Santa Rosa County School District STEAM (Science, Technology, Engineering, Art, and Mathematics)
Evaluation Project: Year One Report

(2015-2016) – July 15, 2016

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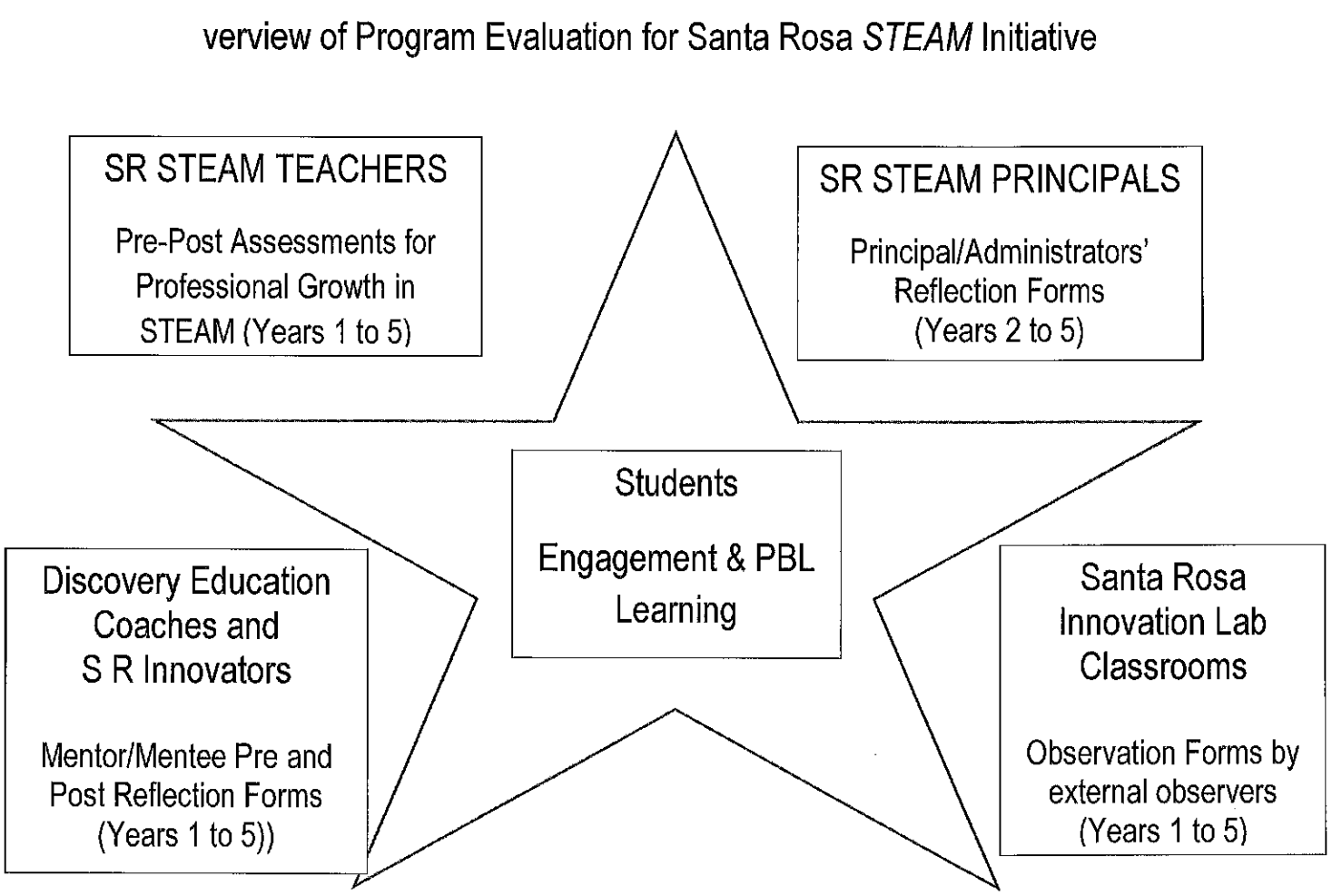
STEAM Evaluation Project Overview

The evaluation component of the STEAM Program serves to examine the impact of the STEAM program on instructional environments and professional development efforts in year one. In subsequent years the evaluation may include the connection to student achievement within STEAM-related courses as requested by the district. The evaluation effort empirically blends three assessment arenas for the purpose of establishing a relational data base for the investigation. The three types of assessment data include: (1) teacher and instructional staff pre and post assessment data relative to the professional development efforts of the district directed toward the STEAM initiative; (2) observational data collected weekly by external observers relative to the integration of the STEAM program into classrooms and strategies used within the schools; and (3) mentor-mentee data retrieved from teachers and coaches relative to the impact of the Discovery Education mentoring partnership with the district teachers in STEAM. The evaluation process involves the use of data from several measures developed and pilot tested for the STEAM program evaluation. (a) Classroom Observation tool developed for the project to determine the educational environment and classroom strategies observed relative to the goals of STEAM within the district. External observers trained to identify the various strategies that comprise the STEAM integration into schools conducted classroom observations weekly for 10 weeks in year one at 20 schools (17 elementary schools, 2 middle schools, and one high school). (b) Teacher Professional Development data retrieved from the pre and post assessments of the STEAM professional development efforts of the district focused on the STEAM program in year one were analyzed to determine the impact/effectiveness of the PD relative to teachers' knowledge and attitudes toward the STEAM initiative who are involved in the STEAM program. (c) Mentoring/Mentee data retrieved from the STEAM teachers in year one provide the STEAM teachers' perceptions of the coaching efforts received from the district and Discovery Education mentors. Results provide empirical evidence for determining the impact of the STEAM program on teacher professional development sessions and coaching efforts and the impact of the newly implemented STEAM program within instructional environments, and future professional development efforts in STEAM implementation. The findings lend strong evidence for program officials charged with data-driven-decision-making regarding the professional development and next steps efforts in implementing the STEAM program in Santa Rosa schools.

Figure 1: Overview of Program Evaluation &Collaboration of Santa Rosa County School District and the University of West Florida Community Outreach Research and Learning (UWF CORAL) Center for the *STEAM Initiative Program (2015 to 2020)*



Anticipated Program Evaluation Outcomes:

Positive increases in Professional Development instructional outcomes

Positive increases in Coaching/Innovators outcomes

Positive reflections by school administrators

Positive relationships among classroom observations and students' engagement and PBL outcomes

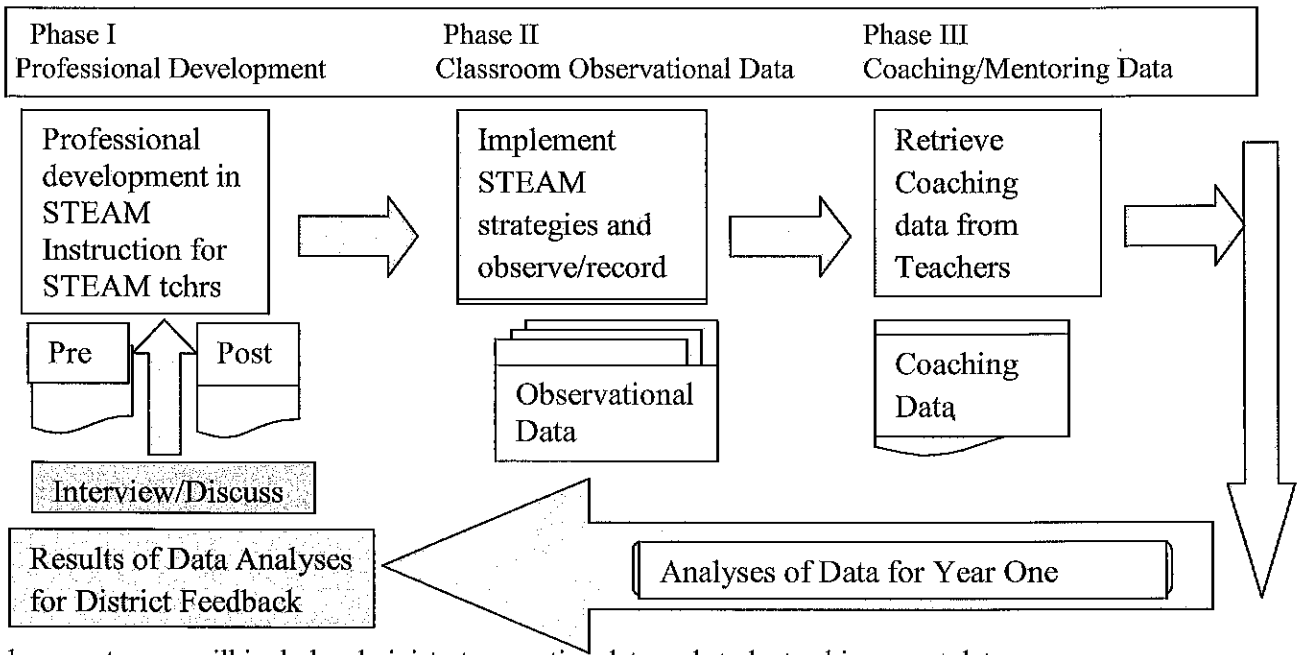
Introduction

This report provides initial year one findings obtained from the relational database that connects the three types of assessment data retrieved by the evaluation project in year one: 1) STEAM teachers' professional development efforts; (2) observational data collected weekly by external observers relative to the STEAM goals and strategies used in the schools during the spring semester of 2016; and (3) mentoring reactions of STEAM teachers relative to the coaching from Discovery Education and other coaching efforts within the program. A presentation of the overview of the relational database is presented in section one of this report with a brief description of each of the three types of data and their relevance to the objectives and criteria established for the STEAM program. Section three of this report provides the evaluation findings from year one of the STEAM initiative Evaluation Project. Section four of this report provides a summary of the findings with empirical evidence defining the impact of the STEAM program on teachers and classroom instructional environments, and reports the suggested outcomes relative to future professional development efforts in STEAM from year one (2015-2016). The final section of the report provides recommendations to Santa Rosa County School District for moving ahead in year two (2016-2017) with specific focus areas and next steps for continued professional development in STEAM efforts.

Section I: Evaluation Project Relational Database

The relational database that connects the three types of assessment data retrieved in year one and posited for subsequent years of the evaluation project: 1) STEAM teachers' professional development efforts; (2) observational data collected weekly by external observers relative to the STEAM goals and strategies used in the schools during the spring semester of 2016; and (3) mentoring reactions of STEAM teachers relative to the coaching from Discovery Education and other coaching efforts within the program. Additional types of data including student achievement data for determining interaction impact effects of the STEAM program efforts will be integrated into the program evaluation in subsequent years as requested by the district officials. This concept is exemplified in Figure 2.

Figure 2
Relational Database Structure and Impact (applied annually from 2015 to 2020)[1]



[1]Subsequent years will include administrator reaction data and student achievement data.

Discussion of Figure 2

Pre and post assessments of the fall 2015 professional development component comprise Phase One of the STEAM evaluation process. Appendix A contains a copy of the Pre/Post Professional Development Assessment Form. Phase Two of the evaluation project or the Implementation of the STEAM strategies within classrooms in the spring of 2016 comprised the observational data collection phase. Trained external observers completed two 15-minute observations once a week per school in randomly selected STEAM classrooms in grades Kindergarten to grade 12 in 17 elementary schools, two middle schools, and one high school for 10 weeks during the spring academic semester (Spring 2016) using an observation form developed and pilot tested prior to the implementation of the evaluation project. Appendix B contains a copy of the observation instrument. Phase Three of the evaluation project report consists of the analysis of coaching reflection data from the STEAM program teachers for the purpose of providing the district information concerning the usefulness and assistance of the mentors/coaches from Discovery Education relative to the implementation of the STEAM program as reflected by the mentees (STEAM teachers). Appendix C contains a copy of the Coaches/Innovators Assessment Form. Phase Three is comprised of the STEAM teachers' reflections on the mentoring/coaching component of the STEAM program whereby STEAM teachers provided reflective relative to their individual coaching experiences in their respective classrooms. The triad evaluation program for year one includes the discussions with stakeholders for the cycle to continue the evaluation project to maintain a seamless process.

Section II: Specific Analyses and Results of Year One (2015-2016) of the Santa Rosa STEAM Evaluation Project

Three areas of discussion comprise the analyses and results reported from Year One of the Santa Rosa County School District STEAM Evaluation Project: (1) results from the professional development component relative to implementation influences; (2) results of the observational data analyses or influences within STEAM classrooms; and (3) results of the STEAM teachers' (Innovators) reflections on coaching and mentoring from the Discovery Education coaches.

I. Results from the Professional Development Component

Teachers from 20 schools (17 elementary schools. two middle schools, one high school) were pre and post assessed using a mixed methods instrument depicting their degree of knowledge, attitudes, and confidence in implementing specific STEAM strategies as per the framework surrounding the Innovation Framework (Discovery Education, 2015). Three areas of data were analyzed with descriptive statistics and frequencies for the following purposes: (1) determining demographic descriptions of the teachers engaged in the professional development as Innovators; (2) determining changes from pre to post using inferential statistical procedures; and (3) retrieving qualitative information from the teachers for purposes of discerning attitudes toward

Implementing the STEAM program. Results of the professional development pre and post assessments are presented in Table 1 and Table 2.

Table 1
Pre and Post Assessment Results for STEAM Year One (2015-2016) Professional Development (N=65) Mean Values Based on Likert Scale of 1 to 5 for Pedagogical Discontentment Scale

Pedagogical Discontentment Scale	Pre	Post	Sig	Result
1. Teaching STEAM to students of lower ability levels.	1.97	1.53	<.01	+*Post*
2. Balancing personal STEAM teaching goals with state and national standards	2.80	2.56	0.14	*NS*
3. Monitoring student understanding through alternative forms of assessment.	2.19	2.14	0.72	*NS*
4. Balancing the needs between both high and low ability level students.	2.58	1.93	<.001	+*Post*
5. Preparing students to assume new roles within inquiry-based learning.	2.18	1.82	<.05	+*Post*
6. Using inquiry-based teaching within all content areas.	2.41	2.02	<.05	+*Post*
7. Assessing students' understandings from inquiry-based learning.	2.36	2.00	<.05	+*Post*
8. Assessing students' nature of STEAM understandings.	2.39	2.05	<.05	+*Post*
9. Including all ability levels during inquiry-based teaching and learning.	2.26	1.74	<.001	+*Post*
10. Teaching STEAM to students from economically disadvantaged backgrounds.	1.74	1.31	<.01	+*Post*
11. Planning and using alternative methods of assessment.	2.28	2.03	<.10	+*Post*
12. Having sufficient STEAM content knowledge to generate lessons.	2.75	2.33	<.05	+*Post*
13. Teaching STEAM to students of higher ability levels.	1.66	1.28	<.01	+*Post*
14. Teaching STEAM subject matter that is unfamiliar to me.	2.82	2.45	<.01	+*Post*
15. Integrating the nature of STEAM throughout the curriculum.	2.48	2.05	<.05	+*Post*
16. Having sufficient STEAM content knowledge to facilitate classroom discussion.	2.77	2.05	<.001	+*Post*
17. Using assessment practices to modify STEAM teaching.	2.41	2.10	<.05	+*Post*
18. Developing strategies for teaching the nature of STEAM.	2.59	2.02	<.001	+*Post*
19. Ability to plan successful inquiry-based activities/learning.	2.59	2.02	<.001	+*Post*
20. Balancing personal STEAM teaching goals with state/national testing concerns.	3.11	2.72	<.05	+*Post*
21. Balancing the depth versus breadth of science content being taught.	2.57	2.33	0.12	*NS*
Total Pedagogical Discontentment Scores	50.85	42.33	<.001	+*Post*

Overall mean differences between pre and post assessments for the professional development activities when examining teachers' Pedagogical Discontentment levels revealed a significant decrease in pedagogical discontentment from pre to post assessment times (after completion of the professional development sessions) with teaching and learning pedagogy focused on STEAM. These results support an effective positive professional development for STEAM.

Table 2

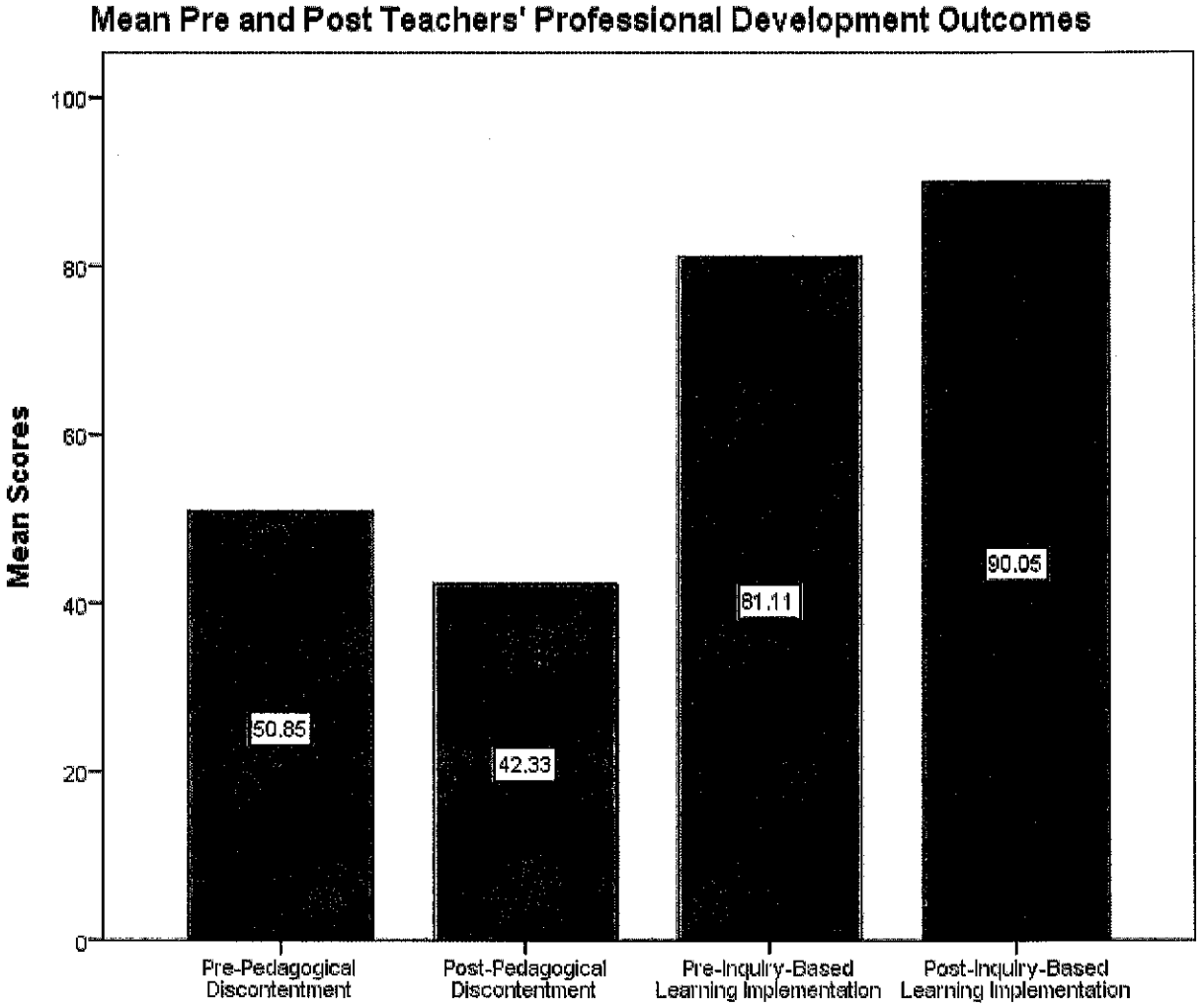
Pre and Post Assessment Results for STEAM Year One (2015-2016) Professional Development (N=65) Mean Values Based on Likert Scale of 1 to 5 for the Inquiry-Based Learning Implementation Scale

Inquiry-Based Learning Implementation Scale	Pre	Post	Sig	Result
1. Demonstrate the use of a new instrument or piece of equipment.	3.51	3.57	0.70	*NS*
2. Have students write the problem or activity before doing an experiment.	3.02	3.33	<.10	+*Post*
3. Review relevant concepts and skills that were learned in previous lessons.	4.08	4.20	0.54	*NS*
4. Introduce new vocabulary words.	4.18	4.20	0.92	*NS*
5. Ask students to identify and define words.	3.79	3.79	1.00	*NS*
6. Ask students to make predictions about an experiment or STEAM activity outcome.	3.87	4.08	0.30	*NS*
7. Check to see that students understand new procedures before beginning an experiment.	3.80	4.16	<.10	+*Post*
8. Discuss how everyday situations directly relate to experiments or STEAM activities.	3.61	4.31	<.01	+*Post*
9. Check students' design for safety before conducting experiments or activities.	3.61	4.02	<.10	+*Post*
10. Monitor small group progress during experiments or STEAM activity.	3.98	4.56	<.01	+*Post*
11. Encourage students to collaborate within their groups.	4.26	4.64	<.05	+*Post*
12. Circulate and interact with students while they are conducting experiments.	4.36	4.67	0.10	*NS*
13. Discuss variations in data collected by students following their experiments.	3.79	4.25	<.05	+*Post*
14. Have students share their predictions with the class.	3.84	3.97	0.45	*NS*
15. Have students share their data or findings with the class.	3.85	4.18	<.05	+*Post*
16. Challenge students to consider the effects of errors on group results.	3.30	4.07	<.001	+*Post*
17. Compare and contrast students' explanations of findings.	3.36	4.07	<.001	+*Post*
18. Question students as they conduct their experiments.	3.95	4.41	<.05	+*Post*
19. Connect new information with students' everyday lives.	3.72	4.21	<.01	+*Post*
20. Connect current events with STEAM concepts.	3.13	3.90	<.001	+*Post*
21. Use questioning strategies to respond to students' questions about STEAM concepts.	3.36	4.08	<.01	+*Post*
22. Have students ask questions about STEAM phenomena addressed activities.	2.85	3.61	<.001	+*Post*
Total Inquiry-based Learning Implementation Scores	81.11	90.05	<.01	+*Post*

Overall mean differences between pre and post assessments for the professional development activities when examining teachers' Inquiry-based Learning Implementation (IBLI) levels revealed a significant increase in IBLI from pre to post assessment times (after completion of the professional development sessions) with inquiry-based learning focused on STEAM. These results support an effective positive professional development for STEAM in year one.

Figure 3

Visual Representation of STEAM Teachers' Pre and Post Professional Development Outcomes



As indicated in Figure 3, the resulting pedagogical discontentment or the moving from a previous pedagogical approach to a new pedagogical approach and the discontentment often created from this movement was covered within the district's planned professional development efforts. The significant decrease (Mean of 50.85 changed to Mean of 42.33) in the STEAM teachers' feelings of "new territory" or "new teaching approaches" that may be associated with embarking upon the district's new focus on STEAM demonstrates an effective professional development effort for engaging teachers in a new pedagogical arena. As indicated in Figure 3, the resulting significant increase (Mean of 81.11 to a Mean of 90.05) of STEAM teachers' attitudes toward Inquiry-Based Learning Implementation demonstrates a sound professional development effort for engaging teachers in implementing inquiry-based learning.

Figure 4

Selected Qualitative Feedback from Year One (2015-2016) for Pre and Post Teacher Professional Development Assessments

Qualitative Assessment	Selected Teachers' Responses
1. Describe your perception of the term, "STEAM Initiative".	The STEAM Initiative is: 1. a hands-on problem solving approach for preparing students for the future 2. an interactive learning approach to science, technology, engineering, arts, and mathematics 3. integrating all aspects of teaching and learning with technologies 4. encouraging teachers and students to step out of the box 5. preparing students for the global job market
2. Describe your perception of a STEAM teaching/learning environment.	A STEAM Teaching/learning environment is described as: 1. structured but flexible 2. engaging, integrated, open-ended, meaningful, project-based 3. a happy, energetic environment welcoming to students, engaging in conversations, and group projects 4. the teacher serving as the facilitator and students are engaged in working groups and collaborative efforts 5. a safe place to fail time and time again comfortably and to celebrate each success
3. Describe your perception of a STEAM classroom (physical facilities/resources, etc.)	A STEAM Classroom is described as: 1. arranged with lab tables rather than desks with varying optional spaces for working and collaborating in groups 2. filled with technology-rich equipment for discovering, researching, and recording data 3. bright, inviting, and organized with easy access to materials and technologies 4. a total learning lab with mobile devices and the latest technologies 5. a large space for movement, filled with musical instruments and art materials as well as synthesizers and advanced technology resources
4. Describe your motivation level for teaching STEAM.	My motivation level for teaching STEAM is: 1. very high with excitement and anticipation to "get the ball rolling" 2. "Off the chart!" I feel this approach is going to help me become the teacher I always wanted to be 3. Extremely excited and eager , but a little anxious about how to begin 4. Super high because I have already been integrating STEAM into my classroom prior to the district approval of the STEAM Initiative 5. Super excited—have always taught interdisciplinary and glad to have the resources and support to be successful

Demographics and Additional Information Concerning the STEAM Teachers/Innovators for Year One (2015-2016)

The following information is provided to describe the N= 65 teachers who participated in the evaluation component of the Year One (2015-2016) STEAM Initiative: (a) the distribution of the number of years teaching; (b) the distribution of participants by age, gender, and ethnicity; (c) distributions of participants by their highest degree earned and favorite subject to teach; and (d) the distribution of participating teachers by the current grade they are teaching. Each of these demographic focus areas is captured within the Frequency Distributions delivered in Table 3.

Table 3 Demographics of STEAM Teachers for Year One (2015-2016)

Number of Years Teaching	f	%		Ages of STEAM Teachers	f	%
< 5 years	12	15%		< 25 years	1	1%
5 to 10 years	28	35%		25 to 35 years	22	28%
11 to 15 years	17	21%		36 to 46 years	33	41%
16- 20 years	9	11%		47 to 57 years	19	24%
>20 years	14	18%		>Age 57	2	2%
Missing data	0	0%		Missing data	3	4%
TOTAL	N= 80	100%		TOTAL	N= 80	100%
Gender of STEAM Teachers	f	%		Ethnicity of STEAM Teachers	f	%
Male	6	8%		Hispanic	1	1%
Female	74	92%		Native American	0	0%
Other	0	0%		Caucasian	78	98%
				African American	0	0%
				Asian	0	0%
				Other	1	1%
TOTAL	N=80	100%		TOTAL	N=80	100%
Highest Degree Held				Favorite Subjects Taught		
Bachelor's Degree	60	75%		Math/Sciences Technology	54	68%
Master's Degree or Higher	20	25%		Liberal Arts/Reading	26	32%
TOTAL	N=80	100%			N=80	100%

II. Results from the Classroom Observational Component

An external trained observer visited each of 20 schools within Santa Rosa County School District during the spring of 2016 (the first semester of the STEAM Initiative implementation): elementary school (N=17), middle schools (N= 2) and high school (N=1) twice per week for 10 weeks conducting two 15-minute observations of STEAM classrooms selected at random in grades K-12 at each visit. Four observers trained using the observation coding instrument for conducting the observations conducted a total of N= 372 observations during the spring 2016 semester. The observation instrument and pertinent psychometric information associated with the observation instrument is available in Appendix A. A total of N= 372 observations were performed during the spring 2016 academic year representing 20 schools comprised of STEAM teachers with the grade level distribution and observation frequencies by schools as presented in Table 4.

Table 4

Frequencies of Observations by Grade Level for Spring Semester of 2016

Grade Level	f	%		Grade Level	f	%
K	24	6.5%		7th	22	5.9%
1st	46	12.4%		8th	22	5.9%
2nd	36	9.7%		9th	21	5.6%
3rd	50	13.4%		10th	19	5.1%
4th	35	9.4%		11th	20	5.4%
5th	50	13.4%		12th	17	4.5%
6th	10	2.7%		TOTAL	372	100%

Table 4 (continued)

Frequencies of Observations by School (N=372)

Name of School	f	%		Name of School	f	%
Bagdad Elementary	20	5.4%		Jay Elementary School	26	7.0%
Berryhill Elementary	16	4.3%		Jay High School	8	2.2%
Central Elementary	16	4.3%		King Middle School	16	4.3%
Chumuckla Elem	14	3.8%		Oriole Beach Elementary	20	5.4%
Dixon Intermediate	12	3.2%		Pea Ridge Elementary	26	7.0%
Dixon Primary	22	5.9%		Rhodes Elementary	21	5.6%
East Milton Elem	20	5.4%		Russell Elementary	22	5.9%
Gulf Breeze Elem	22	5.9%		West Navarre Inter	18	4.8%
Holly Navarre Int	24	6.5%		West Navarre Primary	20	5.4%
Holly Navarre Prim	16	4.3%				
Hobbs Middle School	13	3.5%		TOTAL	372	100%

Table 4 (continued)

Distribution of Observed Classroom Layouts, Technology Uses, and Objectives for Success (N=372 observations) for Year One (2015-2016)

Classroom Environments	f	%		Objectives for Success Classroom	f	%
Traditional Desks Layout	161	43%		Accelerates Math and Science	180	48%
Non-Traditional Layout	61	17%		Promotes STEAM and Problem-based Learning	79	22%
Appropriate Layout	108	29%		Centers-based STEAM Lab Classroom	48	13%
Innovative Layout	42	11%		Creates engaged personalized learning	53	14%
TOTAL	372	100%		Fosters student content creation	12	3%
Technology Usage	f	%		Designs digital assessment lessons	0	0%
Teacher Uses Technology	182	49%		TOTAL	372	100%
Teacher Uses Innovative Technologies	19	5%				
Students Use Technologies	149	40%				
Students Use Innovative Technologies	22	6%				
TOTAL	372	100%				

Data retrieved from the classroom observations during the spring 2016 semester was focused on 20 schools with 80 teachers and multiple classrooms with four observers employed and trained to conduct two 15 minute observations within randomly selected classrooms/teachers in the 20 targeted schools for the evaluation of the STEAM Initiative. The observation form used in the data collection was piloted for reliability and validation prior to using within the classrooms. The Observation Form is available in Appendix B of this report. An abbreviated form of the observation instrument is depicted in Figure 5.

Figure 5

Abbreviated Form of Classroom Observation Instrument Used by Observers during the Spring, 2016 Semester for Assessing STEAM Classroom Environments

Observer_____ Date _____ School _____ Grade Level _____ Type of Classroom _____

Observed Classroom Characteristics	Rating Level[1] 1	Rating Level 2	Rating Level 3	Rating Level 4
Creative Preparation	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Creative Inquiry	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Critical Thinking Integration	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Critical Thinking Problem Solving	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Critical Thinking Logical Thinking	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Communication Data/Information Collection	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Communication Argumentation	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Collaboration Team Work	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4
Collaboration Investigation Skills	Descriptive = 1	Emerging = 2	Developing = 3	Accomplished = 4

[1] Each of the rating levels are distinctively defined for each category of assessment and observers are trained to recognize specific characteristics and exemplars for representing each rating as per defined for each of the nine categories listed. For specific definitions of each of the ratings examine the full instrument used by observers available in Appendix B.

As indicated in Figure 5, the ratings by observers using the Likert-like scaling mechanism provide clear assessment data for each 15-minute observation period. A total of N= 372 observations were performed by four observers trained in using the instrument provided in Figure 5 and Appendix B. Observations were conducted in grades K-12 during the year one (Spring 2016) observation period with the analyses of the data reported in Tables 4 and 5.

Table 5

Frequency Distributions of Observation Data Retrieved from Four Observers in Year One (2015-2016) of the STEAM Initiative with N= 372 Observations

Creative Prep Rating Levels	f	%		Creative Inquiry Rating Levels	f	%
Descriptive = 1	246	66%		Descriptive = 1	245	66%
Emerging = 2	90	24%		Emerging = 2	83	22%
Developing = 3	26	7%		Developing = 3	35	9%
Accomplished = 4	10	3%		Accomplished = 4	9	2%
TOTAL	372	100%		TOTAL	372	100%
Critical Thinking Integration Rating Levels	f	%		Critical Thinking Problem Solving Rating Levels	f	%
Descriptive = 1	265	71%		Descriptive = 1	184	50%
Emerging = 2	75	20%		Emerging = 2	103	28%
Developing = 3	30	8%		Developing = 3	77	21%
Accomplished = 4	2	1%		Accomplished = 4	8	1%
TOTAL	372	100%			372	100%
Critical Thinking Logical Thinking Rating Levels	f	%		Communication Data & Information Rating Levels	f	%
Descriptive = 1	186	50%		Descriptive = 1	179	48%
Emerging = 2	123	33%		Emerging = 2	123	33%
Developing = 3	57	15%		Developing = 3	64	17%
Accomplished = 4	6	2%		Accomplished = 4	6	2%
TOTAL	372	100%		TOTAL	372	100%
Communication Argumentation Rating Levels	f	%		Collaboration Team Work Rating Levels	f	%
Descriptive = 1	258	69%		Descriptive = 1	222	60%
Emerging = 2	41	11%		Emerging = 2	82	22%
Developing = 3	73	20%		Developing = 3	62	17%
Accomplished = 4	0	0%		Accomplished = 4	6	1%
TOTAL	372	100%		TOTAL	372	100%
Collaboration Investigation Skills Rating Levels	f	%				
Descriptive = 1	210	57%				
Emerging = 2	80	21%				
Developing = 3	72	19%				
Accomplished = 4	10	3%				
TOTAL	372	100%				

Observational results depicted in Table 5 reveal the presence of each of the nine focus areas of innovative thinking skills with Descriptive and/or Emerging levels observed in a majority of the classrooms visited by the four observers. These data reflect a strong baseline measure of classroom focus on the types of thinking, problem-solving, communication, and collaboration skills necessary to propel the district into a sustaining STEAM initiative in subsequent years. Descriptive and Emerging observations reflecting more than three-fourths of the observed classroom settings in year one of the STEAM Initiative are fully described in Figure 5.

Figure 6

Descriptions of the Two Major Observation Ratings for Classrooms in Year one of the STEAM Initiative (2015-2016)

	Descriptive Rating = 1	**Emerging Rating = 2**
Creative Preparation	Lessons incorporated opportunities for students to investigate local and global issues, universal problems, and transdisciplinary ideas. **66%**	The teacher designs guided experiences to support disciplinary core ideas and practices and academic content standards. The teacher designs interdisciplinary lessons that involve local & global issues and universal problems. However, students are asked to follow directions to come to a solution. Students are guided in providing examples of utilizing skills, concepts, and dispositions that lead to success. **24%**
Creative Inquiry	Students are taught and expected to ask questions, identify problems, seek appropriate resources, and persevere in problem solving. **66%**	Inquiry is teacher directed or guided and is limited to a set process. The teacher designs or provides opportunities for students to learn understanding inuiry begins with a question. **22%**
Critical Thinking Integration	Learning experiences are transdisciplinary in nature and focus on authentic content connections, and current real world issues within the context of multiple disciplines. **71%**	The teacher plans multidisciplinary experiences that focus on a common theme, but stay within the content boundaries. The teacher leads students through prompted discussions associated with a problem or question. The teacher plans lessons that incorporate skills and concepts across two subject areas. **20%**
Critical Thinking Problem-Solving	Students are taught and expected to construct explanation, design, solutions, and solve problems using textual and empirical evidence. **50%**	The teacher leads instruction on constructing explanations, designing solutions, and solving problems using evidence. The teacher provides students with resources that provide explanations and solutions based on evidence. The teacher guides students to where they can find supporting evidence. **28%**

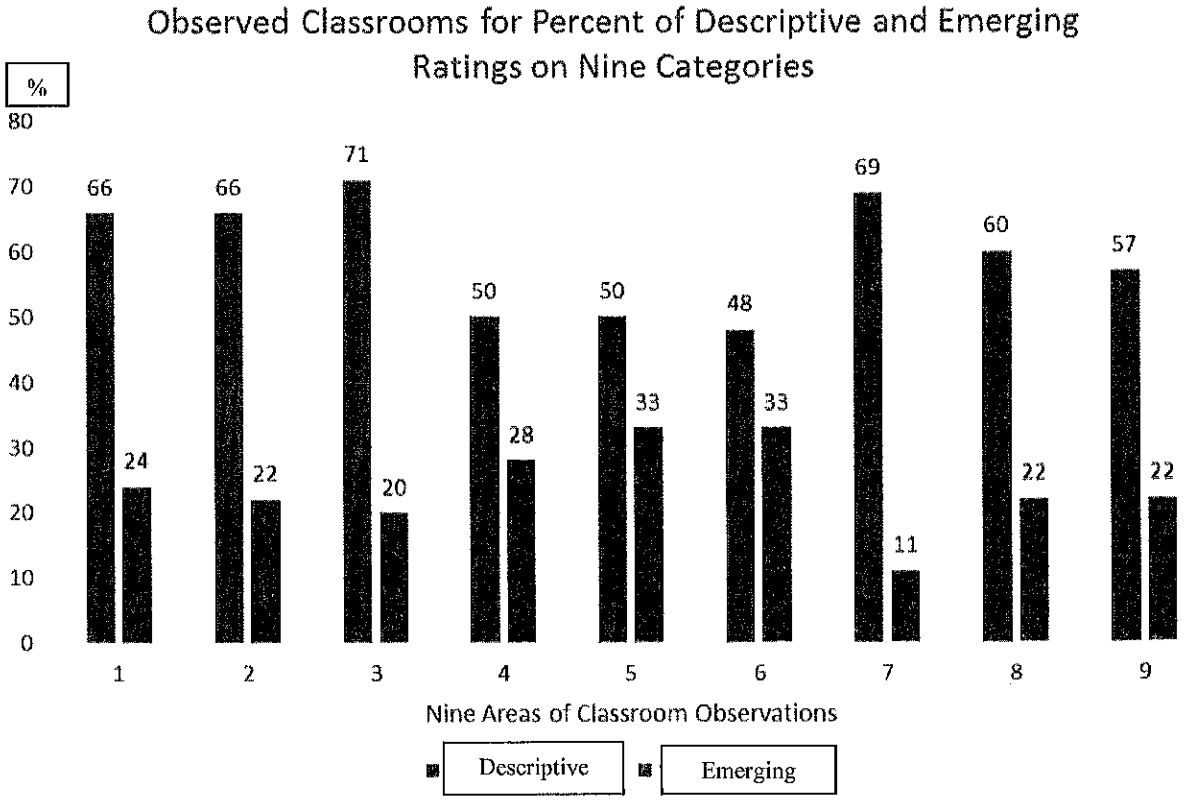
Figure 6 (continued)

Descriptions of the Two Major Observation Ratings for Classrooms in Year one of the STEAM Initiative (2015-2016)

	Descriptive Rating = 1	**Emerging Rating = 2**
Critical Thinking Logical Thinking	Students are taught and provided opportunities to think logically, abstractly, and quantitatively. **50%**	The teacher provides students with experiences to explore quantitative and qualitative data. Students are given opportunities to measure quantities, study patterns, create charts and graphs, and apply computations. The teacher provides lessons to support students' development as logical, abstract, and quantitative thinkers. **33%**
Communication Data & Information Collection	Students are expected to choose appropriate mediums and sources to gather, synthesize, evaluate, and communicate data and information. **48%**	The teacher guides experiences that require students to interact with a specific set of media sources ad types. The teacher provides instruction around text and media features that allow students to identify pertinent and accurate information. The teacher guides students to synthesize and evaluate information and data that have been gathered. The teacher directs students to communicate in a specific way. **33%**
Communication Argumentation	Students engage in constructive argumentation. Students taught and expected to analyze and defend their thinking surrounding the claims of others. **69%**	The teacher provides instruction on constructing and analyzing arguments. The teacher provides students with activities in which they explain how data support their arguments. The teacher guides students in analyzing personal arguments of others for flawed reasoning, bias, or misconceptions. **11%**
Collaboration Team Work	Students work together to solve problems, develop ideas, and achieve goals. **60%**	The teacher plans experiences in which students are required to work in collaborative groups. The teacher provides guidance on how to work in collaborative groups. Students follow the duties of specific roles within collaborative groups. **22%**
Collaboration Investigation Skills	Students are taught and expected to plan and carry out investigations. Students are taught ad expected to implement appropriate tools and methods. **57%**	The teacher provides instruction on investigation skills. The teacher suggests approaches for student to use to answer questions or solve problems. The teacher selects technological tools and methods that are relevant to the investigation. **22%**

Figure 7

Summary of the Percent of Descriptive and Emerging Ratings for Nine Observational Categories for year one of the STEAM Initiative (2015-2016) with N= 372 Observations



KEY: Nine Areas of Classroom Observations:
1 = Creative Preparation
2 = Creative Inquiry
3 = Critical Thinking Integration
4 = Critical Thinking Problem-Solving
5 = Critical Thinking Logical Thinking
6 = Communication Data & Information Collection
7 = Communication & Argumentation
8 = Collaboration Team Work
9 = Collaboration Investigation Skills

An examination of the findings reported in Figure 7 reveals an overwhelmingly positive effort in classroom activities and environments for supporting the underlying initial skills for the nine key areas of focus promoting the Year One efforts of the Santa Rosa County Schools STEAM Initiative. High percentages of Descriptive Ratings for each of the nine key areas of observations focused on considerations in teaching and learning indicate substantial "buy-in" and "action" by STEAM classroom teachers. Notable percentages for emerging ratings also demonstrates a strong effort by STEAM teachers for introducing and moving forward in the plan of action for integrating STEAM into the curriculum.

III. Results from the STEAM Teachers' (Innovators) Perceptions of their Coaching Experiences with Discovery Education

The third area of assessment for the Year One STEAM Initiative for Santa Rosa County Schools is the mentoring or coaching component provided by the Discovery Education professionals with both group and one-on-one mentoring/coaching experiences during the first year of the project. The Santa Rosa STEAM Initiative Coach/Mentee Reflection Form for Mentees is available in Appendix C of this report. This form was used to assess teachers' perceptions of their coaching experiences. Almost 70% or 55 of the N= 80 STEAM teachers in year one completed the online form and returned the form to the evaluation team with no identifiers information. The distribution of teachers who completed the online Coach/Mentee Reflection Form includes: (a) 40 (73%) elementary teachers, 8(14%) middle school teachers, and 4(7%) high school teachers with 3(5%) of the teachers choosing not to report their school affiliation. Data were retrieved from this form were designed to ensure teachers' anonymity or identifiers. Resulting quantitative data retrieved from the STEAM initiative teachers' perceptions of their coaches are presented in Table 6.

Table 6

Frequency Results of the Coaching/Mentee Reflection Form: For Mentees (N= 55 teachers)

My coach was accessible	f	%	My coach demonstrated professional integrity	f	%
Strongly Disagree	3	5%	Strongly Disagree	3	5%
Disagree	0	0%	Disagree	0	0%
Slightly Disagree	0	0%	Slightly Disagree	2	4%
Slightly Agree	4	7%	Slightly Agree	1	2%
Agree	11	20%	Agree	6	11%
Strongly Agree	36	66%	Strongly Agree	42	76%
NA	1	2%	NA	1	2%
TOTAL	55	100%	TOTAL	55	100%

My coach demonstrated content expertise in my area of need	f	%	My coach was approachable	f	%
Strongly Disagree	3	5%	Strongly Disagree	3	5%
Disagree	0	0%	Disagree	0	0%
Slightly Disagree	0	0%	Slightly Disagree	0	0%
Slightly Agree	2	4%	Slightly Agree	1	2%
Agree	11	20%	Agree	9	16%
Strongly Agree	38	69%	Strongly Agree	40	73%
NA	1	2%	NA	2	4%
TOTAL	55	100%	TOTAL	55	100%

My coach was supportive and encouraging	f	%	My coach provided constructive feedback	f	%
Strongly Disagree	3	5%	Strongly Disagree	3	5%
Disagree	0	0%	Disagree	0	0%
Slightly Disagree	0	0%	Slightly Disagree	0	0%
Slightly Agree	1	2%	Slightly Agree	4	7%
Agree	9	16%	Agree	12	22%
Strongly Agree	40	73%	Strongly Agree	32	59%
NA	2	4%	NA	4	7%
TOTAL	55	100%	TOTAL	55	100%

My coach motivated me to improve my work product	f	%	My coach was helpful in providing direction	f	%
Strongly Disagree	3	5%	Strongly Disagree	3	5%
Disagree	0	0%	Disagree	0	0%
Slightly Disagree	0	0%	Slightly Disagree	1	2%
Slightly Agree	3	5%	Slightly Agree	5	9%
Agree	11	20%	Agree	12	22%
Strongly Agree	35	65%	Strongly Agree	31	57%
NA	3	5%	NA	3	5%
TOTAL	55	100%	TOTAL	55	100%

My coach answered my questions satisfactorily	f	%	My coach acknowledged my contributions	f	%
Strongly Disagree	3	5%	Strongly Disagree	3	5%
Disagree	0	0%	Disagree	0	0%
Slightly Disagree	1	2%	Slightly Disagree	1	2%
Slightly Agree	6	11%	Slightly Agree	0	0%
Agree	11	20%	Agree	15	28%
Strongly Agree	32	58%	Strongly Agree	32	58%
NA	2	4%	NA	4	7%
TOTAL	55	100%	TOTAL	55	100%
My coach suggested appropriate resources	f	%	My coach challenged me to extend my abilities	f	%
Strongly Disagree	3	5%	Strongly Disagree	3	5%
Disagree	0	0%	Disagree	0	0%
Slightly Disagree	2	4%	Slightly Disagree	0	0%
Slightly Agree	1	2%	Slightly Agree	3	5%
Agree	11	20%	Agree	9	17%
Strongly Agree	36	65%	Strongly Agree	38	69%
NA	2	4%	NA	2	4%
TOTAL	55	100%	TOTAL	55	100%

As indicated in Table 6, a large majority (57% to 78%) of STEAM teachers strongly agreed with the assistance and role of the coach as implemented in the STEAM Initiative. The use of coaches for the STEAM Initiative is supported as an effective component of the STEAM program with all 12 questions rated with a majority of strongly agree responses from the STEAM teachers relative to the following commitment for the STEAM coaching component: Coaches were accessible, approachable, supportive, encouraging, demonstrated professional integrity, demonstrated content expertise aligned with teachers' backgrounds, provided constructive feedback, motivated teachers to improve work product, helpful in providing direction and guidance, answered questions clearly and in a timely manner, acknowledged teachers' contributions appropriately, suggested experts and source materials, and challenged teachers to extend their skills by taking risks and trying innovative activities.

Additional information retrieved from the STEAM teachers (N=55) related to teachers' perceptions of the coaches efforts are depicted in Figure 7 in two qualitative areas of discussion:

Figure 7

Qualitative Data Retrieved from STEAM Teachers' Perceptions of the STEAM Coaches (Discovery Education Partner Coaches) for Year One of STEAM Initiative (2015-2016)

What kinds of activities/experiences do you feel were most beneficial/effective for the coach/mentee relationship?	What activities/experiences/resources do you feel need to be changed or reexamined relative to the STEAM Coach/Mentee program?
1. Co-teaching 2. Debriefing Sessions 3. Developing lesson plans together 4. Reflecting on lessons and shared ideas 5. One-on-one planning sessions 6. Experiencing new technologies 7. Sharing celebrations and frustrations 8. Learning labs and associated activities 9. Lesson feedback time and small group planning 10. Discussing together after observations 11. Lesson modeling 12. Brainstorming ideas for STEAM Lessons 13. Coach leading small group training 14. Planning across grade levels activities 15. Allowing students to lead in their own learning 16. Administrators participating in coaching sessions 17. Visiting other teachers' STEAM rooms 18. Observations/consultations with coach 19. Combining classrooms of students 20. Receiving resources, materials & guidance OVERALL #1 Response: Planning and providing feedback on a one-on-one basis for teachers and coaches together as partners	1. None at this time. 2. More planning time with teachers and coaches 3. More emphasis on STEAM careers 4. Continued support in terms of supplies/funds/ resources 5. Replacing some of the PD with coaching time 6. Less time away from students 7. More demonstrations from coaches during training sessions 8. More hands-on training versus lecture 9. Organizing cohorts by subject area/grade rather than geographic area 10. Coaches present at PD trainings 11. Having concrete goals for STEAM teachers 12. Separating primary and intermediate elementary teachers 13. More engineering activities 14. More "how to incorporate" the Arts 15. Connecting training to STEAM lab creation 16. Focusing on new knowledge to teach differently OVERALL #1 Response: No changes at this time –the coaching component is very helpful and will assist in the success of the STEAM Initiative.

Section IV: Summary of Findings for Year One of the STEAM Initiative (2015-2016)

Section four of this report provides a summary of the findings with empirical evidence defining the initiation of the STEAM Initiative program on teacher professional development efforts, instructional (classroom) environments, and the coaching partnership of Discovery Education with district teachers and professionals. This summary will provide the staging and appropriate recommendations for the continued assessment and evaluation of the Santa Rosa County Schools STEAM Initiative program.

Summary: Professional Development of STEAM Teachers as Innovators

(1) Overall Impact of Professional Development: The professional development program provided focused training and mentoring by Discovery Education and Santa Rosa teachers for generating positive cognitive and affective outcomes relative to teachers' knowledge levels and attitudes for implementing the STEAM initiative program. Teachers' entering affective and cognitive levels for the Year One (2015-2016) PD sessions sustained consistently high positive levels indicating a rich infusion (in attitude and understanding) of teachers as they embark upon a new initiative with partnering coaches from Discovery Education. Both quantitative and qualitative results from the PD evaluation indicate STEAM teachers have fully embraced with excitement and diligence the new STEAM Initiative.

(2) Specific Focus Areas of Professional Development Assessment: Two areas of focus comprised the professional development assessment for the STEAM Initiative: Pedagogical Discontentment and Inquiry-Based Learning. Both of these scales (Available in Appendix A) depict two critical components of the STEAM Initiative, i.e., the degree to which teachers are able to move away from their traditional pedagogy practices to embrace the pedagogical focus of the new STEAM Initiative (scored as Pedagogical Discontentment Scale) and the degree to which teachers are willing and comfortable to embrace inquiry-based learning for their classrooms (scored as the Inquiry-Based Learning Scale).

(3) Quantitative & Qualitative Evaluation Results of Professional Development Assessments:
   (a) Results from the quantitative assessments of teachers perceptions of their ***Pedagogical Discontentment*** levels increased in the positive direction for 19 out of the 21 areas of assessment or 90% of the areas of pedagogical discontentment potentially afforded the STEAM Initiative were changed to positive feelings of pedagogical contentment after participating in the professional development provided for the STEAM Initiative.
   (b) Results from the quantitative assessments of teachers perceptions of their ***Inquiry-Based Learning*** levels increased in the positive direction for 16 out of 22 areas of assessment or 72% of the areas of inquiry-based learning were increased as a direct result of the professional development provided teachers from the STEAM Initiative.
   (c) Summary commentary of these two results from the quantiative assessment indicated that the Professional Development component is effective in providing both pedagogical contentment (affective) and cognitive (inquiry-based instruction) as relevant components for the professional development of STEAM teachers.

(d) Summary commentary of the qualitative remarks of teachers were found to be excitement with high energy and anticipation as innovators for propelling the implementation of the STEAM Initiative to prepare students as problem solvers and collborators for a global society.

Summary: Classroom Observations of STEAM Classroom Environments

(1) Overall impact of Classroom Observation Component: The N=372 classroom observations were performed at 17 elementary schools, two middle schools, and one high school during the spring 2016 semester utilizing four observers (each observer was responsible for five schools) who had been trained to assess classrooms using the observation form provided in Appendix B. Interrater reliability and special training sessions were conducted prior to the data collection phase of observing classrooms. Classrooms were assessed using a four-point scaling format of descriptive, emerging, developing, and accomplished relative to nine specific areas of observed classroom environment characteristics. The overall impact of the STEAM Initiative for Year One (2015-2016) relative to the observed classroom environments is indicative of a new program in its first year of operation, that is, the major observed types of classroom activities in year one represented only the lower levels of engagement within the classrooms (Descriptive and Emerging). These two lower levels of implementation are representative of a positive beginning (first year) for the initiative.

(2) Specific results highlighted from the findings of the classroom observation efforts depicted in the nine areas of observed classroom environments indicated varying strong initial efforts to implement the STEAM Initiative as summarized in the following statements:

KEY: Nine Areas of Classroom Observations: (Ratings of Developing and/or Accomplished)
1 = Creative Preparation: approximately 10% of observed classrooms exhibited this environment
2 = Creative Inquiry: approximately 10% of observed classrooms exhibited this environment
3 = Critical Thinking Integration: approximately 10% of observed classrooms exhibited this environment
4 = Critical Thinking Problem-Solving: approximately 22% of observed classrooms exhibited this environment
5 = Critical Thinking Logical Thinking: approximately 17% of observed classrooms exhibited this environment
6 = Communication Data & Information Collection: approximately 19% of observed classrooms exhibited this environment
7 = Communication & Argumentation: approximately 20% of observed classrooms exhibited this environment
8 = Collaboration Team Work: approximately 18% of observed classrooms exhibited this environment
9 = Collaboration Investigation Skills: approximately 22% of observed classrooms demonstrating this environment

Although all observed classrooms exhibited prominent evidence of Descriptive and Emerging ratings of environments from the coded classroom observervations, the above findings also indicate a strong propensity for all classrooms moving forward toward the Developing and Accomplished ratings for STEAM driven classroom environments. Therefore, the initial year one observational data suggest a high level of evidence for the distirct to move forward with few barriers within classrooms relative to melding exiting classrooms into STEAM classroom environments.

Summary: Results of the STEAM Teachers'/Innovators'Perceptions of the Coaching Component of the STEAM Initiative

STEAM teachers/innovators were provided with an online survey instrument at the end of the 2015-2016 academic year evaluation. The online Mentoring/Coaching instrument was designed for the purpose of assessing teachers' relationships, benefits, challenges, and overall perceptions of the coaching component focus of the STEAM Initiative. This instrument is located in Appendix C. Results of the 55 teachers/innovators' responses from the completed surveys are summarized in the following statements.

(1) Overall findings of coaching perceptions of STEAM Teachers/Innovators indicate a strong majority (approximately 60% to 80%) of teachers strongly agreed and positively assessed the coaching component for all 12 areas of coaching listed:
   (a) Coach accessibility;
   (b) Coach demonstrates content expertise;
   (c) Coach was approachable;
   (d) Coach was supportive and encouraging;
   (e) Coach provided constructive feedback;
   (f) Coach motivated me to improve my work product;
   (g) Coach was helpful in providing direction and guidance;
   (h) Coach answered my questions satisfactorily;
   (i) Coach acknowledged my contributions appropriately;
   (j) Coach suggested appropriate resources and materials;
   (k) Coach challenged and extended my abilities.

(2) Qualitative commentary retrieved from the STEAM Teachers/Innovators are summarized in the third section of the report with the most common summary statements as follows:
   (a) The most beneficial activity involving the coaches for the STEAM initiative is planning and providing feedback on a one-on-one basis for teachers and coaches together as partners, and
   (b) The most needed changes for the coaching component as perceived by the teachers/innovators is no changes at this time –the coaching component is very helpful and will assist in the success of the STEAM Initiative.

Appendix A:

Santa Rosa Schools Professional Development Pre and Post Assessment for STEAM Initiative (2015-2016)

Santa Rosa Schools Professional Development Assessment for *STEAM Initiative*
2015-2016
PRE-Assessment

Demographics:

1. Grade(s) you currently teach: **K 1 2 3 4 5 6 7 8 9 10 11 12 (circle all that apply)**

2A) Number of years you have been teaching? _____ 2B) Your Current Age? _____

3. What is your favorite subject to teach? _____

4. Highest Degree (please circle): Bachelors Masters Specialist Doctorate

5. Gender (please circle): Female Male Other

6. Ethnicity (please circle): Hispanic Native American Caucasian African American Asian Other

***STEAM Initiative*: Your Initial Thoughts:**

1. Describe your perception of the term: *STEAM Initiative*:

2. Describe your perception of a *STEAM teaching/learning environment*:

3. Describe your perception of a *STEAM classroom (physical facilities/resources etc):*

4. Describe your motivation level for teaching *STEAM:*

Pedagogical Discontentment Scale:

Please circle the level for each statement relative to your own perceived level of discontentment:
1 = no discontentment 2 = slight discontentment 3 = moderate discontentment 4= substantial discontentment 5=very high discontentment

1.	Teaching STEAM to students of lower ability levels	1 2 3 4 5
2.	Balancing personal STEAM teaching goals with state and national standards	1 2 3 4 5
3.	Monitoring student understanding through alternative forms of assessment	1 2 3 4 5
4.	Balancing the needs between both high and low ability level students	1 2 3 4 5
5.	Preparing students to assume new roles within inquiry-based learning	1 2 3 4 5
6.	Using inquiry-based teaching within all content areas	1 2 3 4 5
7.	Assessing students' understandings from inquiry-based learning	1 2 3 4 5
8.	Assessing students' nature of STEAM understandings	1 2 3 4 5
9.	Including all ability levels during inquiry-based teaching and learning	1 2 3 4 5
10.	Teaching STEAM to students from economically disadvantaged backgrounds	1 2 3 4 5
11.	Planning and using alternative methods of assessment	1 2 3 4 5
12.	Having sufficient STEAM content knowledge to generate lessons	1 2 3 4 5
13.	Teaching STEAM to students of higher ability levels	1 2 3 4 5
14.	Teaching STEAM subject matter that is unfamiliar to me	1 2 3 4 5
15.	Integrating the nature of STEAM throughout the curriculum	1 2 3 4 5
16.	Having sufficient STEAM content knowledge to facilitate classroom discussion	1 2 3 4 5
17.	Using assessment practices to modify STEAM teaching	1 2 3 4 5
18.	Developing strategies for teaching the nature of STEAM	1 2 3 4 5
19.	Ability to plan successful inquiry-based activities/learning	1 2 3 4 5
20.	Balancing personal STEAM teaching goals with state/national testing concerns	1 2 3 4 5
21.	Balancing the depth versus breadth of science content being taught	1 2 3 4 5

Inquiry-Based Learning Implementation Scale

When you teach STEAM how frequently do you perform each of the following?
1 = never 2 = rarely 3 = sometimes 4 = often 5 = always

1.	Demonstrate the use of a new instrument or piece of equipment	1 2 3 4 5
2.	Have students write the problem or activity before doing an experiment	1 2 3 4 5
3.	Review relevant concepts and skills that were learned in previous lessons	1 2 3 4 5
4.	Introduce new vocabulary words	1 2 3 4 5
5.	Ask students to identify and define words	1 2 3 4 5
6.	Ask students to make predictions about an experiment or STEAM activity outcome	1 2 3 4 5
7.	Check to see that students understand new procedures before beginning an experime	1 2 3 4 5
8.	Discuss how everyday situations directly relate to experiments or STEAM activities	1 2 3 4 5
9.	Check students' design for safety before conducting experiments or activities	1 2 3 4 5
10.	Monitor small group progress during experiments or STEAM activity	1 2 3 4 5
11.	Encourage students to collaborate within their groups	1 2 3 4 5
12.	Circulate and interact with students while they are conducting experiments	1 2 3 4 5
13.	Discuss variations in data collected by students following their experiments	1 2 3 4 5
14.	Have students share their predictions with the class	1 2 3 4 5
15.	Have students share their data or findings with the class	1 2 3 4 5
16.	Challenge students to consider the effects of errors on group results	1 2 3 4 5
17.	Compare and contrast students' explanations of findings	1 2 3 4 5
18.	Question students as they conduct their experiments	1 2 3 4 5

19. Connect new information with students' everyday lives	1 2 3 4 5
20. Connect current events with STEAM concepts	1 2 3 4 5
21. Use questioning strategies to respond to students' questions about STEAM concepts	1 2 3 4 5
22. Have students ask questions about the STEAM phenomena addressed in activities	1 2 3 4 5

Thank you for your participation....

Appendix B:

Santa Rosa School District Classroom Observation Form for STEAM Initiative

(2015-2016)

[insert in landscape mode]

Observer_____ Date _____School _____Grade Level _____ Room _____ Type of Classroom _____ Other_____

Classroom Environment Layout: (Check One)					
1: Traditional desks layout					
2: Non-traditional layout					
3: Appropriate layout					
4: Innovative layout					
Technology: (Check One)					
1:Teacher uses technologies					
2:Teacher uses innovative tech					
3: Student uses technologies					
4:Student uses innovative tech					
Obj for Success:(Check One)					
1: Accelerates math/science					
2: Promotes STEAM PBL					
3: Centers-based STEAM lab class					
4:Creates engaged personalized learning					
5:Fosters student content creation					
6: Design digital Assessments/lessons					

CREATIVE Preparation	**Descriptive: 1** Lessons incorporate opportunities for students to investigate local and global issues, universal problems, and transdisciplinary ideas.	**Emerging: 2** The teacher designs guided experiences to support disciplinary core ideas and practices and academic content standards. The teacher designs interdisciplinary lessons that involve local & global issues and universal problems However, students are asked to follow directions to come to a solution. Students are guided in providing examples of utilizing skills, concepts, and dispositions that lead to success.	**Developing: 3** The teacher designs classroom experiences that link interdisciplinary academic standards. The teacher designs transdisciplinary lessons that may involve local and global issues. However, the teacher approaches issues from content-specific perspectives and students are directed as to how to address these issues. Students show progress through the skills, concepts, and dispositions they develop. The teacher asks students to provide ideas for upcoming investigations/learning activities	**Accomplished: 4** The teacher designs authentic transdisciplinary experiences to support student inquiry and design. The teacher encourages students to think outside of the box to solve problems and supports students' unique ideas and approaches. The teacher identifies and highlights academic standards that support investigations. The teacher involves students in the development of some lesson topics and learning activities. Students demonstrate progress in unique and creative ways through multiple mediums.
CREATIVE Inquiry	**Descriptive: 1** Students are taught and expected to ask questions, identify problems, seek appropriate resources, and persevere in problem solving.	**Emerging: 2** Inquiry is teacher directed or guided and is limited to a set process. The teacher designs or provides opportunities for students to learn that understanding inquiry begins with a question.	**Developing: 3** The teacher predominantly initiates inquiry. The teacher guides students through inquiry opportunities that follow different models such as problem-based learning, the design process, the scientific method, or numerous other models. Students engage in their own inquiries and recommend investigation protocols.	**Accomplished: 4** Inquiry can be student directed, but the level is appropriately selected. The teacher acts as a facilitator to support student-initiated inquiry. Students engage in appropriate but varied models of inquiry. Students connect that many careers use varied inquiry models in their everyday functions.
CRITICAL THINKING Integration	**Descriptive: 1** Learning experiences are transdisciplinary in nature and focus on authentic content connections, and current real world issues within the context of multiple disciplines.	**Emerging: 2** The teacher plans multidisciplinary experiences that focus on a common theme, but stay within the content boundaries. The teacher leads students through prompted discussions associated with a problem or question. The teacher plans lessons that incorporate skills and concepts across two subject areas.	**Developing: 3** The teacher plans multidisciplinary learning experiences that link multiple content areas. Students use their knowledge in multiple contents to answer complex questions, challenges, or problems. The teacher is the one who relates the interdisciplinary nature of problems to real world situations	**Accomplished: 4** The teacher plans meaningful authentic opportunities for students to analyze real world relationships across content areas. Students explore how those transdisciplinary connections may be applied to help answer complex questions, challenges, or real world problems. The teacher supports students in developing the understanding that many real world problems involve multiple minds and thought processes.

Observer_____ Date _____School _____Grade Level _____ Room _____ Type of Classroom _____ Other_____

CRITICAL THINKING **Problem Solving**	**Descriptive: 1** Students are taught and expected to construct explanation, design solutions, and solve problems using textual and empirical evidence.	**Emerging: 2** The teacher leads instruction on constructing explanations, designing solutions, and solving problems using evidence. The teacher provides students with resources that provide explanations and solutions based on evidence. The teacher guides students to where they can find supporting evidence.	**Developing: 3** The teacher guides students through activities in which they provide explanations and solutions based on evidence from a variety of sources. The teacher guides students to apply specific scientific principles and theories to solve problems. The teacher directs conversations with students as to whether there is enough evidence available to make legitimate conclusions.	**Accomplished: 4** The teacher designs experiences in which students provide multiple explanations and solutions based on evidence from a variety of sources. Students select and apply textual and experiential evidence to provide solutions to problems. Students are expected to determine if there is enough evidence available to make legitimate conclusions
CRITICAL THINKING **Logical Thinking**	**Descriptive: 1** Students are taught and provided opportunities to think logically, abstractly, and quantitatively.	**Emerging: 2** The teacher provides students with experiences to explore quantitative and qualitative data. Students are given opportunities to measure quantities, study patterns, create charts and graphs, and apply computations. The teacher provides lessons to support students' development as logical, abstract, and quantitative thinkers.	**Developing: 3** The teacher guides students through activities in which they determine if data should be represented quantitatively or qualitatively. The teacher provides opportunities for students to use systematic procedures and carefully worked-out concepts for problem-solving. The teacher introduces digital tools that allow students to collect and analyze data and test proposed solutions.	**Accomplished: 4** The teacher designs lessons in which students determine if data should be represented qualitatively or quantitatively. Students create systematic procedures and carefully worked-out concepts for problem solving. Students also select appropriate digital tools or processes to test proposed solutions. Students are asked to explain and support their logical thinking.
COMMUNICATION **Data and Information Collection**	**Descriptive: 1** Students are expected to choose appropriate mediums and sources to gather, synthesize, evaluate, and communicate data and information.	**Emerging: 2** The teacher guides experiences that require students to interact with a specific set of media sources and types. The teacher provides instruction around text and media features that allow students to identify pertinent and accurate information. The teacher guides students to synthesize and evaluate information and data that have been gathered. The teacher directs students to communicate in a specific way.	**Developing: 3** The teacher builds experiences that require students to gather information from a variety if sources abd utilize specific tools. The teacher provides help to students in evaluating their sources of information. Teachers require a specific number of sources and media types. Students begin to consider different interpretations of the data. The teacher asks students to communicate information using varied media sources.	**Accomplished: 4** The teacher creates authentic opportunities in which students determine how they will obtain, incorporate, and communicate data and information. Students gather a variety of types of information from multiple sources. Students are expected to synthesize, analyze, and evaluate data and sources of information. Teachers allow students to select the appropriate avenue to communicate their information.

Observer_____ Date _____School _____Grade Level _____ Room _____ Type of Classroom _____ Other_____

COMMUNICATION **Argumentation**	**Descriptive: 1** Students engage in constructive argumentation. Students taught and expected to analyze and defend their thinking surrounding the claims of others.	**Emerging: 2** The teacher provides instruction on constructing and analyzing arguments. The teacher provides students with activities in which they explain how data support their arguments. The teacher guides students in analyzing personal arguments as well as the arguments of others for flawed reasoning, bias, or misconceptions. The teacher critiques competing arguments and identifies the merits and disadvantages of each argument.	**Developing: 3** The teacher guides students through activities in which they construct oral and written arguments and explain how data support their claims. The teacher asks students to analyze personal arguments and the arguments of others for flawed reasoning, bias, or misconceptions. The teacher critiques competing arguments and helps identify the merits and disadvantages to determine the best argument.	**Accomplished: 4** The teacher plans opportunities for students to authentically debate information and engage in constructive argumentation. Students pose a variety of questions to evaluate an argument. The teacher asks students to respectfully critique peer arguments and revise their own arguments based on the discussion with others.
COLLABORATION **Team Work**	**Descriptive: 1** Students work together to solve problems, develop ideas, and achieve goals.	**Emerging: 2** The teacher plans experiences in which students are required to work in collaborative groups. The teacher provides guidance on how to work in collaborative groups. Students follow the duties of specific roles within collaborative groups.	**Developing: 3** The teacher plans various collaborative experiences in which students practice and apply the interpersonal skills valued in real-world work environments. The teacher guides students as they learn to work in a variety of teams and to share responsibility. The teacher selects a team leader to be in charge of the responsibilities.	**Accomplished: 4** The teacher plans various collaborative experiences including ones in which students form groups based on interests. The teacher develops students' interpersonal skills through simulated real-world work environments. Students engage in learning experiences where they have to work in a variety of teams, share responsibilities, value the opinions of others, and compromise.
COLLABORATION **Investigation Skills**	**Descriptive: 1** Students are taught and expected to plan and carry out investigations. Students are taught and expected to implement appropriate tools and methods.	**Emerging: 2** The teacher provides instruction on investigation skills. The teacher suggests approaches for students to use to answer questions or solve problems. The teacher selects technological tools and methods that are relevant to the investigation.	**Developing: 3** The teacher guides students through a systematic approach for investigations. The teacher includes students in conversations and decision-making regarding appropriate investigation tools.	**Accomplished: 4** The teacher plans activities in which students work independently or in collaborative groups to plan and implement investigations. Students determine the best investigation tools, resources, and methods.

Appendix C:

Santa Rosa School District Coach/Mentee Reflection Form:

For Mentees (STEAM Teachers/Innovators)

For STEAM Initiative

(2015-2016)

Santa Rosa STEAM Initiative Coach/Mentee Reflection Form: For MENTEES

The purpose of this scale is to evaluate the mentoring characteristics of _____ (please enter the name of your coach), with whom you have had a professional, coach/mentee relationship. Indicate the extent to which you agree or disagree with each statement listed below. Please highlight the number that corresponds to your response and return by email. Your responses will be kept confidential. Thank you.

0=Strongly Disagree (SD)
1=Disagree (D)
2=Slightly Disagree (SID)
3=Slightly Agree (SIA)
4=Agree (A)
5=Strongly Agree (SA)
6=Not Applicable (NA)

	SD	D	SID	SIA	A	SA	NA
1. My coach was accessible	0	1	2	3	4	5	6
2. My coach demonstrated professional integrity	0	1	2	3	4	5	6
3. My coach demonstrated content expertise in my area of need	0	1	2	3	4	5	6
4. My coach was approachable	0	1	2	3	4	5	6
5. My coach was supportive and encouraging	0	1	2	3	4	5	6
6. My coach provided constructive and useful critiques of my work	0	1	2	3	4	5	6
7. My coach motivated me to improve my work product	0	1	2	3	4	5	6
8. My coach was helpful in providing direction and guidance on professional issues (e.g., networking)	0	1	2	3	4	5	6
9. My coach answered my questions satisfactorily (e.g., timely response, clear, comprehensive)	0	1	2	3	4	5	6
10. My coach acknowledged my contributions appropriately (e.g., committee contributions, awards)	0	1	2	3	4	5	6
11. My coach suggested appropriate resources (e.g., experts, electronic contacts, source materials)	0	1	2	3	4	5	6
12. My coach challenged me to extend my abilities (e.g., risk taking, try innovative activities)	0	1	2	3	4	5	6

13. What kinds of activities/experiences do you feel were most beneficial or effective for the coach/mentee relationship?

14. What activities/experiences/resources do you feel need to be changed or reexamined relative to the Santa Rosa STEAM Coach/Mentee program?