
    c. Only air.
    d. Only light.
    e. Only water.

Rio Connections: Increasing Continuity throughout the Science Curricula

Focus Group with Science Coaches

Introduction

Good morning and thanks for meeting with us. Our purpose today is to have a discussion about the Rio Connection Increasing Continuity Throughout the Science Curricula project as part of the evaluation of the project.

The discussion is an opportunity for you to provide us with your thoughts as coaches about the implementation and possible impacts of the project.

There are no right or wrong answers to the questions I'll pose and I welcome a variety of perceptions and input. Please feel comfortable to express your thoughts and opinions about your experiences.

_____will be taking notes but we'd like to audio record the discussion so we don't miss anything. The recording will be used for our reference only and will be erased once the research report is complete.   The report will not include your names, though we may use a quote or two from the group without identifying who said it. Remember that your participation in today's discussion is strictly voluntary. Does anyone have any questions about this procedure?

Can we start by reviewing what building/s you were each working in and how many teachers you were coaching? Anyone can start and please introduce yourself with your first name.

1. This project is now in its third year and most of you have been coaches throughout the grant. What are your overall thoughts about this professional development for teachers?

2. If you have been a coach in previous years, can you tell me what is different, if anything, about your experience this year?

3. What PD strategies, if any, were effective toward increasing pedagogical knowledge?

4. How effective were the workshop and coaching opportunities toward generating long-term changes to classroom teaching and instructional strategies for the participating teachers?

5. From your perspectives how helpful were the curriculum mapping and co-teaching activities? Lets start with curriculum mapping. How effective were the co-teaching activities?

6. Lets talk about the coaching component specifically. Overall, how have teachers responded to the coaching offer?
    a. Are all teachers willing to accept it?
    b. What are the barriers for teachers who do not accept the coaching?

    c. If you have worked in multiple buildings, are there differences in how receptive teachers are to coaching? What do you think causes the differences, if present?

7. In your classroom observations, do you see evidence that students have educationally benefitted from this project? If so, could you elaborate?

8. What support or other needs do you see among the teachers and students with whom you work?

9. What has been challenging for you as a coach?

10. What do you believe has worked particularly well within the coaching component for this project?

11. What final comments do you have about the project?